PRACTICE OF RESEARCH METHOD

First-Person Methods

Toward an Empirical Phenomenology of Experience

Wolff-Michael Roth

SensePublishers

FIRST-PERSON METHODS

PRACTICE OF RESEARCH METHOD
Volume 3

Series Editor
Wolff-Michael Roth, *University of Victoria, Canada*

Scope
Research methods and research methodology are at the heart of the human endeavors that produce knowledge. Research methods and research methodology are central aspects of the distinction between folk knowledge and the disciplined way in which disciplinary forms of knowledge are produced. However, in the teaching of research methods and methodology, there traditionally has been an abyss between descriptions of how to do research, descriptions of research practices, and the actual lived research praxis.

The purpose of this series is to encourage the publication of books that take a very practical and pragmatic approach to research methods. For any action in research, there are potentially many different alternative ways of how to go about *enacting* it. Experienced practitioners bring to these decisions a sort of scientific *feel for the game* that allows them to do what they do all the while expressing expertise. To transmit such a feel for the game requires teaching methods that are more like those in high-level sports or the arts. Teaching occurs not through first principles and general precepts but by means of practical suggestions in actual cases. The teacher of method thereby looks more like a coach. This series aims at publishing contributions that teach methods much in the way a coach would tell an athlete what to do next. That is, the books in this series aim at *praxis of method*, that is, teaching the feel of the game of social science research.

First-Person Methods

Toward an Empirical Phenomenology of Experience

By

Wolff-Michael Roth
Griffith University, Mt. Gravatt, Queensland, Australia

SENSE PUBLISHERS
ROTTERDAM / BOSTON / TAIPEI

A C.I.P. record for this book is available from the Library of Congress.

ISBN 978-94-6091-829-2 (paperback)
ISBN 978-94-6091-830-8 (hardback)
ISBN 978-94-6091-831-5 (e-book)

Published by: Sense Publishers,
P.O. Box 21858, 3001 AW Rotterdam, The Netherlands
https://www.sensepublishers.com/

Printed on acid-free paper

Contents

Preface

For many years, I have recorded the unfolding of critical problem-solving events in my life, paying particular attention to avoiding after-the-fact rationalizations while describing and explaining events *as these were giving themselves to me*. The purpose of these recordings has been to capture – to the extent that this is possible – the first-time-through nature of problem solving and, particularly, the perceptual processes involved. An important instant in my career, when I produced an extended database of first-hand experiences, was a three-month fellowship at the *Hanse-Wissenschaftskolleg* / Hanse Institute for Advanced Study (Delmenhorst, Germany) that allowed me to record my own perceptual processes during 'experiments' and during the data analysis of tapes recorded in a tenth-grade physics classroom. As I analyzed the physics tapes, it became evident to me that students faced some fundamental questions, 'What is it that I am supposed to see?' and 'Do I see what I am supposed to see?' To better understand the students' experiences of learning about static electricity while producing unfamiliar events, I conducted several 'experiments' to reproduce the effect of perceiving something for the first time (i.e., something unfamiliar). Many of the experiences I recorded relate to events while riding my bicycle to and from the university, a 25-km trip, or during trips in the surrounding environment. I also designed an experiment, where I would take the same 25-km trip every day for 20 days, recording what I remembered and learned. During and after each daily bicycle trip into the countryside surrounding the *Institute*, I recorded perceptions, salient entities, and striking realizations that appeared into my mind, that is, anything that appeared to pertain to perceptual phenomena. At some point during this stay I realized that much of the research that I conduct from a third-person perspective – as a researcher interested in the learning of mathematics and science – was not possible without my intimate understanding of cognition that I developed through analyses based on a first-person perspective. Most recently, I used this approach to expose the centrality of *passibility* to human experience and knowledge and, in the course, exhibit the limits of the constructivist metaphor so prevalent in the study of learning. These limits can be seen precisely in those aspects of our lives where we clearly do not engage in

'construction' and 'interpretation' (Roth 2011). These analyses allowed me to show where constructivism is consistent with metaphysics, that is, with a philosophy that splits the human experience into two, one associated with the visceral body, the other with the mind.

In the history of psychology, first-person methods, such as introspection, have come into disrepute in favor of the experimental approach. Yet Francisco Varela, a well-known scholar writing on embodiment and ethics, was a neuroscientist who practiced first-person methods to generate data that the experimental methods had to be able to account of to be recognized as valid. Jean-Luc Nancy, one of the most eminent French philosophers of the 20th and early 21st centuries, also practices first-person methods. In fact, both produced gripping accounts of learning about the human existence that arose from the analyses of the organ transplantations they underwent, the latter of a heart, the former of a liver (Nancy 2000; Varela 2001). Both came to understand, while reflecting on this *other* organ, the ultimate otherness of the self as fundamental condition of human experience even without or prior to any organ transplant. This understanding of the inherently self-other nature of everything we know to be human runs counter to constructivist ideas, where, because the individual constructs its own mental structure, the mind could only find itself and therefore its self-identity.

First-person methods are interesting in the light of the fact that a little over a decade ago, the researchers who discovered the mirror neurons and their functions suggested in a *Science* publication (Rizzolatti et al. 1997) that the phenomenological philosopher Maurice Merleau-Ponty had correctly described, in the 1940s, the way the brain functions simply based on his first-person analysis of how humans perceive – for example, a cube as a series of two-dimensional perspectives that reveal themselves when the object that we know as a cube is rotated. Rather than having a representation of a cube somewhere in the mind – six square sides, eight corners, 12 edges, all 90° angles, and so on – we know a cube through its feel, its changing aspects when rotated, which always reveals something while hiding other things about the object denoted by the word 'cube'.[1] That is, in the cognitive neurosciences, there is acknowledgement of the value of having rigorous first-person accounts and explanations of experiences that can even serve as test beds for the most rigorous of sciences.

I started my research career as a physicist and then began to study cognition from a Piagetian and neo-Piagetian (short-term memory and information processing) point of view. But I have also been a teacher. What bugged me about all the research on cognition and cognitive development was that it never described the person's view: Descriptions of teaching had very little to do with the way in which I experienced teaching and descriptions of learning had very little to do with the way in which I experience learning. Yet in our lives, we do not do what we do because some outside force or intrinsic factor determines us: We do what we do because of reasons that we can explain to others. I organize my life according to

[1] The object actually is not a cube, as mathematicians understand it, because no real (material) object has precisely those properties that a geometer's 'cube' as. Historically, the idealization emerged from continual refinements of real objects until, at some point in Greek history, the idealizations arose as projected limit objects (Husserl 1939).

those things that are available to me in and to my consciousness. Yet much research on learning does not deal in consciousness: Theories, such as individual and social constructivism, are about the rational construction of mental structures rather than about consciousness. Because we can explain what we do to others, what I think and do inherently can be shared. Any action is not singularly mine but descriptively available to others. Thus, my research interests have included returning reason to the person, especially in the case where research attributed non-reason or misconceptions to him/her. For me, it therefore has become a challenge to study how the world really looks to different people and what we can learn from it about the underlying dimensions that allow them to have the different experiences that they have. For a scientist, asking different people about their experiences – as does phenomenography – constitutes a confounding of experience and the history of the people. What I want is to generate different forms of living and lived experience while everything else remains the same. Some time in my career as a researcher, I began to realize that I could do such research: when I did it from a first-person perspective. If I was to consciously bring about variations in the experiences of a particular situation, I could study the conditions under which I would have one versus another experience. Then I would find out more about what makes *me* have this or that experience. That is, I began to be very little interested in merely sampling descriptions of experiences. The analyses of such descriptions, precisely because they are descriptions, tell us more about language and less about the person *in flesh and blood* to whom something happens and who renders these happenings in some form of account.

For nearly two decades, I have used first-person methods as an integral part of my research. Even though not all of this work was directly reported in journals – many of which are very conservative and aligned with traditional psychology and its perspective on method – it has helped me in developing understandings that informed and supported my third-person methods that I tend to report. The purpose of this book is to assist readers in developing first-person methods as *rigorous* means that go far beyond what we can find in the (science, mathematics) educational literature under the name of 'phenomenology', which frequently is little more than a name for doing 'woe-me' studies. In this book, I articulate clear distinctions between investigating, for example, *discourse about emotion* and investigating emotions themselves.

This book is designed to assist researchers in the field of education to develop their competencies in first-person methods. I provide concrete examples, which the readers are invited to do on their own, and provide descriptions, precepts, and possible findings that guide them in their inquiries. Over the course of my career, I have developed many such examples, which are suited for the present purposes because they can easily be conducted without equipment (e.g., the stereoscopic glasses that some experiences require). Surrounding the inquiries, I provide commentaries, which assist readers to become reflexively aware of what they are doing and thereby come to bring into discourse the methods they have used. That is, I assist readers to experience methods first hand and then to become reflexively aware of the method *as* method.

I sometimes draw on French and German texts. In this case, all translations are mine; where available to me, I have checked my translation against the copyrighted

one that has been published in English. Throughout this book, I also draw on definitions; I consistently use the *Oxford English Dictionary* (2011) for this purpose. I also draw on the etymology of terms, for which I use the *Oxford English Dictionary*, *Le Grand Robert de la langue française* (Rey 2011), and the *Proto-Indo-European Etymological Dictionary* (DHNGU 2007).

Brisbane, Queensland
January 2012

Epigraph

We think we know perfectly well what 'seeing', 'hearing', 'sensing' are, because perception has for a long time provided us with colored or sonorous objects. When we try to analyze it, we transpose these objects into consciousness. We commit what psychologists call 'the experience error' [English in original], which means that we immediately suppose in our consciousness things that we know are in the things. We make perception out of the perceived. And since the perceived is obviously accessible only through perception, *we end up understanding neither one nor the other*. We are caught up in the world and we do not succeed in extricating ourselves from it to move to the consciousness of the world. (Merleau-Ponty 1945: 11, emphasis added)

We believed we knew what feeling, seeing, hearing are, and now these words raise problems. We are invited to go back to the very experiences that they signify to define them anew. (Ibid: 17)

1

Towards a Rigorous Praxis of First-Person Method

> The subjective is intrinsically open to intersubjective validation, if only we avail ourselves of a method and procedure for doing so. (Varela and Shear 1999: 2)
>
> We investigate conscious activity in so far as it perceives itself unfolding in an operative and immanent mode, at once habitual and pre-reflective. (Depraz et al. 2002: 1)

We are not determined by our contexts but rather make decisions based on reasons that are grounded in the way in which the world appears to us at any one moment. Whereas learning environment research tends to suggest that this or that aspect of the learning environment determines us, close analysis of interviews immediately provides us with evidence to the contrary. For example, in interviews with scientists we may find out that a particular individual became a marine biologist using as an explanation that her aunt had frequently taken her to the beach, where the biologist developed a liking for anything related to the ocean. In this case, the decision to become a scientist is grounded in the positive aspect that the social environment provided. But the converse is also the case: someone becomes a scientist *even though* the environment is adverse. Thus, in one of my studies, the scientist suggested that his parents wanted him to become a doctor, doing what they could to convince him. But he wanted to become a water scientist. In a biographical interview, he tells me how, despite and against his parents' wishes, he did become a scientist in his chosen field. Moreover, most of the researchers I know who do learning environment research and who use causal or correlational models to show the associations between learning environment and achievement measures do not understand themselves as determined by the social environment. That is, there is a considerable difference between theories such researchers use for modeling the learning of their participants and the theories they use to model their own learning.

My own take on the question of learning theories is that they need to be reflexive, describing our own learning as much as they are intended to describe the learning of people generally and students of all ages specifically. In this book I am interested in is the description of first-person methods that are employed to inquire

about knowing and learning by investigating our experiences, that is, in knowing and learning 'right here at home'. But the kind of first-person method I am striving for is not contended with the reification of everyday, frequently mythical descriptions, but rather investigates phenomena critically in such a manner that more general conditions of knowing and learning are exhibited. This will show that the senses, movements, and our bodies are foundational to the sense we make of the 'ten thousand' things in and of the world and ourselves. Sense is not a something that can be understood through the development of metaphysical concepts but precisely by investigating how the senses of the body constitute the body of sense. It is not that we 'make sense' or 'construct meaning' as if it were something we do with minds disconnected from everything else, but rather, it is through sensory movements that become independent of the specific situation that object permanence and thought come about. And it is precisely through active movements that the senses of the body *are affected* (note the passive construction) and learn about the world. This relationship between movement, activity, and being affected, though already recognized by the ancient Greek – 'Let us the first proceed on the assumption that to be acted upon or moves is identical with active operation' (Aristotle 1907: 417a)[1] – has been lost to modern learning theories. The latter theories solely focus on the agential aspect of human experience, completely neglecting both activity (as in activity theory) and the passive and pathic aspects of life. In fact, Aristotle uses the term *páskhein* (πάσχειν), the present active infinitive of the verb *páskho* (πάσχω), to suffer, undergo. This relationship of agency and passivity, though a central idea in recent philosophical developments, remains to be explored in the educational research literature. Such an exploration occurs, among other things, throughout this book. In fact, Aristotle recommends using the term 'suffering' ('impression') not in a single sense but as both changing and not changing the individual undergoing the experience. It is a dialectical framing, whereby learning derives from active and passive syntheses (Husserl 2001).

Studying learning from and through a first-person approach requires two steps: bracketing of experience – also referred to as *phenomenological reduction* or *epoché* – and expression and validation. In the following, I focus on *epoché*, the cornerstone of the phenomenological method, because expression and validation are little different from those in other sciences. *Epoché* (from Gr. *ἐποχή* [epoché], suspension of judgment) is a systematic method for suspending judgment, a process of stepping outside of our usual, mundane, and preconceived notions about how the world works to gain greater insights and better understandings. There are three stages to *epoché:* (a) an initial phase, during which experiences are systematically produced all the while suspending one's beliefs about them, (b) a conversion phase during which attention is changed from the content of experience to the process of experience, and (c) a phase of accepting experience (no-attention). The first stage requires an unprejudiced openness to the details of experience, whereas the second stage requires analysis of the processes that make experience possible in the first place. The third stage constitutes a systematic approach to a phenomenon that many scientists have experienced: after wrestling long and hard with difficult prob-

[1] This passage has also been translated in this manner: 'Let us the in the first place agree to regard in our discussion the words "passive impression", "movement", and "activity" as identical'.

lems, the solutions come to them while engaging in very different activities (sleeping, exercising).

Inherently, as the name suggests, first-person methods require the experiences of the researcher. But the point is to make the first-person approach a rigorous method, which means, that it and its results can be and are shared by others. The point is to study, from the perspective of conscious activity, the activity of consciousness itself. The range of relevant phenomena is vast including 'not only all the ordinary dimensions of human life (perception, motion, memory, imagination, speech, everyday social interactions), as well as cognitive events that can be precisely defined as tasks in laboratory experiments (for example, a protocol for visual attention), but also manifestations of mental life more fraught with meaning (dreaming, intense emotions, social tensions, altered states of consciousness)' (Depraz et al. 2002: 2). In this book, I exemplify the praxis of first-person method by investigating a range of the phenomena that the authors of the quotation list. The first-person approach is required because the phenomena to be studied remain in a condition of immanence: they exist pre-reflectively. The point of the first-person methods is to study consciousness before reflection is setting in, and is perceptually and discursively articulated by what is at hand. The purpose of the approach is to study consciousness and conscious experience at the point of their emergence. It is only through a first-person approach that we can seek out among all the 'acts of consciousness which remain in a condition of immanence' 'a form of pre-reflexivity on the basis of which consciousness is able to perceive its very self at work' and which generally goes 'unperceived' (ibid: 2).

The term 'first-person method' does not merely mean, therefore, using the first-person *accounts* of one person or several persons, whom the researcher interviews. In the latter case, the *account* of experience is all that the researcher has access to, which, inherently, is constrained by the language available to the interlocutors – plus some other forms of expressions used in communication such as gestures, prosody, or body movements. In such a method, all we have available is text, and there is nothing that will allow us to get out of text. This is quite evident from a now almost infamous text on texts: 'Yet if reading must not be content with doubling the text it cannot legitimately transgress the text toward something other than it, toward a referent (a reality that is metaphysical, historical, psychobiographical, etc.) or toward a signified outside the text whose content could take place, could have taken place outside of language, that is to say, in the sense that we give here to that word, outside of writing in general. That is why the methodological considerations that we risk applying here to an example are closely dependent on general propositions that we have elaborated above; as regards the absence of the referent or the transcendental signified. *There is no outside-text* [there is nothing outside of the text]' (Derrida 1967c: 227). Text only leads to a doubling of the text, layers texts upon texts; the interpretation of text can only take us back to more text, enfolding text upon itself – to leave nothing but the text outside of which there is nothing left.[2] It is a world of its own: making reference only to itself. What Derrida

[2] The experience of texts layering themselves upon texts is actually a very common experience. Thus, in one of my research projects, a teacher asks a student during mathematics class, 'what did we say that group was about' while pointing to a group of cubes; and the student responds, after a period of silence, 'what do you mean like'. The teacher utters in turn, 'What was the . . . what did we put for the name of

points out is that anything that appears as thing, anything that is articulated as differing from other things in nature, is jointed to (verbal) articulation. Anything that appears as some thing already has this characteristic of a text: it is a means of making present again some other presence. From the very fact that we make use of a *re*presentation – word, gesture, or diagram – we can conclude that the thing for which the representation stands is *absent*. For reasons that I show in chapter 8, as one instance of realizing first-person methods, 'the absolute presence, Nature, that which words like "real mother" etc. name, have always already escaped, have never existed; that what opens sense and language is this writing as the disappearance of natural presence' (ibid: 228).

When I use the term 'experience', I am writing about more than can be put into words – because much of our lives extends far beyond what we do or even can describe in words. When I say, 'My hand hurts', then nothing at all is communicated about the current carnal state in which I am, nothing about the intensity, nothing about the more or less extended limitations that this pain places on my action. Before I can say that I am in pain I experience pain at a pre-reflexive level, which I can do without having to conceptualize this experience. This conceptualization, consciousness always already is too late to capture the onset of what is happening to me before I become conscious of experiencing pain. Thus, when using the term 'experience', I 'mean the lived, *first-hand* acquaintance with, and account of, the entire span of our minds and actions, with the emphasis not on the context of the action but on the immediate and embodied, and thus inextricably personal, nature of the content of action. Experience is always that which a *singular* subject is subjected to *at any given time and place*, that to whish s/he has access "in the first person"' (Depraz et al. 2002: 2). The interest of this kind of research is not only in that which a singular subject is subjected to but, more precisely, in the singular dimensions of the experience that only the first-person perspective can reveal. Thus, we may speak of 'lived experience' in the first-person perspective only when the lived 'correspond[s] to an authentic and intimate contact of the subject with its own experience' (Depraz 2009: 4). It is intended to understand the dimensions of experience that are more archaic, more carnal than what language can articulate. It is that which I feel rather than that which I can describe as feeling. What the first-person researcher aims at is producing and drawing on the pathic aspect of experience that have not yet been interpreted by language; these are experiences in the way they appear at the pre-noetic level, that is, the form of experience that precedes intellectual activity, intellectual intuition, knowledge, and cognitive engagement.

First-person methods have a lot of potential for identifying the 'commonalities and isomorphisms between the practices found in different domains for different reasons' (Depraz et al. 2002: 3). In fact, there is a 'need for first-person data in the cognitive neurosciences, the need for reduction as a concrete and embodied *praxis* in phenomenology, the need for introspection in cognitive psychology, the need for

---

the group?' In this instance, she uses a different way of saying the same, being instigated to do so by the student's question what she has meant. Only another, different way of saying the same can be done, which therefore merely shifts the signifier without attaining some 'meaning'. The student could ask 'what do you mean?' repeatedly, and all that we would observe is the production of further sentences on the part of the teacher – until the 'game' eventually would be ended.

various know-hows in a wide range of psychotherapies, and the needs of various spiritual practices which highlight the "examination of consciousness" and the "practice of effortless effort"' (ibid: 3). First-person methods concerned with the description of the 'authentic and intimate contact of the subject with its own experience' may be of interest to neuroscientists attempting to correlate brain imaging techniques with the experience of the person, to philosophers accessing primary experiences rather than texts, to psychologists and educators concerned with understanding the subjective contents of mind in the course of learning, to therapists and educators interested in assisting others in dealing with their ailments or in arriving at sound decision making about their lives, and to any one interested in spiritual experiences.

The kinds of approaches I exhibit in this book are aimed at bridging the dichotomous framing of the inevitable dialectical tension of the ideal and the material dimensions of human existence. Those who are firmly grounded in the ideal and idealism – e.g., in constructivist approaches characteristic of I. Kant, J. Piaget, or more recent, radical and social realizations thereof; and ill-conceived and misconceived forms of 'post-modernism' or 'post-structuralism' – will claim that there is nothing we can add to experience that lies outside of text (constructions), that is, that all experience is always already framed by the particular discourses (ideologies) that we have available. The other extreme formulation would be that it is possible to have experiences that are raw, pure, and inexpressible. The first-person method explicitly acknowledges – in its approach that brings into contact the ideal (discursive, ideological) and the material (embodied, carnal) dimensions of life – a productive tension. Accordingly, anything we can articulate is a manifestation of life, which itself remains inaccessible (Marion 2010). Just as light *in itself* is inaccessible to physicists but manifests (reveals) itself *as wave* or *as particle*, we may study forms of experience that emerge from life itself even though this life in itself is ineffable (e.g., Henry 2000). Just as physicists have found ways of 'talking about' light that allow them to anticipate how light will manifest itself and under which conditions it will manifest itself in one or another way, those using first-person methods are concerned with finding descriptions that allow them to anticipate how life (consciousness) will manifest itself under given conditions.[3] The point is not to find out how life or cognition *really is* but to arrive at descriptions of the processes that bring the phenomena of interest about. That is, there is an interest in the process of *phenomenalization*, that is, the process by means of which we experience this or that phenomenon. These descriptions are more general than the specific manifestations, because they allow us to anticipate what will be experienced; this exceeds research efforts that merely constitute catalogues of the experiences observed.

[3] The Schrödinger formalism or Heisenberg matrix mechanics approach provide mathematical descriptions that predict the outcome of experiments (manifestations). Thus, for example, a light ray that falls through a narrow aperture will give rise to interference patterns, a wave phenomenon, but the interference patterns (in the old days) are recorded by means of photographic plates the blackening of which requires understanding light as a particulate phenomenon. Similarly, light entering a camera is bent in the lenses, a wave phenomenon, but the operation of the light meter inside the camera is a particulate phenomenon.

In the remainder of this book, I exemplify and comment on a praxis of first-person methods with respect to (a) sensing and sense, including vision and seeing, tact and touching, hearing and listening, and tasting and smelling (Part I); (b) mundane experiences, including memory, the process by means of which something becomes significant, crises and suffering as sources of learning, and the relation of thinking and speaking as interdependent processes (Part II); and (c) specific phenomena of ekstatic (i.e., consciously salient) knowing and learning, including problem solving, the relationship of work, primary experience and accounts, and reading (Part III). I conclude with some commentaries on publishing the results of research using first-person methods (Part IV).

I

ON SENSING AND SENSE

> [S]ensation consists in being moved and acted upon, for it is held to be a species of qualitative change. (Aristotle 1907: 416b)
>
> Räumlichkeit mag die Projektion der Ausdehnung des psychischen Apparats sein. Keine andere Ableitung wahrscheinlich. Anstatt Kants a priori Bedingungen unseres psychischen Apparats. Psyche ist ausgedehnt: weiß nichts davon.[1] (Freud 1999: 152)

Whereas sense perception is theorized in our culture in terms of action words, Aristotle already notes the passive dimensions that come with learning about the world through the senses. He characterizes it as a process in which the perceiver is moved and impressed. We can hear this latter adjective in a double way, both as a physical process, whereby the person is qualitatively changed – especially salient when light is too strong, a sound is too light, an odor too strong – and when the person is affectively changed. In this context it is further noteworthy that an interesting coincidence – one researchers seldom point out and highlight – is that between the term we use to denote our interaction with the world, sense and the senses, and what we make of it: sense. That is, most researchers do not attend to the fact that without the living body that can be impressed, there would be no mind, no world in the way we tend to speak of, no interpretation, and no thought. At the very end of his life, Freud uttered his suspicion that the psyche is not something ephemeral, not something in the mind, not the untouchable soul, but something (physically) extended[2]. Psyche is extended, he says, but it does not know it. 'Psyche is *body*, and that is precisely what escapes it' (Nancy 2006: 22). Even more interestingly, it is precisely this breakaway, this escapement that constitutes the psyche. 'The "unconscious" is the extendedness of Psyche, and that, which

[1] Translation: 'Spatiality may be the projection of the extension of the psychic apparatus. No other derivation possible. Instead of Kant's a priori conditions of our psychic apparatus. Psyche is spread out, does not know thereof'.

[2] Descartes calls material things 'res extensa', extended things, and contrasts them with 'res cogitans', thinking things.

after Lacan nobody calls *subject*, is the singularity of a local coloring or of carnation' (ibid: 22). The philosopher concludes from such considerations this: '*The body is the archi-tectonic of sense*' (ibid: 25, underline added). In other words, the *body* of sense is the sense of the *body*.[3] This is to say that it is not that mind finds itself a body, as it may appear from the discourses on the 'embodied mind', or that mind and the sense it makes somehow get into the body. Rather, it is precisely the senses of the primary, self-affecting pre-reflective body that constitute the body of sense. Without the material senses, there would be no ideality that we call sense. Sense is irremediably connected with and indissociable from our living (primary) bodies with senses.

Materiality takes us to bodies and the body, their weight and weightiness, and ultimately to the sense of touch, tact, and, therefore, to contact, contiguity, contingency, and contamination. The body, corpus, is of tactile nature leading us to a 'Tactile corpus: skimming, grazing, pressing, pushing in, squeezing, smoothing, scratching, rubbing, stroking, palpating, groping, kneading, massaging, embracing, hugging, striking, pinching, biting, sucking, wetting, holding, letting go, licking, jerking, looking, listening, smelling, tasting, avoiding, kissing, cradling, swinging, carrying, weighing . . .' (Nancy 2006: 82). Even those senses that are not immediately associated with the senses of touch, hearing, smelling, and tasting, are listed here together with those other experiences that directly arise from contact and tact.

When we talk and write about *lived* experience and take recourse to descriptions that people provide of certain situations, then we already draw on a system of expression that is decidedly ideal and ideological. When we study descriptions, we do not investigate how the senses constitute what we become aware of and then describe them in this or that manner but we precisely investigate the structure of the possibilities that a language provides for accounting of experience. When we ask the students in a physics lecture what they see in a teacher demonstration and some answer 'I see motion' and others say 'I've seen nothing move' then we yield descriptions. We can analyze such sentences as much as we want: all we find out are properties and possibilities that come with the English language – or the properties of the language in which the discussion was held. We may say that the students differently 'interpreted' the focal display. But this does not take us further, as I do not 'interpret' what I see when I look out of my office window, the plum tree and the roof of the chicken coop – I just see a plum tree and a chicken coop roof. That is, what such research does not give us are the underlying conditions that lead to this or that pre-noetic perception *given to me* in the first place, that is, *before* I begin to reflect and realize that what I have become aware of is a plum tree or the roof of a chicken coop.

To get us out of the quagmire, we may have to by-pass language and access the senses of the body, which, following Nancy, *constitute* the body of sense rather than the other way around. Much of the effort in 20th-century philosophy has been devoted, actually, to the problematic of the relation between experiences and accounts thereof. Thus, Edmund Husserl showed that the intentional consciousness

[3] The body here needs to be understood as the original body rather than as the transcendental body, that is, our body in the way in which we are aware of it. A third kind of body is the material one, the one Descartes calls 'res extensa' and that we theorize in and using the sciences.

of sound is tied to retention and to the capacity to make it present again, *re*present it. Martin Heidegger subsequently showed in a number of analyses of early, pre-Socratic Greek thought the emergence of an approach that takes the representations (*das Seiende*) for the real thing that has given rise to them: Being (*das Sein*). We actually do know of experiences where language does not intervene, when we are completely absorbed in something or in experiences that nowadays are denoted by the expressions of 'being in the flow', 'being in the groove'. In these instances, we do not make this presence present (again), that is, we do not represent it, which is accompanied by some striking consequences. For example, we lose any notion of time: *precisely* because we do not *re*present *it* or the situation. In chapter 8, I elaborate on methods for investigating such phenomena.

The methods and results of psychological and phenomenological research on perception described are quite different. Many current psychological models take an intermediate level between neuroscientific and phenomenological inquiry. However, there are suggestions (including those by philosophers, physicists, and mathematicians) that such an intermediate level for explaining perception is not necessary. A fruitful approach lies in bridging directly between neuroscientific and phenomenological studies of human experience. Conducting research through a first-person perspective constitutes a useful way of investigating phenomena in their own right but becomes especially powerful as an objective constraint on the models that third-person approaches develop. Thus, if a third-person approach is inadequate for describing what I experience, it has to be changed. First-person methods therefore provide constraints on what are suitable and useful third-person descriptions.

In the four chapters that constitute this Part I, I focus on how we might investigate sense experiences – seeing, touching, tasting, smelling, and hearing – and what we get from such investigations. The variation of sense experiences is easy to set up through particular experimental conditions. Throughout these chapters, I invite my readers to engage in the experiments as an integral part of their reading. It is in the doing of the experiments that the sense of the writing becomes possible: It is an experimental way of allowing sense to emerge from the senses of the body. This experimental method is much more difficult and perhaps prohibitive when we get to such phenomena as (identity) crises or (physical, emotional) suffering. Even everyday phenomena, such as forgetting or falling asleep, may be more difficult to set up precisely because *intending* these keeps them from occurring. The harder I might try to fall asleep by thinking about it, the less I am able to fall asleep; the harder I try to forget something, the longer it stays actively with me. It is the trying, my focusing on falling asleep or forgetting as an object of consciousness, that keeps this object present in my consciousness.

Some readers might ask why we might be interested in investigating basic experiences, such as the visual perception of basic shapes, basic three-dimensional figures, simple objects or the processes by means of which we learn through touch, hearing, taste, or smell. For me, it has become quite evident that I needed to better understand these basic processes, for example, when I attempted to understand what perception is like when (a) second-grade children begin to learn about the geometry of three-dimensional objects, (b) even professors near retirement do not see first-year university graphs in the way that is required for providing the correct

answers, (c) someone attempts to prove that the interior angles of a triangle on a Euclidean plane add up to 180°, or (d) we try to understand why touch may be a better paradigm for understanding cognition than visual perception. When I wrestled with these issues, I drew on first-person inquiries to be able to hold in check any preconceived common or scientific sense that we might have developed with respect to the phenomenon. The first-person method allows me to break with the normal perception and enact a process of radical doubt, which led me to a deeper and more selective understanding than what the literature appears to be telling me.

There is another central finding about knowing and learning that comes from an exploration of the senses: whereas 'to construct [knowledge, meaning, sense]' is a transitive verb, the verbs associated with the senses also have intransitive and passive uses that the verb 'to construct' excludes. First, verbs such as 'to smell' exist in transitive (e.g., 'I smell a rose') and intransitive form (e.g., 'it smells'), which points us to the deliberative and non-deliberative acts of olfactory experience; and being affected by smell may occur both when we actively seek to smell something and when we are subjected to some smell (e.g., the odors of other people, a pulp mill). Moreover, the formulation 'it smells' points to the object as the origin of our sensation rather than to the mind that somehow 'constructs' the smell. Second, whereas others may construct me as a 'science nerd', involving the actions of others, the investigation of the senses shows that I am affected by my own actions, that is, that there are phenomena I undergo and am subject and subjected to. This is especially apparent in those situations where we attempt to sense something without sufficient caution: we burn or cut our fingers while touching something, we burn the inside of our nostrils when getting too close to a chemical, or we burn our taste buds when trying to taste something we are currently cooking. These basic sense experiences are foundational to learning and knowing. The investigation of the senses, therefore, also puts into relief – and seriously questions – the reigning epistemological paradigm not only in education but also in much of the social sciences: constructivism. However, such recent phenomena as aromatherapy should alert us to the fact that there are emotional and cognitive effects brought about by experiences based on very different sensory modalities, which work precisely because they by-pass cognitive, deliberate interpretation. Thus, one study that I found in the Web of Science reports that dart throwers improved performance (accuracy and consistency) after being exposed to peppermint scents as compared to a control condition and lavender scent. However, both peppermint and lavender scents significantly decreased anxiety levels. Other studies on aromatherapy for people with learning disabilities showed increased capacities to concentrate on cognitive tasks. For a good understanding of cognition, therefore, we have to ask questions including 'Why might there be a connection between smell and cognition?' and 'How might this connection operate?'

2

On Vision and Seeing

Seeing is believing.

Neuroscientists describe vision in terms of the processes that unfold when light falls onto the retina. Between the retina and the visual cortex, there are many transformations that the original (retinal) stimulus undergoes. In humans (as in all mammalian species), there are the photoreceptors in the retina, ganglion cells, ganglion cell axons (optic nerve), and synaptic transitions. At higher levels following the optical tract, neural activation is set in motion by the original stimulus that passes through the superior colliculus, lateral geniculate nucleus, and optic radiations before reaching the visual cortex. However, vision does not only involve activation that travels from the retina to the visual cortex ('afferent' movement); rather, activation also travels in the opposite way ('efferent' movement) so that higher-level processes directly affect the photoreceptors.

Everyday understanding of visual perception and its psychological equivalent take the visual cortex to be something like a panoramic internal screen from which the conscious (Cartesian) 'I' extracts or constructs the patterns of a given world. That is, the visual cortex is taken as the 'mirror of nature' that underlies some epistemologies. Such a view is implemented in almost all current cognitive models of learning from visual contact with the world. For example, the cells in the visual areas are treated as feature detectors that extract from a visual array ('raw primal sketch') propositions like 'there is an edge with coordinates (112,39), orientation 128°, contrast 82, and width 4' (Anderson 1985: 31). More recently, researchers also use artificial neural networks to perform feature extraction and use gestalt principles to scan a visual buffer for structure and form. But these newer models still presuppose the existence of features that are immediately given to the conscious mind. From this perspective, then, students extract the patterns from the visual spectacles presented to them (e.g., in a demonstration) that create some patterns on their retinas. If students do not see what they are supposed to see, the problems are attributed to deficits in their minds.

Recent research in the neurosciences puts such conceptualizations into relief, by and large questioning the existence of the Cartesian observer who extracts patterns that can be represented in propositional terms. Thus, the very process of perception of objects appears to change with experience, though the role of experience in human perception has yet to be fully understood. There is mounting neuroscientific evidence that much of our perceptual apparatus is affected by learning. Seeing is hypothesized to be a way of learning how the world *is* from the individual's immediate apprehension of how the world *looks*. There is increasing evidence that perceptual and motor systems are highly correlated; this evidence supports the hypothesis that the invariant structures of reality unfold in and through active exploration of appearances. In this, neuroscientific research is consistent with views (and explicitly linked to previously developed insights) that have been analytically developed by phenomenological philosophers such as the late Ludwig Wittgenstein and Maurice Merleau-Ponty.

Phenomenological philosophers point out that we always perceive from a first-person perspective: from the inside so to speak. Research in the cognitive neurosciences, too, show that perception is not merely embedded in an abstract world full of constraints; perception actively contributes to the forthcoming of a world through the movements of the person. This world, for the individual, is not the world measured and explained by scientists. Rather, perception is situated so that '[w]hat the world *is* to the organism depends on what the organism is doing and might do next' (Clancey 1997: 257), and, most importantly, what it has done in the past. At the same time, we do not have to reconstruct objects from first principles based on visible appearance; our knowledgeable interactions with things are facilitated by their functionally significant perceptual properties or gestalts. How this works is largely unknown – but it would be a mistake to assume a simple context-independent mapping between perceptual features of the world and the things we perceive.

One of the most important findings of phenomenological inquiry is the vagueness, blurredness, indeterminacy, and indistinctness of the visual field: there are no such things as visual images of precisely 24 or 25 pencil marks, 100-gons and circles, or gaggles of 100 geese (Wittgenstein 1975). This vagueness, blurredness, indeterminacy, and indistinctness of the perceptual field, rather than being a problem, has to be taken as an irreducible and a priori feature of perception; it has to be taken as a positive phenomenon. This phenomenon has been the focus of research in phenomenological studies of perception: building on Gestalt psychological principles, this research articulates perception in terms of the dialectical unit of figure and ground. The simplest perceptual entity is not a sensation but a relatively precise figure floating over a more indistinct ground. The figure-ground structure of perceptual experience is an invariant of perception, known to be such prior to phenomenological reflection.

We live in worlds that come forth from our actions; we learn as a function of the events and our encounters with the objects in these worlds rather than in scientific, third-person worlds. To understand learning as it arises from individual, subjective experience, we need systematic phenomenological inquiry; the results of such inquiries can then be correlated with those from neuroscientific research. At present, however, scientific (psychological) approaches to learning (science, mathematics)

almost always take third-person perspectives. One of the reasons for the reluctance to adopt a first-person perspective lies in the fact that phenomenological inquiry is charged with being 'introspective', 'fluffy stuff', and 'extremely subjective'. This, however, is an inappropriate view. The real aim of classical phenomenological, first-person inquiry is the articulation of experience in terms of concrete *universals*, which manifest themselves in the particularities of all members *without* exception. First-person (subject-centered) approaches therefore develop (psychological) concepts that are concretely applicable to every single human being.

In the following section, I provide a first example. Readers are invited to experience the structure of the method first hand. Stop your reading at the places indicated and engage in the inquiry described prior to reading on. In the second part of this chapter, I provide a description of the method designed to inquire into what it might mean to learn something not already known. While staying at the *Hanse Institute for Advanced Sciences* (as a fellow in the cognitive division), I conducted studies of physics students in the process of learning about electricity. I wanted to better understand their learning processes, and therefore engaged in first-person investigations of perception.

Fundamentals of Visual Perception

One of my own first experiments of this kind involved a classical image used in Gestalt psychology (Fig. 2.1).[1] What do you see? Are there different things you can see? If you can see several things, what do you have to do to go from seeing one thing to seeing the other thing? That is, what are the conditions for seeing one thing and how do the conditions have to be changed to see another? Attempt to find answers to these questions by engaging with the figure prior to reading on.

In the introduction to this book (chapter 1) I note that *epoché* has an initial phase during which experiences are systematically produced. In the preceding paragraph, I invite the reader to varying the perceptual experience without requiring any systematicity. During this phase, first-person researchers suspend their beliefs about the entity, here the drawing denoted by the term 'Maltese cross'.[2] The intent of this phase is to bring about a conversion from the content to the process of seeing. That is, during this conversion, the attention is changed from the content of experience – the *what* of seeing – to the process of experience – the *how* of experience. During this phase, there is no judgment. We accept all experience without

[1] I find it useful to regenerate such images on the computer and then look at them against a completely white background. Working with a graphical software package, such as Adobe Illustrator, I have conducted experiments, such as the one described here, on the airplane. The advantage of using a software package is that one can *systematically* vary or change the image under investigation.

[2] It is actually possible to see many other things than the Maltese cross. It is possible to see the figure as a square circus tent from above, a cross of the German Order, a cross of the Teutonic Order, a simile of the cross of St. Benedict. We limit our present inquiry to the Maltese cross, even though one might design experiments concerning variations of the cross and the conditions to perceive it as an instance of one or the other crosses that might be perceived.

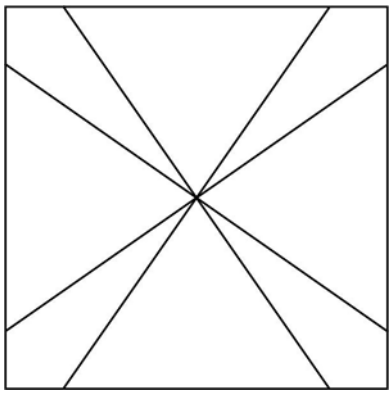


Fig. 2.1 This figure, which is known as the Maltese cross, has been used in Gestalt psychological research concerning perception.

particularly paying attention to or preference for one or the other. That is, this first stage of the first-person inquiry requires an unprejudiced openness to the details of experience. Up to this point, in your first attempt, you may have simply noted the two crosses that can be seen: although there is but one material configuration – the ink dots on the white page that make Fig. 2.1 – there are at least two figures that can be seen easily against (or as floating over) a diffuse ground. (Go to the appendix A1, p. 249, if you require some assistance with identifying the two crosses I am referring to here.) Gestalt theorists have explained the phenomenon in terms of the law of proximity, according to which items that are closer together in physical space are grouped preferentially. In the present situation, the cross that is oriented along the diagonals tends to be perceived preferentially – that is, as an average across persons – rather than the upright, broad-leafed Maltese cross. Can you see the second cross stand out against everything else as ground?

There are actually two issues that we have to research. First, we see a cross. That is, we see a figure that has a particular internal structure. In the case of the broad-leafed Maltese cross we see four leaves along the vertical and horizontal axes. Second, we see a cross against some ground. How is it that we see the cross *as* cross? And how is it that we see this figure (cross) in the first place? That is, there are two aspects to our perception, one leading to the perception of the *internal* structure, the other one leading to perception of the overall structure to everything else *outside* of it.

With some practice, you notice the upright, *broad*-leafed Maltese cross as a figure with the remainder of the square as diffuse ground. Or, if this was the cross that first stood out in your perception, practice until you can see the other, *narrow*-leafed cross to stand out. You want to arrive at a point that you can, at will, see one or the other. Remember, our goal is to vary this experience so that we can investigate the conditions for seeing one or the other. We are not interested in the fact that we do see the broad-leafed or the narrow-leafed Maltese cross. We are about to investigate what the conditions are for seeing one or the other.

At this point you should be at ease with seeing one or the other cross. Do not continue until you can switch back and forth between the two images.

Before reading on, think about this. You may have noticed already that you always see a *figure*; but you do not attend to the ground. That is, when the broad-leafed Maltese cross stands out, this is what you see against everything else, which is rather indeterminate. You do not see the broad-leafed cross against a narrow-leafed cross. This is so because there is always something constituting a figure; but the figure always is against a ground. You do not attend to the ground, which is precisely why the ground is ground. If you attend to that aspect of the display, *it* will come to be the figure against everything else as ground. Figure and ground constitute each other. I therefore write the pair dialectically: figure | ground. This notation is meant to make salient that each term depends on the other. We cannot have figure without ground, and ground is ground precisely because it is not figure. For any particular something that is figure, everything else is the ground. In fact, there are not two phenomena that work together, one figure, the other one ground. There is one diastatic[3] figure | ground phenomenon. We see below the work that the eyes do to accomplish a figure standing against the ground. Once we understand this work from our inquiry, we also know why figure | ground is one phenomenon rather than a combination of two phenomena.

Now we move to the next stage in our exploration. Remember, this kind of research is not about having *this* experience. It is about exploring *the conditions* of having this experience as compared to other possible experiences. We want to know more about the conditions for seeing one rather than the other cross. This means that we have to systematically move between the two figures so that we can explore the process that brings about the change in figuration. Gaze at the image and make it switch back and forth between the two configurations. You may look at one of the figures, let us say a broad-leafed Maltese cross, and then close the eyes. Open the eyes again but with the intent to see the other cross. Practice so that you can produce a switch between the two as fast as you can flicker with the eyes. Once you can easily switch between the two figure | ground configurations, we attempt to understand *what* makes you see the broad-leafed cross in one instance and the narrow-leafed cross in the other? What are you doing without being conscious thereof that brings about the switch between the two ways of perceiving?

Your inquiry will show that the figure | ground reversal, which here is a figure to ground and ground to figure transformation, is associated with a shift of your focal point. If you have not yet seen it on your own then return to the image. Place your perceptual focus on a point about one-third of the distance between the center and the outside border and in the center of the vertical leaf. You will see the cross to which this leaf belongs: the broad-leafed Maltese cross. Now move the focus to a point near the diagonal axis, again about one-third of the distance between the center and the corner of the square. You notice that the narrow-leafed cross comes to be the figure.[4] Move back to the first focal point; then return to the second. You notice the switch between the two crosses. That is, moving back and forth between

[3] *Diastasis* means separation. The phenomenon therefore is one shifted with respect to itself: it is non-self-identical.

[4] If this does not happen right away, then the problem is of the kind that we explore below (chapter 12): the separation of a description of an action, a recipe, and the action itself. Once you have produced the intended action, the description will be obvious.

the two focal points switches between the two figures and, equivalently, switches between the two grounds. In fact, what is figure in one situation is ground in the other. We now know more about what makes something a figure and everything else the ground; and we can use this knowledge intentionally to reverse figure and ground. This figure | ground structure is in fact an invariant of perceptual experience, whereby the ground becomes increasingly indeterminate whereas the figure comes to be increasingly determinate (Thompson et al. 1999).

We therefore have arrived at a first result of our inquiry. *We can intentionally move from one figure to another by choosing a particular focal point.* Now, we have to ask immediately: Is it the focal point that determines what we see? How is it then that we see what I loosely call internal and external structure? What would happen if we were not moving the eyes at all?

It is not easy to get the eyes to stop moving so that the figure we look at falls onto the same place on the retina for an extended period of time. Psychologists actually have devices for fixing the image onto the retina. With such a device it would be easy to study what happens if the effects of eye movement on perception are eliminated. But, with some practice, we can get to that point.[5] I find it easiest to do this experiment with one eye only. Return to the Maltese cross (Fig. 2.1) and focus on the intersection. Try keeping the focus without letting the eye slip. You may soon notice that at first some of the lines begin to turn into a light grey. With more practice, you will experience the entire visual field turning into a continuous grey. Under strictly controlled experimental conditions, this extinguishing of the figure occurs within 1–3 seconds (Yarbus 1967). Because it will take a while to get to that point, you may want to read on and take my description on faith for the moment and return to practice the experiment at some other time.

We therefore have arrived at a second result of our inquiry. *When there is no movement of the image on the retina, such as when the eye is focused onto the same spot, then the image will disappear and we see nothing but a constant grey*.

We can now stop and move to the second stage of epoché, which may lead us to results or hypotheses that can be investigated by means of further experimentation. In this second stage of the process involves, as I point out in the introduction, a systematic analysis of the results obtained during the first stage. I have already begun this second phase by stating the first and second results of the experimental phase: (a) what I see as figure depends on the focal point and (b) no eye movement, or rather, no movement of the retinal image implies no figure at all. We can generate some further results or hypotheses if we think about the implications of these two results.

The first result shows that the movement of the eye to a new focal point produces a shift in the figure | ground configuration. I know that in each of these posi-

[5] The effect was first described already in 1804 by Ignaz Paul Vital Troxler and known under the name of Troxler's effect or Troxler's fading. Nowadays, various means are used to achieve it. The image can be projected by means of a contact lens onto the retina, where it will stay even if the eye moves. The object movement also may be adjusted to the eye movement so that the former cancels the latter and the image remains stable. Finally, the image may be projected via flash, which creates an afterimage. As readers will have experienced, any after image will fade within a few seconds. *Eye Movements and Vision* (Yarbus, 1967) provides a good introduction to the general topic of perception.

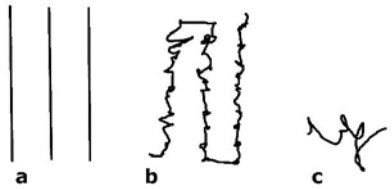


Fig. 2.2 If a person is asked, in an eye tracking experiment, to follow the three straight lines (a), the eye does not move straight, as the person might intend to do, but involves small involuntary and unconscious sideward saccadic movements (b). When the person is asked to count the same lines, we see slight movements following the line from down to upward, sideward movements to change to another line, and sideward saccades (c). (See Yarbus, 1967, for such experiments.)

tions, vision would disappear if the image were to be fixed on the retina. Thus, movement is required to see anything at all. But what is it that allows me to see a narrow-leafed rather than a broad-leafed Maltese cross? There has to be something that distinguishes the two perceptions. Or, to sharpen the point I am driving at: What is it that allows us to see a cross rather than a line or a triangle? It is not a simple apperception of the thing – e.g., it has been suggested that 'we can perceive a whole geometric figure . . . we can perceive a whole line as simultaneous' (Piaget 1970: 61) – but rather, even the simplest thing such as a line is the result of eye movement that distinguishes a straight line from a curve. The eye movement in each case is not the same. Thus, we are led to the realization that two movements are required, one that produces the figure | ground distinction and the other that produces the particulars of the figure as this rather than another figure. Or rather, we could state this as a hypothesis and then engage in subsequent investigations to find out about the eye movements that allow us to view a straight line rather than a curved one, a rectangle or square rather than a triangle or circle. At this point, I do not intend pursuing this line of work but simply refer readers to some experiments. Thus, recent physiological studies show that the intensity of the figure | ground distinction is a function of saccades, that is, the slight, unconscious eye movements that shift the image on the retina (Supèr 2006). In the book I refer to above, readers can see what the eye does when there is a more complex displays, for example, one involving a square, a triangle, a circle and two sets of straight lines, one oriented vertically the other one horizontally (Yarbus 1967). One observes that even when the eye follows a line – these are the movements that produce the line as line – there are saccadic sideward movements – these stabilize the line against the ground. As a result, if there is an array of three vertical lines (Fig. 2.2a), the instruction to follow the lines will lead to a corresponding recorded eye movement (Fig. 2.2b); and the instruction to count the number of straight lines will also reproduce the lines and the sideward movement (Fig. 2.2c).

There are some tremendous implications that derive from this investigation for my understanding of cognition. *If visual perception requires the movement of my auto-sensing body, and if it requires sensing, then whatever I see as an object independent of myself* actually *involves my flesh. What appears to me in my percep-*

tion appears as it does because of the specificity of my, specifically human *movements and sensibility to be affected. The world and I are intertwined!*

In this section, I engage the reader in an exploration of visual perception. At this point, we have arrived at some basic understanding of what happens when we see something. In doing what I ask you to do, you actually did the experiment on your own. This comes with two advantages, one with respect to method the other with respect to the findings. In both instances, we can learn something more than we have done so far. By doing the experiment, you have *lived* rather than *read about* the method. You have enacted the method, and therefore practiced it. You have, in and through your investigation, done what you need to do when you engage in a first-person inquiry. In this way, method is not just something you read about in a book but is something that you actually do. This is what I had in mind when I created this series for Sense Publishers, concerned as it is with the *praxis* of research method rather than some *account* of research method. That is, once you will have done such inquiries sufficiently often, you will be *competent in* the practice rather than just *knowing about* it. The latter might involve being able to describe and talk about it, as sports journalists comment on professional athletes and games, which they can do without actually being professional athletes themselves – though, in a very strong sense, they do not know with their bodies the phenomenon (i.e., *what*) that they are talking about. Having done first-person inquiry gives you a real understanding, one that is engrained in your doing, in your dispositions, rather than one that you have to think hard about to make it work.

The other aspect of this way of working is that some result that natural scientists already have researched or will be researching in the future, are known to you in and through your personal, pre-reflexive experience. In the present case, I refer to the earliest accounts of visual experiments in the early 19th century, and subsequent work published in the 1960s. Other work – such as the findings of the relation between figure | ground strength and the saccadic movements – however, has been published only recently. In this same vein, a study published 1997 in the flagship journal of the natural sciences, *Science*, about the way in which we perceive spatial objects, suggests that their results had been anticipated by the philosopher Maurice Merleau-Ponty (1945) in his book about the phenomenology of perception. For me, personally, coming to such results that are confirmed by third-person research is of utter gratification, as it provides me with the sense of a true understanding, something that has become apparent to me in and through my lived experience, rather than something that I know and master symbolically. Such symbolic mastery is not mastery of the real thing. It is superficial, in a way. We do not feel it. Experience, on the other hand, is essentially pathic. Because I have experienced what happens in perception, I can also experience *sym*pathy and *em*pathy, which I cannot truly do when something I know is not related to pathos.

My own research is concerned with the study of knowing and learning related to mathematics and science. The present method and results have assisted me in understanding demonstrations that high school science teachers or professors use as part of their lectures. Thus, if students do not already know what is to be seen or what is relevant in a demonstration, the results of the current investigations allow us to anticipate that there will be differences in what students perceive. But these differences are not the result of conscious ‘constructions’; rather, they are the re-

sults of non-conscious processes: where the eyes focus and what they do thereafter. There are implications, however, to making different observations. Thus, if these differences among students and between students and teachers/professors do not come to the fore, then the lecturing individuals might assume that the students had seen something that allows them to make sense of the theory taught when in fact the students have seen something else. It then will make absolutely no sense to the students what the lecture is about; or alternatively, they will produce a fit between what they hear and what they have seen not realizing that there are grave inconsistencies. In one research project conducted in an Australian high school, I could show precisely this (Roth et al. 1997). Some 18 students saw motion in a demonstration and five did not. To make sense of the lecture, however, one had to have seen motion. When the 18 students provided explanations, these could not make sense because the teacher assumed no motion had occurred and required answers that explained no motion rather than answers that explained the motion. What is it that made some students see motion where others did not see it?

We can extend our thinking about the results of this investigation, and this leads us into the third stage of epoché. This third stage requires us to 'sit still' and let the results work upon us. The true impact of some findings will become evident to us only later. We may suddenly have an insight or wake up at night and know, all of a sudden and without having intended it, what our findings really mean or imply. For example, I did not immediately realize that the present results also show us that perception is not a matter of 'interpretation'. It is not that I see *something* that I then interpret to be a Maltese cross. My eyes work on their own, based on my (their) immanent knowing how to move; they do not require the conscious mind to follow movement trajectories that allow me to see what I see. What is there to be seen then is given to me in my perception. Their (my) movements are engrained, so to speak; these movement forms constitute kinetic melodies that my eyes recall on their own without requiring my consciousness. It is during a time of non-attention that I have come to accept new understandings that emerge in my conscious awareness. It is during such moments of non-attention that I have developed the insights about perception described here. In fact, this third stage of the phenomenological *epoché* is of sufficient importance to be investigated as a phenomenon in its own right: Knowing as something pathic, *being given* (to us), as a recent book title suggests (Marion 1997), rather than as something intended. We encounter this aspect throughout the present book, but especially in chapter 9 devoted to investigating the passions.

One way in which readers may want to pursue the present inquiry is by systematically varying the cross itself. Again, this is easily done using a graphics program that affords changing the relative angles of the two crosses, which may produce further changes of interest to us. That is, we can always extend some inquiry and thereby produce new variations that allow us to better understand the conditions for having *this* rather than *that* (perceptual) experience. I have produced one such change using the Maltese cross (Fig. 2.3). But for a true inquiry, I would produce many crosses if the purpose of my investigation were to understand the role of proximity of adjacent lines on salience of a particular figure. Thus, for example, the investigator may ask in which configuration the vertical cross rather than the diagonal one will be dominant, that is, will be the one that springs first into the

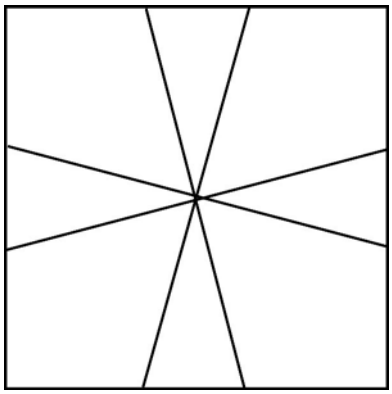


Fig. 2.3 One variation of the basic figure known as the Maltese cross.

eye. What are the relative angles when the dominance shifts from one to the other cross?

It turns out that sometimes one investigation will lead us to something unsuspected so that we learn about something else. Thus, in the next section, I engage readers in an inquiry that goes, among psychologists, under the name of Müller-Lyer illusion. When I first investigated it I wanted to find out why two lines appeared to have different lengths even though I knew they were of the same length (I had merely copied and pasted the second one). That is, on the surface, this might look like an investigation that belongs into this section, where we produce simple perceptual experiences, such as the perception of a straight line. It turns out that the results have taught me something about the relation between perceptual depth and its effect on the perception of line length.

The Perception of Depth

My interest in the relation between perception and the three-dimensional nature of the world arose for me in the context of doing a study on young children's learning of geometry. I was especially interested in understanding what the second-grade students I was following already brought with them in terms of experiences and competencies that were presupposed by the lessons and that are part of the fundamental experiences of being in this world. The basic things that the children were working with included objects standing for cubes, cylinders, rectangular prisms, pyramids, spheres, and so on.[6] While writing a chapter with a graduate student, we asked the question that also became part of the title: 'What makes a cube a cube?' We begin the chapter with a drawing (like Fig. 2.4) but then, because of the book's

[6] The practical things we encounter in the world are only approximations of the things that geometry deals in, which are ideal objects with properties that real objects can have only in a limit case.

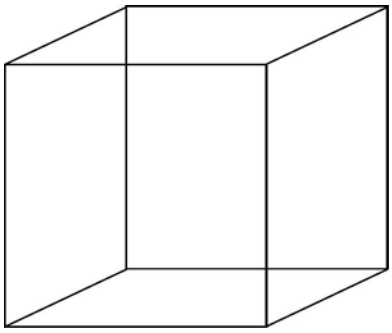


Fig. 2.4 The Necker cube serves us for a first-person experiment in spatial perception from two-dimensional drawings.

focus on the interface between body and culture, go on to relate children's bodily experiences in cultural settings. But in pondering the question subsequently, while looking at the figure again, I began to investigate why we see the line drawing on a flat page *as a cube* and not as some assembly of straight lines in a two-dimensional plane. 'What makes this drawing', I began to ask, 'appear as something three-dimensional?' I asked in particular because I could not buy into the constructivist answer that the perceivers 'construct' what they see. Clearly, constructivists confuse what appears on the retina with some inner representation that is subsequently interpreted by the conscious mind. This means that the lines would be on something like an internal mirror. Some inner mind would then look at this image and interpret the combination of lines in this or that way, thereby constructing it as one or another cube, a combination of lines, or still something else. The preceding investigation with the Maltese cross shows that prior to any rational conception and interpretation, the eyes are engaged in movements that make us see something. We may liken what we see to other experiences, for example, see Fig. 2.1 or 2.3 as instances of the Maltese cross, or a cross of the German Order, and so on. But by the time there is something that can be likened to something else or given a name, other events have happened. These events are not apparent to consciousness but can be, nevertheless, investigated using first-person methods.

The figure is known in the psychological research as the Necker cube (Fig. 2.4). Although there are but a few black lines on a two-dimensional sheet of paper, most research participants report something like 'I see a (three-dimensional) cube', 'I see a cube from below that extends from front right to back left', or 'I see a cube from the top that extends from the front left to the back right'. When asked further, participants may outline, moving their fingers along the lines, where they see the different surfaces of the particular cube they see. In their statements – which may be provided verbally alone or communicated using a range of semiotic resources – they provide *accounts* or reports of experience. What they have not provided us with is access to the actual lived work that is obliquely referred to in the account/report.

To find out more about perception, we need to set up an experiment, which begins with epoché and its three phases: generation of experience, reflection, and

passive acceptance of new understanding. We begin with the generation of experience.

So what is the lived work underlying the report of seeing this or that cube? The drawing (Fig. 2.4) allows us to investigate the *process* of perception and how we come to see in depth what we see in depth, that is, the *object* of perception. Upon first sight, you may see a cube, if you see a cube at all, from slightly above extending from the front left to the back and right. But, if you see a cube, you might actually see one from below and extending from front right to the left back. If you do not see one or the other, stop here and try. (You may verify what you perceive with the two drawings in the appendix A2, p. 249.) These two perceptions are the two spatial configurations that are seen in psychological experiments, where they are categorized as 'cognitive illusions'. I know from lectures when presenting this drawing that many people initially will see only one of the two cubes; but as soon as audience members have seen the second one, they will be able to see them over and again – which means that they (their eyes) now have learned how to see the second cube. Rather than wondering about illusions, let us engage in the analysis of the lived work of perception to find out what is at the origin of the perception of the cube in one or the other way (i.e., from below or from above). We may do so by, for example, by exploring how to quickly switch back and forth from the cube seen slightly from above to the other one seen from below.

To begin with, look at the figure (Fig. 2.4) and allow the first cube to appear, for example, the one that you see from below and extending into the back toward the left; then intend seeing the other one until you see it. Move back to see the first; return to the second. You might also do this: look at the first cube, the one seen from the bottom and extending toward the back and left. Close your eyes – but intend to see the other cube upon opening the eyes again. Practice until you can switch between the two with the rapid flicker of the eyelids. Once you achieve this, focus on and observe what is happing with your eyes during the flicker. That is, how do you (intentionally) generate *this* or *that* experience voluntarily?

You may notice that if you place your eyes to the lower left corner that appears inside the set of lines and then move toward a non-present vanishing point to the left ('along the surface') – this may be along the edge leading from the 'front' vertex toward the back left – then the cube-seen-from-below becomes instantly apparent. Similarly, focusing on the equivalent vertex further up and to the right and then moving along the edge 'backward' to a non-existing vanishing point allow you to see a cube-from-above. That is, unbeknownst to your intellectual consciousness, the *movement* of the eye from one of the two vertices toward a non-existing vanishing point in the back to the left or right of the diagram creates one or the other perceptual experience. This, therefore, is a statement about how the work of seeing produces the cube even if we do not consciously attend to it. If the eyes do not make these movements, then the cubes do not appear and the lines remain on a flat surface.

As a first result of reflective analysis, we note that this experiment shows us that the cube is not (intentionally) constructed because when you looked at the figure for the first time, the cubes appeared, you did not intentionally construct it. And for the very first time you looked at the figure, you might have not seen any cube at all or only one and not the other.

This result generates new questions. How do the eyes know to move like this to make the cube appear? A first clue comes from our experience itself, especially when you were seeing initially only one cube or no cube at all. But as soon as you have been able to see one or the other or both cubes for a few times, you can easily see it (them) again when returning to the figure. This shows us that our knowing emerges from initially uncoordinated movements during which the flesh auto-affects itself such that it develops the capacity to move and develops an *immanent* memory of this capacity. We know that it is not reflective a reflective kind of memory, because we do not intentionally have to place our focal point and intentionally move the eyes. I (my eyes) *immanently* know what to do and do again to see the cube. In other words, during first random movements and before I have seen a cube for the first time, corporeal-kinetic movement forms (archetypes) emerge that would be more ancient, more basic than any 'image schemas' or 'sensorimotor schemas'. Our perceptual ways *are given to us in an initial event of donation*.

In the third phase of the inquiry, we may realize that one of the upshots of this investigation is this: We do not just see or recognize a cube because its mirror image is produced on the retina. Rather, our eyes have to do work; and associated with this work there are changes on the retina. Based on the changing images, and based on prior experience, we have learned to see cubes. We can see cubes because our eyes (we) know what they (we) have to do to make a cube appear. It is in the non-perceived movement of the eye that the distension and dehiscence between the cubical figure and the ground occurs and that the former comes to detach itself from the latter. But we should not think of the image as something standing before the ground, as if projected against a screen; rather, in the image the ground is rising to us. It is not merely, as enactivist theorists would say, that the organism is bringing forth a world – the world gives itself to the organism, which learns how to make any figure reappear. That is, the movements of the eyes are not random, not constructed, but they are entrained by the structures of the material world in which the organism is embedded. 'It is in reference to my flesh that I apprehend the objects in the world', as we have seen in the preceding section, so that 'in my desiring perception I discover something like a *flesh* of objects' (Sartre 1956: 392). It is in reference to my flesh that I apprehend the objects of the world, which means 'that I make myself passive in relation to them and that they are revealed to me from the point of view of this passivity, in it and through it' (ibid: 392). There is therefore a fundamentally passive component to perception that tends to be obliterated in the (social, radical) constructivist literature but that is essential to understand the dual, subjective | objective nature of mathematics or science that has become the point of unresolved contention between formal and constructivist accounts of these fields.

We can extend this experiment by changing the figure, turning it into one that follows the laws of perspective drawing. The investigation then constitutes another *variation of experience* – everything else being the same – teaching us about the underlying processes of perception. I begin by making a duplicate of the Adobe Illustrator™ file that I had used to make the first cube (Fig. 2.4). I draw four lines from the 'front rectangle' so that they intersect somewhere in the background to the right and back of the cube. I then use the individual point selection tool of the

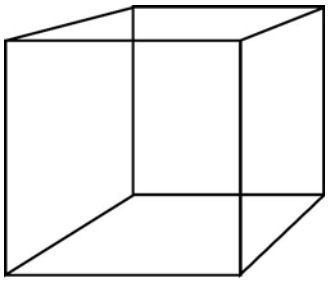


Fig. 2.5 A cube drawn according to the laws of perspective, which means, the four parallel line from 'front' to 'back' have to intersect even further back.

software to move the corners of the back square onto the corresponding line so that the four edges that lead from front to back all fall on a line. This gives me a new drawing (Fig. 2.5), which I can use for the same kind of investigation as before. (The steps in the construction are shown in appendix A3, p. 250.)

Readers may stop here and do this experiment on their own. You may notice that the cube seen from the top – oriented from the front left to the back and right – is more prominent than before, and certainly more prominent than another three-dimensional figure that we can see. If you do not yet see it, try what we have done before. Move to the lower of the two corners within the outline and move your eyes along the edge toward the left and back. What do you see? It is no longer a cube but a truncated pyramid – the front square appears smaller than the back square. That is, when we do the switching part of the experiment, we also move from a cube to a truncated pyramid.

An extension of these experiments came for me from another one related to the perception of lines. While on some long flight home from a conference, what is known as the Müller-Lyer illusion (Fig. 2.6) came to my mind (notice the passive construction of the sentence) while thinking about the perception of lines in geometry. I first took a pen and drew some lines into my notebook but then realized that the hand drawings and perhaps the background of the notebook itself – drawn lines to be written on – interfered with the effect I remembered to be associated with the phenomenon. An idea came to me: Use the drawing software on my laptop, draw the figure, and then begin investigating it.

As I began, I knew that the two lines were of the same lengths but could not get rid of the appearance of lines of different length. As much as I tried 'constructing' them the same in my mind, they *appeared (looked) different*. I was wondering whether I could make the illusion disappear by squinting or by turning the laptop in different directions. But nothing helped. I then had another idea: remove parts of the arrows on one or both of the figures to see how this would affect my perception. I then systematically removed lines only on the left or right or only on top or the bottom of the arrows. *This, thereby, constituted a systematic variation of the conditions of my experience.* I was attentive to what my eyes were doing, thereby coming to realize that they were following the arrowhead lines to make something like a perceptual completion. Readers who want to find out for themselves should stop here before reading on.

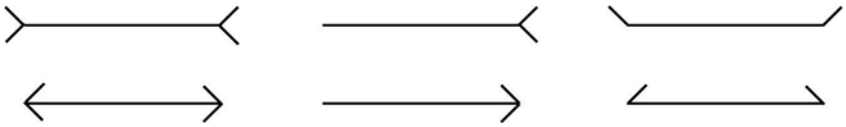


Fig. 2.6 The original version of the Müller-Lyer 'illusion' and two among many systematic variations produced with a drawing program. How do the changes in the drawing change what we see?

To find out what happens, look at the right-most variation of the Müller-Lyer lines (Fig. 2.6). As the eyes follow the remaining lines from the arrowheads, you notice how they follow these so that the horizontal line appears to be in the back; the eyes follow the arrowhead lines from the horizontal line toward the back in the lower instances. I only realized this after some reflection (second phase of epoché) and after leaving the experiment for a while (third phase of epoché): The two instances are like fragments of railroad tracks, where the tie is further back than the 'free' part of the arrowhead in the upper case, but where the tie is further in front than the arrowhead in the lower case. I realized that my eyes were doing what they have learned from parallel lines that recede into the back and toward the horizon (e.g., while standing on a railroad track following them into the distance. Even though the ties of a railroad are of constant length, those further away and in the back look smaller. If I were to see two ties of the same length but one further away from me than the other, the former would appear larger, because a tie of the same length that is closer to me would appear smaller.

We can now take these results and reflect upon them in the context of the second cube investigated earlier. In the perspective drawing (Fig. 2.5), the eye sees the smaller square as lying behind the bigger square but consider them to be the same size, as it would be for any railroad tie a little further away that appears smaller but that the eye recognizes to be the same size. On the other hand, in the second perspective, the actually smaller square comes to lie in front of the bigger square. Now the effect is even further emphasized. The drawing appears like a truncated pyramid with the base further in the distance than the smaller square. The effect with the Necker cube is enabled by the identical sizes of the two squares, which allows one or the other cube to be seen alternatively, each equally possible because the relations between the front and the back square – and therefore the corresponding horizontal lines that constitute them – are the same.

An *Experiment* in Original, Everyday Perception

During a stay in the 'Neurosciences and Cognitive Sciences' section of the *Hanse Institute for Advanced Studies* (Delmenhorst, Germany) I took this problematic head on: How does something that we have not known appear to us in our perception? While analyzing the videotapes collected during a 20-lesson tenth-grade high school physics course on static electricity, I also conducted an inquiry into the experience of learning and into the process of *coming to know*. I had been inspired by

a series of publications concerning first- and third-person methods (e.g., Varela 1996; Varela and Shear 1999) and therefore kept daily notes not only about my learning while analyzing the videotapes – my third-person perspective on learning – but also about things I noticed while riding my bicycle through the countryside for pleasure or while riding to the university. Most importantly for my research, I designed an experiment for the purpose of tracking knowing, learning, memory, noticing something for a first time, and so on. In this experiment, I would take the same tour for 20 days in a row. Each time preceding the trip, I would write down everything I anticipated seeing – an empty set {} on the first day, because I had never been where the trip would take me. Upon returning, I would write either in my notebook or in my dated electronic files what I remembered having seen. The trip turned out to be about 25 km in length, taking me from the *Institute* outside the city, through valleys, fields, and an extended forest and back.

Central to the experiment were the planned trips themselves. Each day I would go out – rain or shine – and, upon returning, write my entries including the following:[7]

> Day 1. As I was riding along, I was aware of my surroundings (trees, flowers, and so forth) without really focusing on anything in particular. Although I was aware at the moment outside of what I was looking at, here at home, I remember few things in particular, few stretches of the trip. But those things I do remember are associated with a particular type of experience. There were things, like a particular house or a road sign ('Landwehr') that was pulling my gaze to take a closer look. As I focus, sometimes with considerable delay, a memory surfaces – the house looks like the one I had lived in 40 years earlier, 'Landwehr' was the name of a professor and of a street in the city where I went to university. [E01p7–8]
>
> Today (my fifth) trip, I notice for the first time the little plates, inscribed with numbers that increase by 0.1 about every 100 meters. I infer that these are distance indicators with reference to some starting point. [E01p31] (I subsequently found the starting point during an explicitly planned trip.)
>
> Today (my seventh) trip, I notice for the first time the upper parts of two gigantic towers that are visible above the treetops. [NBp13] (From then on, I not only saw the towers each time I came by this place, but I was expecting them to show up even before I got to the place.)

Later on, sometimes on the same day, sometimes following a particular observation during the data analyses that I conducted at the time, I returned to notes and drew on one or the other to illustrate some idea I was having or to make a comparison between what I had experienced and what I observed on the videotapes. For example, my analyses – stage 2 of the epoché – included the following commentaries:

> The movement of the body with respect to the surroundings and of the eyes with respect to the body is so central to the experience that it is easily over-

[7] I use a bar on the left of those texts that have been excerpted from my database. Codes in square brackets – e.g., '[E01p7–8]' – refer to the original data source ('E01'), specific electronic files and the page numbers within the files ('p7–8').

> looked. These data show that I am *perceptually tuned* to my surroundings, which enables me to move about, my perception is indeterminate: initially, few features come to stand as figures against the ground, to be remembered subsequently. Before my awareness grasps detailed features, the physical world appears to exist, indistinct, and as invitation to be articulated. I remembered few concrete things after the first and even subsequent trips along the same route. However, in the course of the repeated experience, new features emerge into consciousness: I see the road sign with the 'Landwehr' inscription, the distance signs, and the towers for the first time.
>
> Despite the self-awareness that the experiment is about recalling the maximum number of features and despite an extended effort to recall as much as possible, I perceive one or more new features 'for the first time', each time I travel. Consequently, my world becomes more (perceptually) articulated, allowing me to articulate it (verbally) in my notes. At the same time, certain entities (e.g., the 'Landwehr' sign) have a certain 'grabbiness', which turns out to be related to (and is articulated in terms of) previous experience. Encountering these entities brings forth an experience of déjà vu, including specific details (features) that come to stand as figures against ground. The descriptive articulation follows the perceptual articulation.

It is with respect to this last episode that I articulate the first-person method further. What became important in this experiment was to notice those aspects of original perception that we do not normally attend to or take for granted. The following analysis of the events on Day 7 of the experiment actually shows an engagement with a form of experience that I first became first aware of in my teens. In those days, I was taking the bus from my village to the nearby city to attend an academically oriented high school (*Gymnasium*). Because my village was the second-to-last pick-up location, the bus was always full and I had to stand near the driver or even on the steps next to the door up front in the bus. One day, just as we drove down the valley toward the city, I noticed a cathedral that I had never seen before, even though I had stood in this place in the bus for the past seven years. At the time, I could not make sense of this experience and had long forgotten about it. Why would it be that we can look at some scene every day for more than seven years and then, all of a sudden, see something that I had never seen before and yet which predates my existence – the cathedral was hundreds of years old?

In the following, I provide an example of the way in which I 'worked up' the initial entry into my logbook that expands on the original experience and sets it into the perspective of the analytic questions that I have had with respect to learning and the problematic framing thereof by constructivist theory. The episode shows that the phenomenological epoché (a) does not take the world in the way it offers itself, where we do not pay attention to much of the surroundings but take them for granted (e.g., we seldom become conscious of the floor or street we are standing or walking on) and (b) notes the different levels of awareness related to (specific aspects of) the surroundings.

> On the side of the road I saw a set of twin silos. They were so big that they can easily be found on aerial photographs, sitting about 40 meters apart at a distance of 200 meters from the road. An entire slew of questions began to

appear and unfold in my mind. How could I not have seen these twin silos on my first or at least second ride? I immediately realized that I could not have answered questions about the twin silos following my six earlier trips, and, during an examination, would have failed the test *even though the examiners could have thought that I had had already* six *times the experience*. I understood that I could not have aimed at seeing these twin silos precisely because I had no clue about their existence. I was in a situation not unlike that in which students find themselves when science teachers set up in 'inquiry learning'. How was I to know that these twin silos were relevant and not something else? There is nothing that 'construction' of my experience would have allowed me to arrive at the twin silos, because nothing that *was given to me in my perception* would have lend itself as material to 'construct' anything useful from it.

Another important question during my inquiry was, 'How did these shapes come to stand out against everything else as a ground?' 'Why these shapes and not some other shapes that could have become figure against ground in precisely the same setting?'

As the questions raced through my head, I experienced another shock: I realized that I had forgotten the world that existed for me before. Now I was thinking about a world populated with the twin towers, and I asked questions such as 'How could I not have seen the twin silos?' I realize that these questions presupposed the existence of the silos prior to my first actual experience of them. I immediately realize that if there had been a teacher with me, presupposing a world in which the silos existed, would anticipate me, the student, to see the twin silos, whereas I could not intentionally look for them. And this, I realize today, is precisely where Jean Piaget and his constructivism are wrong. He assumed that there are (mathematical) structures in the world, which children (he considered them to be little scientists) can discover. Thus, he assumed children to look and interact with a balance beam and then, depending on their developmental stage, *abstract* a more or less mathematical pattern. But to do so, one has to see the weight as weight and distance as distance, which is absolutely not the case even among older students who might see, for example, locations on the beam and number of objects suspended. Even mature scientists may see one aspect, such as the slope of the curve, when the relevant values required in solving a problem are the absolute values of the curve. There is nothing, I realized, that children can inherently abstract from the balance beam much in the same way that there was nothing for me to abstract the twin silos from the perceptual experience. *These things did not exist for me*. I lived in a world *without* twin silos.

For science teachers, *therein* lies the quandary. Having forgotten about the world without the twin silos, they can no longer *empathize* with the children and students, who inhabit a world that they have forgotten. They inhabit a world that they must forget unless they are to drown in the co-presence of all the worlds that they have lived in before. As I was able to experience, this world is in continuous flux because with every bicycle ride, there were so many new features that had come to stand out for me. Today, I know that

> learning is associated with a form of amnesia, a forgetting of the world in the ways we know it. (Roth in press)

We see in this excerpt from my analytic writing how the method separates the specifics of the experience, here the first emergence of the twin silos into the consciousness, to unearth and excavate the invariants. To be sure that something is invariant across experiences, analogies and parallel examples are useful, because it is precisely in the comparison that the invariants become invariants: aspects that do not vary when we move from one to the other context. The account also shows that I did not just notice the twin silos to go on and no longer attend to them, taking their existence as a matter of course, as something that goes without saying. Rather, I paid particular attention to what was happening at the instant, the process by means of which thoughts and questions arose within me. In fact, the questions that arose were unintended. So we observe a double intention that is oriented, on the one hand, toward the experience of the twin silos emerging into my consciousness, to the process by means of which this occurred, and the events that immediately followed. For example, in the quoted text I attend to the fact that a particular question arises in and constitutive of the experience: 'How could I not have seen these twin silos on my first or at least second ride?' Moreover, I also note the next question or realization associated with this question: The twin silos are accepted as entities that existed prior to this experience, that is, during the first or at least second ride. The first question is in fact the same that had first occurred to me some 30 years earlier (around 1970). But it is a keen awareness directed toward the presuppositions and to the questionable nature of the presuppositions in this first question that was occasioned for me in the experience of the twin silos.

What is interesting about this experience is this: it exhibits an orientation toward the process of *phenomenalization* itself. It is not the thing, the twin silos, that is of interest but the very way in which these came into being and what happened to me in and after that split second when these first appeared to me in my consciousness. Here, they are given because visual perception is not aware of them. But it is equally evident based on physical principles that the light from the twin silos must have fallen onto my retinas before. Yet the twin silos did not stand out – they were not *ek-static.* In this experience, they literally came to be placed outside (me), an expression that returns us to the etymological roots of the term in the ancient Greek language, *éksta–*, stem of *éxistánai*, to put out of place, from *ek-*, out, and *ístánai*, to place. In phenomenology (e.g., Henry 1990), using the hyphenated spelling therefore is a means to take us back to the original emphasis on the two parts of the phenomenon, the *placing*, on the one hand, and the *outside*, on the other hand. In fact, when the Swiss psychologist Jean Piaget investigated object permanence, he pursued a related phenomenon but from a very different perspective and from a very different epistemology and ontology. He assumed the world to be constant and little children to be deficient thinkers. Through experience, they 'construct' object permanence as they become older and develop. For objects to be permanent, these do in fact have to stand out in the way the twin silos came to stand out for me, and in my adult perception: the changeover from perception to stable object occurred so fast that I almost lost my object, the *phenomenalization* of the twin silos as given to my perception and then their becoming the independent (Galilean) objects that they were afterwards.

Over time, I extended the reflections on this experience. Frequently a new realization struck me out of the blue and even though I had not explicitly thought about this episode; but at other times, I realized something new precisely while thinking about the episode in which the twin silos first appeared to me. I revisited this episode in various places to think about learning from the perspective of the learner – including presentations and a book on learning that makes use of the interplay between third-person and first-person perspectives (Roth 2006). That is, in extended reflection with frequent long pauses between the reflective episodes, ever-new realizations *were given to me* in what constitutes the third part of the phenomenological *epoché*. That is, the third phase of the epoché, in this situation, was not limited to a brief period following the original experience and the first reflections upon it while I was still in Delmenhorst and in the course of completing the experiment in everyday perception.

Many years after these events, I read a little book entitled *La croisée du visible* (Eng. *The Crossing of the Visible*) (Marion 1996); in it, the author takes the question of visibility by analyzing paintings and the work of the painter. Painting gives this philosopher a particular vantage point to provide us with a phenomenology of perceiving something for the first time. When I read the text in the following quotation, I immediately highlighted it because it reminded me of the twin silos. And it is precisely because of the experience related to the twin silos that I found the following quotation intelligible: It made sense because I already have had related sense experiences. 'The unseen that the painter will look for remains therefore, up to the point of its ultimate appearance, unforeseen – unseen thus unforeseen. The unseen, or the unforeseen par excellence. Like death, which (in principle) is not here so long as I am here, and which appears only when I am no longer here, the unseen remains inapparent as long as it is, and disappears the moment that it appears as visible. The unseen appears only to disappear as such. Further, one is not able in any way to foresee the newly visible on the basis of its unseen, by definition invisible' (ibid: 54). The philosopher does not stop there but shows that even the painter does not know what he is going to show in and through his painting (drawing). In fact, there are numerous painters who talked about painting as a way by means of which they themselves find out what there is to see. Painting is *not* expressing what already exists on the inside, in their minds, as if the painter squeezed his/her inner contents onto the canvas. This is precisely the same what others have recognized about everyday (improvised) speaking where speakers themselves find out from the utterance just what they have thought (Merleau-Ponty 1945; Vygotskij 2002).[8] I continue to pursue this inquiry and the methods for such investigations in chapter 9.

Iterating First- and Third-Person Perspectives

An important aspect of my research concerns understanding a variety of phenomena related to the knowing and learning of mathematics and science. To me it is

[8] I am not talking about the situation where a person reads from or regurgitates a memorized text.

always the phenomenon that determines what I want to use as method. I am not (and advise others not to be) a 'mono-maniac of method' (Bourdieu 1992) who knows but one method and who selects research problems as a function of it. But despite the popular saying that to the person who only has a hammer and only knows how to operate *it*, the whole world looks like a nail, many researchers use only the one method they have ever learned, often during their graduate work. I frequently hear graduate students and junior faculty say, 'I want to do a qualitative study', 'I am going to use a questionnaire with Likert-type items', or 'I want to do a phenomenological study'. But, I ask, 'What is your research question?' 'What do you want to find out about?' 'What are your interests?' Surely it is not the method – unless you are a methodologist.[9] I personally saw a good example of what might happen when a person knows only one method and has to abandon what she really wants to do. I had organized sessions where faculty could discuss and develop ideas for research that they sought funding for. A young colleague was interested in pregnant women who join online forums. Being pregnant herself, she intended to organize such a forum, which would grow as the study went along. The problem is that she only knew how to statistically analyze questionnaires. She wanted to do an experimental study with treatment and control groups. But in this situation, because the women would be joining the forum over time, she could not make the assumptions that are required for a psychological experiment. She abandoned what she was really interested in because it did not fit the method she knew. Rather than pursuing the question that really interested her and in which she had a lot of personal investment and experience, and rather than acquiring the practical understanding of method in the process or by taking some course where she could have been introduced to what she needed, she abandoned researching this line of interest.

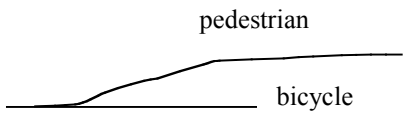
My personal advice always is to find a problem and then, if necessary, to learn and evolve the method(s) required for providing an answer. I begin in this way to show that I research some phenomenon irrespective of the method it requires. I do not do a phenomenological study of something, fitting the object of research to the chosen method. Because of this reason, I may actually take multiple methods that give or promise me a better understanding of the phenomenon. My research notes bear witness to the multiple methods, as I hold up the results of one method against what I am finding out using another method. Relevant to this book, I hold up the findings of some third-person method against the findings from a first-person method. This guards me against something that I also experienced in the context of my work at the *Hanse Institute*. While I was studying the videotapes from the tenth-grade physics class that a local researcher had made available to me, I often found myself in a situation where the colleagues laughed about the students because these were doing this or that. For example, my colleagues laughed about students who said that a plastic foil 'was used up' and no longer produced static electricity. However, one night while I frantically attempted to understand and

[9] I insist on the difference of method and methodology. A *method* is the way in which we conduct a research study. *Methodology* is the science of research methods concerned with understanding these methods. Correspondingly, we have to use the adjectives methodical when the issue concerns method and methodologically when the issue concerns the science of methods.

model some phenomena, I found myself putting plastic foil aside to pick up another one to continue the research. It was in putting a foil aside that I realized I was in the process of doing the same as the tenth-grade students had done. I had observed and noticed in my own actions a behavioral invariant rather than something to be laughed about. Here, combining a first-person method with a third-person method promises new understandings and a critical questioning of our normal ways of seeing things.

In the following example, I exhibit the manner in which my research may unfold. There are keen observations of something in the everyday world (first phase of epoché), which are then closely analyzed to exhibit possible invariants (second phase of epoché). I then explicitly attempt to reflect about the implications for the phenomenon in my research, which, in this example, pertains to learning physics. The difference between the method described here and the one used for investigating spatial perception using the Necker cube or the Müller-Lyer phenomenon lies in the fact that any experience in my everyday world may serve as the phenomenon to be investigated. The question of (perceptual) invariants is posed when I query a different context to see whether there are *analogies* between the situations. The presence of an analogy – as per the etymology of the Greek word, derived from *ánά-,* back, again, new + *logós*, reason, ratio, proportion – means the presence of one or more invariants. In the following excerpt from my research notes, I dissect the original narrative of an experience (first phase of epoché), typed in italics, and begin to intersperse analytical text (second phase), typed in normal font. As a more advanced part of this second phase of the *epoché*, I also ask myself what this account of the perceptual experience during a bicycle trip from the *Institute* to the physics department at the university can teach me about the learning of physics.

May 11, 1999



I am cycling along a trail that was signed as a joint cycling-pedestrian trail. Then, all of a sudden, I see cyclists to my left on another trail that is part of the roadways. I had not seen where the two trails had branched off into separate trails.

In my objective experience there had not been a branch. I rode in a world where there was but one trail. In order to understand my actions, we need to understand what I perceived and thus, my world. For, if we began with some outside world, we need to assume that I was somehow defective in the moment where there was a branch. This would be difficult to argue. Thus, what is most crucial for understanding the actions of the learning and knowing person (organism) is the world from her perspective. We need to know what her world is, lest we want to operate with models in which human experience is always in some deficit mode.

> *I vaguely remember having been on this bicycle trail one time before. At that time then, my world had included either the bicycle trail only, or in fact a branching point which I had taken in favor of the bicycle trail.*
>
> In this case, I had a vague memory. I did not re-member exactly what had been the case before, just an impression that the first time I had come by this point, I had been driving differently. But, while realizing during the second time that there were two trails, I began to objectify this experience. The existence of two trails forced itself onto me. The next time (third) I came by this part of the road, I was consciously aware of the branching point. I perceived the branching point. This part of the road had become differentiated: there existed a fine structure to what and how I experienced it.

We see in the analytical text that *this* reflection occurs after repeated experiences of having come by this particular point en route to the university. The trip itself was not planned as part of an experiment in perception. Rather, anything and any experience could potentially become the starting point of an inquiry. It is evident that we cannot use 'everything', because this would mean that we never get out of experiencing the world to reflect upon these experiences. Perhaps because I was setting myself up in this manner, there were more than the normal amounts of puzzling events that happened to me and that entered my research notebooks or computer files in narrative form frequently accompanied by drawings. The analytic text exhibits my concern for developing an argument for studying learning from a first-person perspective. Whereas this might appear the self-evident thing to do for a researcher with phenomenological inclinations and preference to first-person methods, it was not and still is not the norm in the learning sciences generally and in science or mathematics education more specifically. Here presuppositions reign about what the learner *ought to do* and generally does not do.

The research note then continues with a highlighted question: 'What can we learn from this?' and, more specifically, 'What can we learn from *this* especially about learning physics?' That is, how can the experience of 'missing the branch in the cycling path' teach us something about learning physics?

> *What can we learn from this? (And what can we learn from this especially about learning (physics)?* Here, the first and second time, I experienced in the world. There was no fine structure, but I found myself on one then on the other trail. What I had perceived was not the world I perceived afterwards, which included a branching point. Rather, in my world there had been no branching point. But at the moment when I saw cyclists left to me on another trail, I was startled. In this instant of being startled, I began to objectify my experience, my presence on the pedestrian trail. Being startled here is similar to [students noticing] 'This doesn't work'. But whereas I was already objectifying my experience in terms of a branching point that I had not experienced, the [tenth-grade physics] students did not and perhaps could not yet know (not enough experience, and many more possibilities for doing things that make them arrive at where they are) why what they expected to achieve had not yet been achieved.
>
> But students knew enough to know that what was supposed to happen did not happen. What they could not know is that the reality has to be 'prepared'

> in a quite particular way in order to make physics happen in the way physicists make it happen. Thus, phenomena do not just lie around, they do not just exist, but we must go through a particular preparation to make physics happen to be able to see physics. Physics is therefore not just something that can simply be observed, but is associated with a set of preparations to make it happen before it can be observed.

Readers may notice that the questions are similar to the one concerning the twin silos. But there are other elements in this text that point us to invariants. The text says, 'I was startled'. It was the starting point of a reflection, an objectification of experience and of a phenomenon. Similarly, I had observed the students producing new observation sentences precisely after having produced expressions of being startled. For example, Birgit was startled just prior to producing the statement about a gap she was seeing between the two electrodes of a glow lamp. Being startled and observing something unexpected for the first time are like two sides of the same coin. They are not two phenomena but one that expresses (manifests) itself in two ways. As my research note continues, we observe a second move. Not only did I relate the experience to the physics students I observed in *this* situation, that is, in my ongoing research project on knowing and learning in physics, but I compared, in the subsequent paragraph, what I observed in the present project with what I had observed in a physics class in Australia some four years earlier. I note the difference in the conditions that produces a difference in the observation, because the present student could anticipate what they should observe whereas the Australian students were not in such a position.

> These students are already at a different point than those that we had observed in Australia. There, students were asked to look for patterns when objects were rolled down an inclined plane. There were no other indications what to do so that student did not necessarily begin by letting two different objects roll down the plane at the same time. When they did do this, it emerged from the contingencies of the setting. Furthermore, these students did not have the same checkpoint. Thus, they were in a double bind. In order to know whether what they had seen was what they were supposed to see they needed to know that what they had done was what they were supposed to do. Second, in order to know that what they had done what they were supposed to do, students needed to know that what they had seen was what they were supposed to see (Roth et al. 1997). Here, students already knew what it meant to work but they could not know what it was that made the outcome of their investigations different from what they expected. For example, there could have been something with the materials used, or with their preparation. But at this point, students' worlds were not differentiated. Few objects and operations populated their worlds. And from what they knew about these objects, it should have worked that is, they should have seen the bulb light up, and they should have seen the water stream bent under the influence of the sheet which they had rubbed before.

The notes then continue by returning to looking at the students through the lens of what I had experienced. Thus, those students with few prior experiences cannot

know what to expect and therefore 'are at a similar point as I was on the pedestrian path'. This 'similar point' would then orient us to the invariant. However, the note also is cautionary by suggesting that a student investigation in the physics laboratory may be more like an entire bicycle trip. The paragraph that follows expands on the metaphor of the trip, introducing the possibilities of traveling with a map. This is a quite reasonable move in the reflections, as students in a classroom never 'travel' on their own but do so precisely in the presence of the teacher, other students, and their textbooks. These provide something like markers that the individual 'traveler' may use for navigating an unfamiliar world. Readers may also notice how, without having been explicitly configured or planned as such, doing the investigations involving trips lends itself to specific metaphors, some clearly allowing connections with existing discourses about 'being-in-the-world' or 'finding-oneself-in-a-world'. This is both an affordance, an opportunity, and a constraint: Being in language, we cannot ask questions that fall outside of it, so that our questioning itself is a questioning in language. Once we accept as correct the characterization of language as the verbal expression of inner emotions, human activity, or imagistic-conceptual representation, then all questions with respect to language move within this field (Heidegger 1985). The metaphor is used here as a means to think about how students might move along trajectories in their investigations that contain branching points – from the perspective of the teacher, or, with their own subsequent hindsight – that they do not see.

> The students with little experience are at a similar point as I was on the pedestrian path (though I knew that I must have 'missed' a branch), they found themselves in a situation where they did not expect to find themselves and did not know where they branched off in the trajectory of the investigation. In fact, in such experiments are much more complex and more comparable to an entire bicycle trip where there are many different possibilities for getting off the 'right' trail.
>
> Students travel without a map. This is what they are to learn, the map. I already have some familiarity with maps, so that I can project what I might have to do, and what the experience might be like from looking at the map. For example, when there is a green spot next to the road that I need to pass, I know that I am likely to find a park in my experience. The map lets me expect a green space, park, trees, or something of that nature. Furthermore, there might be a 'T' in the road such that this becomes a checkpoint for my travel. If this checkpoint does not come up in some reasonable time, I will become alerted and know that I am 'off track'.

Our discoveries with respect to a particular episode do not end with the analysis. This is only the second phase of epoché. We may actually return to an event repeatedly to reanalyze it. Or we might, in a new context, become aware of the relation that a previously analyzed event has with the current context. In the following excerpt from the research note, the parentheses indicate that at that point in my writing, I was pursuing an idea different from what I was writing immediately before and immediately thereafter. It is literally a parenthetical comment at the instant of writing. But in the course of writing, I remembered the event again and wrote a form of analysis. In part, such writing and re-writing of analysis allows me

(us) to evolve a suitable language for articulating what we can learn from the event. At the outset, we cannot know what this language will be, and therefore, we cannot select it based on some criteria. It is only afterwards, from the perspective of the suitable language that we have actually evolved, that we can say why it is superior to other languages and descriptions these afford. As the date on the note shows, it was recorded two days following the earlier note.

> May 13, 1999
> (When I was riding my bike down the bike trail one day, and on the next day found myself on the pedestrian path, my world in each case had only one option. I had done what the world afforded me to do. But when I marked that other cyclist where to the left of me, in fact on a trail that was not apparent from my position, I was puzzled, there was a difference between where I was and where other cyclists were. I drove across the grass onto the other trail, which I recognized as such immediately. When I came this way the next time, I re-cognized the situation and perceived the branching point that I had not seen as such on previous occasions. The branching point was at hand, present, cognized and from now on, I could re-present it even when I was not at that place. I could make it present again, make it present strongly even though I was not in the situation. I could carry the image of the branching point, could re-live my passing the branching point as well as the moment of my astonishment when I realized that I was on the pedestrian trail.)

Readers may instantly notice the insistence on *presence*, on what is present, and on representation and what it affords to being able to *recognize* or *re-live* something. That is, this investigation develops a language about memory and thinking, which are topics I take up and develop in chapters 5, 6, and 9. These connections between fundamental processes of perception, sense experiences, and higher-order experiences, sense making and learning, already should alert us to the role that these 'primitive experiences' have in complex understanding – even if the connections are not always immediately evident. The struggle of embodiment theories in the current context dominated by psychological theories of information processing and mental representations shows that this connection is not generally recognized even though these may be deemed to be inevitable and necessary by other theorists of cognition.

Conclusion

In this chapter, I present at least two important strategies for the researcher employing first-person methods: consistent variation within a context and consistent observation across (between) different contexts. We observe consistent variation in the experiments involving the Maltese cross, the Necker cube, the Müller-Lyer effect, and even the repeated traveling of the same route. In these instances I hold constant the context and investigate the variations that arise within it, by looking differently, by observing what is new each time that I engage in a particular set of actions, or by systematically varying an aspect of a given display. The second

strategy, consistent observation, was making observations about noticing things even though I might not have taken a route before or while taking a route in reverse. The point was not to do the trip over and over again but to take note of events that fall into a particular category. For example, in chapter 6 I describe the first-person method at work relating to memory, and memory became an important phenomenon that I investigated during that time at the *Institute* across a variety of very different contexts. In fact, in the preceding section of this chapter, there are traces of this inquiry relating to memory, as I describe the sense I had about having been on a particular bicycle trail before but remembering this only vaguely. I did not remember, however, that there was a fork in the trail heretofore shared by pedestrians and cyclists, which I had not been aware of the first time and only found out about during the second trip.

This chapter begins with the epigraph 'Seeing is believing'. There are others – a simple Google search of the expression testifies to this – who turn this saying around to state 'Believing is seeing'. In this second version, we can recognize a form of thought expressed in the Sapir-Whorf hypothesis that the language available to a person or people *determines* what they see. Apart from the fact that a lot of research provides little support for this hypothesis (e.g. Lakoff 1987), it also does not make sense on evolutionary grounds. The precursors of humans did not speak a language yet were perfectly adapted to their environments in perceptual terms. In this chapter, I describe methods for investigating a variety of perceptual phenomena. These methods do not take as their data the *description* of phenomena obtained from research participants, which would inherently mean that we limit our work to what language can express. Rather, our methods pursue the path of the pathic, investigating processes and movements that we are not normally conscious of and therefore subject and subjected to. Yet the investigation shows that there is a lot we may reveal about perception (a) under experimental conditions and (b) when observed in naturalistic contexts.

A corollary of this chapter is this: *Even though I, the investigator, produce the data, the purpose of the first-person method is not to find out something about* me*, something utterly singular that describes only this one and no other person. The converse is true. In and through such forms of investigations,* invariants *are sought that describe (visual) perception as such.*

3

On Tact and Touching

> Reach hither thy finger, and behold my hands; and reach hither thy hand, and thrust it into my side: and be not faithless, but believing.
> (John 20: 27)

In this biblical reference, vision is insufficient for the doubting Thomas, who does not trust his eyes (to whom, 'seeing' is not 'believing'). It is through tact, the sense of touch, that he ascertains the truth of the world. Touch is more important than the other senses, for it brings us into contact with the world more clearly than the other senses. In the same section of the New Testament, there is another expression relating to tact, which, in its Latin version, has inspired many painters: *Noli me tangĕre*, do not touch me or do not hang onto me.[1] This scene, this very expression, has inspired the extended philosophical reflection – on a major taboo in (nearly) all cultures: tact and touching – published under the same name by one of the foremost phenomenological thinkers of the postmodern era: 'You see but this vision is not, cannot be a touch, if touch itself had to figure as the immediacy of a presence; you see what is not present, you touch the untouchable that keeps itself out of reach of the hands exactly like the one you see before you, already departing from this place of the encounter' (Nancy 2003: 39).

Tact and touching take a special place among the senses, even though vision constitutes not only the dominant one in our culture but also the one privileged as a metaphor for understanding. In chapter 2, I describe how the movements of the eyes constitute the world that is apparent to us in our perception. Whatever it is that we see – whether psychologists call it truth or illusion – precisely *is* what we use for making any decision. I begin the present investigations with the sense of vision because, in our world and epistemological ideology, it is the way in which we talk and think about knowing in the everyday world. Many everyday expres-

[1] Touch-me-not is also the common name of a plant genus, the Latin name of which is *Impatiens*, that is, a word derived from the prefix *in[m]-*, not + *patiēns, tis,* suffering, the present participle of the verb *patī,* to bear, undergo, suffer, allow. Touching, or being touched, thereby comes to be related to suffering. See chapter 8.

sions testify to this. We say 'I see' when we come to understand something or 'I can't see it' when we do not follow the argument of another person. Some explanation may be 'clear' or 'unclear', just as perceptual objects are, or perception through dirty glasses. In many ways, however, and for many purposes and reasons, vision and visual experiences do not constitute the best starting point for thinking about how we know and learn, for the interactional aspects between the subject of knowing and the object (world) it knows about is all too easily obfuscated. Vision is not a good metaphor for conducting research. Especially among scientists and like-minded philosophers, mind (knowledge) came to be seen as a mirror of the world – an idea that goes back to the ancient Greek who thought that 'sense is that which is receptive of sensible forms apart from their matter, as wax receives the imprint of the signet-ring apart from the iron or gold of which it is made' (Aristotle 1907: 424a]). Although the visual sense has come to be the dominant one in our culture – ours is characterized as a visual culture and the mind as mirror of has been the touchstone of the dominant epistemology – touch was for Aristotle the sense that distinguishes humans from animals: 'In the other senses man is inferior to many of the animals, but in delicacy of touch he is far superior to the rest. *And to this he owes his superior intelligence.* This may be seen from the fact that it is this organ of sense and nothing else which makes all the difference in the human race between the natural endowments of man and man' (ibid: 421a, emphasis added).

Two millennia later, the hand, the primary touch organ, also became the distinguishing feature in the philosophy of Karl Marx because of its capacity to make tools and to transform the world. Here, then, both the pathic aspect of the hand as the place where nature leaves its imprint and the agential aspects where human intentions get transformed into nature-transforming actions, are highlighted simultaneously. In this chapter, I show how the two moments, the pathic and the agential, are irremediably intertwined. Learning from and about nature always already has pathic moments that remain un(der)theorized when we think about learning using a constructivist metaphor.

Investigating Tact

Tact, the sense of touch, plays an important role in the imagery of the English language. Etymologically, the term derives from the Latin *tact-us*, the participial stem of *tangĕre,* to touch. All tact requires contact, pointing us to the reciprocal relation between touching and being touched. Tact and contact are also at the base of the word *contingency*, a quality of being subject to the situation or to chance. The same root is at work in the terms *contiguous* – touching, in contact, adjacent, having a common boundary – and *tangent* – line touching a curve. I may be touching and be touched at the same time, physically and emotionally – diseases, moods, and affect are *contagious*. There is a lot that we can learn through first-person investigations of touch, tact, and the related phenomena of contact, contingency, and contamination.

Fig. 3.1 Finding out about the texture of a surface through touch requires the hand to move.

To explore the sense of touch, it is best to be in the dark, where our sense of vision is eliminated, or to close the eyes. In this way, our ongoing investigation is not contaminated by the sense of vision.[2] School children in their early years frequently begin their science and even mathematics lessons by exploring 'mystery' objects that are hidden in boxes or bags. Do the present investigation in the same spirit. Take any object or surface and engage in an experiment of the kind described in chapter 2. For example, you may take the mouse pad, book or newspaper page, or tablecloth. Stop and find out about touch before reading on.

As you begin exploring the chosen object, you may notice immediately that to sense the nature of a surface – I am taking for this experimentation a mouse pad (Fig. 3.1) – it does not suffice to place one's fingers on it. If you place the finger pad down, within an instant, all sensation of the surface has disappeared unless you move in one or another way. To feel something, I actually have to move my hand laterally away from me (Fig. 3.1) and slide the tip of the fingers across the surface. As a result, I have a sensation that I associate with a surface that is not polished like a mirror or some metal but that has some coarseness to it. The dual nature of the sense is actually confounded, as only what we feel on the outside tends to become salient and the resistance felt in the succession of the tactile impressions.

To sense by means of touch requires *being in contact with* (intransitive form of 'to contact'). I actually have *to establish contact* (transitive form of 'to contact') so that I can *come into contact* (intransitive form of 'to contact'). There is something exceeding me, when I have to do something to get into a situation that is other than myself.

I can also push downward, which makes my fingers push into the spongy material until I can feel the resistance in me (fingers, hand). In fact, the video I am recording shows that the fingers themselves flatten a bit as they sink into the material (Fig. 3.1, right). I can feel the surface give in to the pressure until the pad stops – or rather, when the muscles and tendons in my hand and arm begin to hurt. What I

[2] Our sense of vision is involved even though we might not realize it. I began noticing its presence even in walking and in carrying things when I walked in the dark from the kitchen to my office only to realize later that I had left a trail of spills. I subsequently realized that in the dark, the cup might be tipping without my conscious awareness that my hand had rotated so that the coffee spilled from the cup. That is, for the cup to be steady, it is insufficient to have a steady hand. The hand is not steady in itself. It is steady and steadied simultaneously – and the eye has an important role in this.

sense *within me* is a resistance to my movement. This resistance is directed against the effort that I intentionally expend to pushing the fingers down into the pad. What I do not sense is the hardness of the material but the resistance, in my body, to the effort intended by my body.

When my fingers glide across the surface, there are actually two different sensations depending on my orientation. On the one hand, if I intend sensing the surface of the mouse pad, I can feel a coarseness that lies on the *outside* of the skin. But I can also change the intentional orientation toward the inside: and now it is as if the mouse pad is scratching me, a sensation that I feel *within*. If you have difficulties generating this experience, scratch yourself – e.g., your lower arm – with the finger of the other hand, a pen, a ruler, or any other object. Where do you feel something as a result? In and under the skin! Hold the object steady and move the underarm that you want to 'scratch', and you have a feeling in the skin, which, if you really had felt an itch, would have relieved you. But you can take the same underarm and move it across the mouse pad surface: You will feel the surface outside of you. In fact, at this very instant – I am working on a draft of this paragraph – I can feel the itch that remains from a bee sting I received the day before while gathering the vegetables for dinner. I can relieve the itch temporarily by pushing with my right-hand fingers on the spot and rubbing back and forth; but I can also go to any other object, like the door to my office or a bookshelf and rub my upper arm as if I wanted to explore the object. Yet I feel relieved at the place underneath my skin where I locate the itch.

In this instant, I feel the itch: I am itching and feeling the itch from the sting. In this itch, the distance between contact and noncontact, the untouchable and touch are in contact. My flesh is in contact with itself: contiguity of contact without contact. Here, 'contamination then becomes what it is not; it disidentifies itself. It disidentifies everything even before it disidentifies *itself*. It disappropriates, it disappropriates itself, it attains what it should never signify: an interruption of relations and ex-propriety of the proper' (Derrida 2000: 90). Tact here exhibits itself as a limit figure, as a non-distance of distance, right here where it is closest with and to itself. But this limit figure is syncopic, as touching and the touched separate in contact: I feel some *thing* and it is *I* who feels. The thing is felt as external, as other, and as not belonging to me who feels.

We immediately can make a number of further observations (second part of the phenomenological epoché). First, there is an essential agential moment to learning about the surface by means of tact. I instantly and without a second thought move my fingers along the surface of the objects I encounter. This intention, rather than accepting it as a given, requires an exploration and explanation in its own right. I pursue this question of intention in chapter 6: How is it possible to have an intention? What is required to be able to have an intention for doing something? Where does this intention come from? (Is there an intention to have an intention?) For the moment we simply take the capacity to intend as given and pursue the present inquiry about touch.

When I intend to learn about the surface of the mouse pad, I have a sensation at the surface of my skin. It is relatively smooth for the mouse pad that I use right now – the slight coarseness distinguishes this surface from a completely smooth one, such as the melamine surface of the desk on which the mouse pad rests. As in

the case of the visual perception, tact involves movement. But in visual perception, we easily forget that there is an interaction. Tact on the other hand, always involves contact and, therefore, contiguity and contingency. Pursuing the etymological roots of tact, with contact there is contamination, from Latin *con-*, with, + *tangĕre*, to touch. In touch, I relate to the other; but this other relates to me. It is through the self-relation to the other that I come to be myself, for 'the relation to another flesh is a component of the sense of my own flesh' (Franck 1981: 167). This is so because 'the flesh as ordinarily one's own and origin of oneself originarily is improper and the origin of the improper' (ibid: 167). Touch teaches us that the self cannot be the starting point of who I am but that I am always 'contaminated' by the other. That is, as Arthur Rimbaud said, *JE est un autre* ('I is another').

A new question arises then: If tact is contact – and therefore contingency, contiguity, contamination, and contagion – can I ever touch something that is tangible in itself? Moreover, is it not precisely because of the possibility of contagion and contamination that some god could experience if we were actually able to touch him/her? Does not the idea of contact between humans and their gods require a form of contact with an intangible such that the Being/beings touched are not compromised in their integrity? This is why we can say that 'to affirm the presence within us of the idea of the infinite means considering as purely abstract and formal the contradiction that the idea of a metaphysics conceals' (Levinas 1971: 21). Metaphysics approaches but never actually is able to touch the physical, for this would require contact and the possibility of the contamination of the ideal by the real. It is not surprising, therefore, that there is a symbol grounding problem in the cognitive sciences: How can anything conceived of as abstract, like representations, relate to anything in the material world? How can there be 'meanings' of 'meaningless' symbols (words, discourse, language) that relate to nothing but other symbols (words, discourse, language). This inquiry into the sense of touch teaches us that there has to be more to knowing than abstract formulations and *re*presentations; and it teaches us that what and how we know is contingent upon con/tact and contamination of the proper by the non-proper (i.e., the other).

My sensing of the mouse pad surface already exhibits the affective being-affected, something has come close and thereby relevant to me. But this smoothness is not the sum total of my sense impressions. Rather, 'it is the manner in which the surface uses the time of our tactile exploration or modulates the movement of our hand' (Merleau-Ponty 1945: 364). If my hand moves across a different mouse pad surface – the one I keep in my drawer because, being of hard plastic, it does not work so well – the sensation changes. If I push harder onto its surface, a change in the reaction of my hand and arm muscles also occurs.

I begin to sense the effect of moving along the surface as affecting me on the inside. Tact means contact, and effect of the other on me. Vulnerability. If I stop moving my finger across the surface, the sensation stops. I realize: In touching something else, I in fact come to sense myself. In touching something else, I touch and feel myself. The distance between the Other and myself is, in fact, undecidable. At the point of contact, the difference between myself and Other is syncopic, undecidable: myself and the Other mutually affecting each other, contaminating each other. For Kant, this shift in sensation had meant a shift of

consciousness, now emphasizing the (inner) sense organ rather than the external object so that external representations (*Vorstellungen*) are changed into internal ones.[3] But tact precisely means contact and therefore proximity and non-distance that mediated access and *re*presentation bring with them. Tact and touching throw into relief the entire project of metaphysics: 'The style of these modulations defines an equal number of appearances of the tactile phenomena, which cannot be reduced one to the other and which cannot be deduced from an elementary tactile phenomenon' (Merleau-Ponty 1945: 364).

If you find creating this sensation with the hand and fingers difficult then think about what you do when you feel an itch somewhere – like the one that I can sense in my arm right now. You scratch or rub yourself hard on a corner of a wall or doorframe. The itch is on the inside of your skin and moving along an object removes the itch. That is, depending on your intention, to feel or to scratch, the interaction of moving along an object that you already know comes to lie outside or inside of your skin. That is, the intention changes what happens and what you learn (about surfaces, about how to deal with itches). But in any event, the sensation created first and foremost is an auto-affection, created at the interface between an intention to sense or scratch and the touch, which requires a movement of my hand (body) along an object. I cannot anticipate the contents of my touching unless I have seen it before. This result therefore is a pathic experience. That is, to understand the real living act, we require the concept of auto-affection, which is the 'self-reflection of life in motion, of life in its actual aliveness' (Bakhtin 1993: 15). The itch I feel in my arm is a form of auto-affection: the universal structure of experience as such. It is my self-same body that creates and feels the itch: itching and feeling the itch are but two sides of the same coin. The fact that we may find ourselves scratching shows that this itch is present pre-reflectively so that deal wit it even before 'constructing' the itch as itch: The itch is experienced pre-noetically (pre-reflectively) and without the representations that are so dear to constructivist scholars. Without auto-affection, there is no knowing the itch or anything else, there is no Being: 'Only a being that is capable of symbolizing, that is to say, to auto-affect itself, can let itself be affected by the other in general' (Derrida 1967b: 236). Only because I move my hand across the mouse pad can I feel, and this intentional movement that allows me explore the mouse pad surface by means of touch requires auto-affection from which intention emerges. Tact and contact thereby teach me that auto-affection is the condition of experience in general, a possibility that we may also call *Life*. Auto-affection emerges from the encounter of the touching and the touched, the touching-touched, in the 'minute difference that separates acting from passioning' (ibid: 235). This separation, actually, is a *différance*, because the difference between acting and passioning is undecidable, syncopic: perception and self-movement pertain to the same (dialectical) unit and they constitute one another, contact and non-contact are one.

[3] Kant's term *Vorstellungen* (representations) literally means 'things that are made to stand' (*Stellungen*) before (*Vor-*) ourselves. Representations therefore are estranged from ourselves, other than ourselves, inherently unable to capture that which is most intimate to ourselves, our processes of thinking (Marion 2010).

In everyday language we say, 'I feel the cloth-covered surface of the mouse pad, its slight coarseness'. This sentence structure makes me the agent of the feeling. But when I do this for a first time, when I do not know what some surface *feels* like, pretending that it is all about agency does not capture the essence of touch specifically and the sense of touch generally. When I reach out, place my fingers on the mouse pad, and slide them across (Fig. 3.1), I actually have to open up so that I can be affected. To feel by means of touch, I have to open up to allow myself to be affected – even though the movement itself is already part of my 'I can'. But this intending does not teach me anything. It is the way in which my senses are affected by the pad that teaches me about the surface. Without prior experience, I cannot construct the surface of the mouse pad: it affects me. As I do not know what to expect, I cannot but allow the world to act upon me all the while I intentionally move my hand across the mouse pad surface to sample its texture. The world itself exhibits itself to me. That is, although I intend to sample the surface, I actually have to allow the mouse pad surface to affect me, as it is only through this affection that I can have a sensation at all. To intend to touch means allowing oneself to be touched, as the contact of tact is symmetrical: the mouse pad is in contact with the hand, as the hand is in contact with the mouse pad. Sensing, therefore, is essentially pathic: I open up to the world allowing it to affect me. When I say 'I allow myself to be affected', I express in fact this double relation of affecting and being affected, of touching and being touched. We also say 'I am touched' in the passive voice when something emotionally affects us. But for this to happen, we have to allow ourselves to be touched. Something is in*tact* when it has not been touched and therefore affected by something else. Surgeons, for example, have all sorts of strategies that allow them to operate without getting involved in the suffering of the people they operate on: They use physical (covering but the tiny piece they are working on) and emotional screens and barriers that separate them (emotionally) from the very thing that they are in contact with. It is in such contact that healthcare workers may be contaminated in more than one way, and thereby be affected (physically, emotionally).

When I intend feeling the hardness of the mouse pad surface, I actually stop and now push down on the surface using my finger like a stylus and push with arm and hand. In the case of a mouse pad, I can sense how the surface folds around the finger, which moves a bit into the surface (Fig. 3.1, right) and then I can feel resistance within my muscles to the effort they expend while pushing downward. That is, what I initially sense is a resistance not of the substance to my finger but within the muscles that enact the downward push. When I do the same with the melamine-covered desktop right next to the mouse pad, my finger does not penetrate and there is an immediate resistance I feel in the muscles of my fingers, hand, and arm right into my shoulder and upper body.

Up to this point in this inquiry, I have focused on intending to explore the texture of a surface. But I may change the form of experience once I change my intention to feel the shapes of things. For example, I may run my fingers along a coffee mug to feel the texture of its surface. In comparison with the mouse pad, there is a different sensation: it is entirely smooth, as if polished. But I may change my intentionality and run the fingers along, for example, the handle (Fig. 3.2). As my hand runs down the handle, I can feel my fingers begin to move with respect to

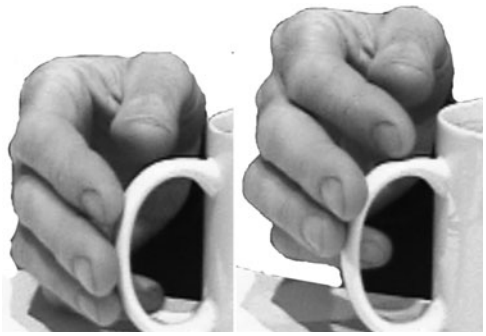


Fig. 3.2 Exploring shapes by means of the sense of touch requires the movement of the hand and opening up to be affected.

each other and the hand moves with respect to the remainder of my body. As I move my hand along what I know to be the handle of the coffee mug, the thumb and index finger begin to move with respect to the middle finger, which itself approximately stays in the same position for a while. From these changes, I know based on experience how to name the underlying shape (topology) as a curve – or, after feeling the other parts of the object, as the handle of a mug. In fact, I may do this blindfolded and I feel 'a coffee mug'. My hand *feels* the mug: I do not have to stop and 'interpret' whatever 'stimuli' affect my sense of touch. It is only through *the contingency of this* contact that I can feel and recognize the thing as mug. If my understanding of mugs did not also imply a bodily experience, I would not be able to know that I am touching a mug, as there is no relation between the sound /mʌg/ or letter combination in 'mug', the feeling in my hand of a MUG, and the abstract concept of a mug. Touch teaches us that there is more to knowing than words and language. Without this and the other senses, ideas (words, language) would not make sense. We can make sense precisely because we are always already in contact (with) and remain in touch with a world. This also means that there is no ideal knowledge as such, for it is always already contaminated in contiguity with the world.

As before, I can slide my hand along some object in the dark. My intention to feel shapes requires my hand to move and to open up to receive the impressions that arise from the interactions between my hand and the object. It is only because there are impressions that I can be impressed. The something gives itself as a mug. But because I cannot anticipate (foresee) what the shape is, I cannot but be a welcoming recipient of what happens to me as I move my fingers and hand *following* the shape. The shape of the object determines the direction of my hand movements. 'I make myself passive with respect to [the objects] and that they are revealed to me from the point of view of this passivity, in and through it' (Sartre 1956: 392). In feeling something as something, I discover the other. When my sense tells mmy consciousness that there is a *mug*, then the other in me has already named what it is that I hold in my hand. It is in the intention to sense what is there, that is, 'in my desiring perception' that 'I discover something like a *flesh* of objects' (ibid: 392). Importantly, what I feel is not the shape. What I feel are changes in the position of

my hand and fingers with respect to each other and with respect to my overall body as a frame of reference. What is interesting about this is has been recognized long ago by a philosopher of incarnate knowing: 'all these movements that the hand executes, all the positions it has taken in running over the solid, can be repeated voluntarily in the absence of this solid. These movements are the signs of diverse elementary perceptions, relative to the primary qualities that are inseparable from resistance; they can therefore serve to reveal ideas, and this call, executed by means of the available signs, constitute the memory properly speaking; there is therefore a true memory of tangible forms' (Maine de Biran 1859: 147).

In all of these explorations by means of touch, we notice the interplay between the agential and pathic moments of learning. The perceptions *are given to me*, in person, in the flesh, as Merleau-Ponty says, not to some abstract mind. The smooth and rough surfaces of the different mouse pads or the handle of my coffee mug resonate within me. They are first and foremost experiences in and of the living flesh, which integrates the auto-affection of its own movement and the unanticipated sensations that are aroused in the process. Although I can intend to learn (find out more about the world I inhabit), I cannot intend and directly aim at the contents of this learning. I cannot construct the surface because the sensation is an entirely pathic experience. Because I do not know what a surface texture will be, I cannot construct its nature. Whereas I can intend to learn by touching, requiring the ability to move my hands, I cannot in a strong sense construct the knowledge about the surface as I can only open up and let it (the surface) affect me. Learning arises from this concurrence of affection and auto-affection in movement. 'The perceptual . . . is always given with the feeling, with the phenomenal, with the silent transcendence. Yet *a Piaget absolutely ignores this*, has completely converted his perception into a cultural Euclidean perception' (Merleau-Ponty 1964: 262, emphasis added). The philosopher therefore challenges us with the task to accurately describe how perception masks itself, how it makes itself Euclidean – which is precisely part of the task I accomplish in this book. In contrast to Gestalt psychologists, Piaget views perception as probabilistic in nature, so that a sensorial datum comes to be the product of an equilibration that depends on innate factors that are external to each other and that interfere with one other.

From very different theoretical backgrounds, theoretical biologists, physiologists, and phenomenological philosophers have come to the same conclusion: perception is self-movement and self-affection. Perception and self-movement emerge from each other: they are made from the same cloth. This is so because the flesh (living body) is not the sum total of tactile sensations and kinesthetic experiences but the effect of a unitary 'I can' (to which I return in chapter 6). The flesh is the source of an auto-affection that is at the source of the 'I can', which subsequently allows intention to emerge. This auto-affection also precedes any sensorimotor schema. The living body, the flesh, is the condition of the self-apperception that allows me to be conscious of a sensation or pain; and this self-relation allows the self of movement and perception to coincide and to weave with and from it the world that we know. The flesh is the living/lived body, which is not the body thought by mind (soul) as its own, but the sensible body in a double sense: it is what I sense, the sensible world including the body, and what senses, a body given to itself in auto-affection that is further affected through its senses.

Interlacement

In chapter 2, I note that vision has become the dominant metaphor for thinking about knowing, even though there have been philosophers – ever-since ancient times – who proposed touch as a more suitable replacement. In the preceding section, I use and exemplify experiments that employ touch as the basis for exploring the role of the senses in the making of sense and, in this, articulate the first-person method for investigating learning. In this section, I further articulate the first-person method related to touch for the purpose of extending this analysis. I describe a first-person experiment readers should do on their own while reading along, because it allows us to establish a fundamental sense of the very possibility of knowing. This is so, because touch – or, rather, self-touching – provides the possibility to study the relationship of the knower and the known, the sensing and the sensed in their simultaneity.

Consider again the exploration of the mouse pad surface. Now, however, I have added a second one to my desktop. It has a smooth synthetic surface. After bringing it home, it had turned out not to work very well with my optical mouse and so I have put it to the side. At present I explore it rather than the one I normally use. Similar to what we see in the preceding section, my hand explores an aspect of the world on my desktop that it comes to exteriorize once the sensed property of the pad is recognizably repeatable. That is, when I am interested in the mouse pad surface, intentionally oriented toward sensing its texture, I exteriorize this world. It comes to stand out: it has an *ek-static* existence. In fact, etymologically, 'ek-static existence' is a redundant expression, for the latter term derives from Latin *existĕre*, to stand out, from *ex-,* out + *sistĕre*, to stand. To stand out is to stand outside, not necessarily outside of the body but *outside of itself*.[4] Exteriorizing means making it stand out; the properties of the mouse pad surface are *ek*static in nature when its coarse, tissue-like surface comes to stand out as such, *as* coarse, rather than being an immanent feature of my relating to the world – e.g., when I walk more rapidly on a coarse surface than on a sheet of ice. When it stands out, the sensation no longer is a property of my sensing but a property of the world. It has become detached, made to stand out and apart. In this case, my hand has learned to recognize *a kind of* surface. In fact, in contact, the mouse pad surface has taught my tact so that the latter can *re*cognize the thing that has shaped the sensing perception. I can refer to the coarseness because my tact *re*cognizes the kind of surface as something that it has felt before. In the experience, tact itself has changed. Because of its changed nature, I now feel a mouse pad rather than having to interpret some raw input – a feeling of coarseness at my fingertips. That is, I no longer experience a something that I then interpret to be a mouse pad; I immediately, that is, without mediation by reflexive pondering, experience a mouse pad – in the way I hear a motorcycle rather than a sound that I only interpret to be a motorcycle. The sensation has created an opening upon a world. But for the exploration of the mouse pad surface to be able to teach me anything at all, there initially has to be a fundamental relation between the movements of the hand and finger, on the one hand, and

[4] I return to this concept in chapter 7 on being and flow and in chapter 8 on passions.

Fig. 3.3 The left hand explores the mouse pad, thereby learning about the world, whereas the right hand touches the hand that touches. The subject of knowing comes to know itself as an object of knowledge.

the thing I touch, on the other hand. This then requires an interlacing of the internal self-affection that relates movement and sensation with the possibility to be a body that can be touched simultaneously (or in turn). I already note in chapter 2 how the very fact that there has to be movement to see anything at all intertwines my body and the world I perceive. Let us pursue this by means of a first-person investigation.

I can experience such interlacing when I use the right hand to touch the left hand in the course of touching the mouse pad surface (Fig. 3.3). Read the following instructions and then stop for a moment and engage in the experiment described. With one hand explore the surface of an object – such as I do right now with my mouse pad. Then take the other hand and touch the first. Focus on touching and feeling the surface while the other hand touches your touching hand. Attempt to understand the *process* of phenomenalization. Focus on the other hand, the one that touches the touching. What is being phenomenalized? What does this tell us about the process of phenomenalization? Stop here and explore before reading on.

You will have noticed that either you experience feeling the surface with your left hand, being able to describe it in more or less vivid terms, but simultaneously, what the right hand feels is not present in the same way. Its touch is present, but only vaguely and in the background. Conversely, if you intend feeling with the right hand what your exploring left hand does, then the sensation of the hand comes to the foreground, you can describe the surface of the hand, but now the surface of the mouse pad moves to the background, constituting but a minor modulation of the sensation that predominates your perception. Simultaneously, there is a strange crossing over. You sense with your right hand, and the left hand lying on the mouse pad itself becomes a strange corpus. The reverse is also true, if you focus on the left hand no longer exploring but experiencing the right hand its brushing movement as a caress, then the sensation from the exploration has stopped and the caress pervades the experience.

We can push this experiment even further by having the two hands explore each other, the pinnacle of contact, where each part is intended to touch the other hand

Fig. 3.4 The left hand explores the right hand, which is in the course of exploring the left hand.

touch (Fig. 3.4). *You do notice that we are engaging here in a systematic variation of experience to provide the basis for finding out the invariants!* Stop for a moment for an experiment, in which the left explores the right hand, which itself is in the process of exploring the left hand.

As before, your intentionality determines which sensation is in the foreground against the other sensation indeterminately residing in the background. When you attempt, for example, to feel with your right-hand fingers the surface of the fingers of the left hand, it is that sensation and the sense of what the surface is like that constitutes the foreground. You can also shift your intentionality to the left-hand fingers, feeling what it is to be touched. Either touching or being touched is in the foreground. You can revert the role of the two hands to come to the same assessment. In all these instances, it is one of the four possible permutations of the sensing-sensed relation that is in the ground, a second one is further back, and the other two are almost entirely disappearing though inherently and necessarily there and constituting the living experience as a whole. That is, my sensation of being touched requires the impressibility of my flesh, and the impressions are brought about by another part of my flesh that by now has almost completely disappeared from attention and consciousness. In your explorations, you may immediately note a phenomenon described some time ago in a phenomenological explorations: 'If my left hand is touching my right hand, and if I should suddenly wish to apprehend with my right hand the work of my left hand in the course of touching, this reflection of the body upon itself always miscarries at the last instant: the instant that I feel my left hand with my right hand, I correspondingly cease touching my right hand with my left hand' (Merleau-Ponty 1964: 24). We cannot have, as our present exploration shows, both experiences equally salient at the same time. This is so because consciousness is always consciousness of something, that is, there is an intentional relation to the object. As a result, the object is object only when there is a related intention; and intention is intention only because there is an object. Object and intention presuppose each other. It is this dimension that stands out, the intentional object, and everything else recedes into the ground of awareness. It does not disappear, it merely is part of the ground and therefore, as investigated in chapter 2, constitutive of the figure without being salient. This is precisely what allows the interlacement: presence and constitutive nature. It is this crossing over that we rec-

ognize. It has its equivalent in visual perception: 'The other men who see "as we do", whom we see seeing and who see us seeing, present us with but an amplification of the same paradox' (ibid: 24).

Returning to our original investigation we now can say this: The touching left hand, which is in the process of feeling out the mouse pad surface, now becomes part of the same (material) world that it is touching: It is both touching, here, the mouse pad, and of the order of the touched, the world that is ek-static in and through my perception. That is, this experiment shows three views simultaneously: My living-lived body (i.e., my immanently known flesh) also is the body I know (i.e., relate to in transcendent form) and is a material body among material bodies, ek-static body among ek-static bodies. It is inhabited by an immanent sense of itself, which stands out as felt body in transcendental consciousness, and to which I relate as a material body among other material bodies. I cannot ever separate from the first body, the one that is immanently present to me. I call it 'my' body when this immanent body comes to stand out and is felt in a nameable manner. Finally, as a medical or physical body (also: as 'a piece of meat'), it is completely objectified. Thus, we may relate three types of experience to the sense of touch. There is the sensation of the smoothness or roughness of the mouse pad; there is the experience of (the resistance of) my living-lived bodily Self moving itself against a resistance that derives from itself and from its movement against the objects of the world to produce the sensation at my finger tips; and there is the sensation deriving from the experience of my right hand that is touching and feeling the left hand sliding over the mouse pad surfaces.[5] The sensation of the living-lived body moving itself intentionally also underlies perception, as I show in the preceding section. The left hand felt by the right hand as something outside itself that can also be seen. That is, both seeing and touching are sensed from the inside – i.e., immanently – having access to the same me that explores the outside. 'We have to get used to think that everything visible is carved into the tangible, all tacit being is promised in a way to visibility, and that there is an encroachment, a crossing-over not only between the touching and the touched, but also between the tangible and the visible that is incrusted in it. . . . Because the same body sees and touches, the visible and tangible belong to the same world. . . . There is a double and crossed bearing of the visible in the tangible and of the tangible in the visible, the two maps are complete and yet they do not become confounded' (Merleau-Ponty 1964: 175). It is precisely this crossing over that allows sighted people to have an image of the thing that they touch but cannot see; and it is this same crossing over that allows St. Thomas to attribute reality to what he has to touch – rather than see – to be able to believe. The 'two maps' of which Merleau-Ponty writes also operate between the sensible and the intelligible, as we can see from the following meditation on the relation of seeing – i.e., understanding and believing – and touching. These two maps allow us fathoming the reality of the seen (understood): 'To see that which is not to see, seeing what gives itself only to the capable gaze, to the eyes that have already seen in the night of the invisible, this is at stake and *Noli me tangere* car-

[5] The origin of the intention in the 'I can' of my power to act, which in fact is the result of a self-affection, has yet to be established. We get to this in chapter 6.

ries its central motif' (Nancy 2003: 38).[6] The author then goes on with the text in the quotation that opens this chapter (p. 43), which articulates the chiasm and connection between the two orders of things: the material and the ideal.

It is precisely the crossing-over that also lies at the apparent independence of the image of the world, as the perceived object, from the mode of its perception in addition to be apparently being independent of perception. The latter independence derives from the fact that I can reproduce the movements underlying visual or sensory perception in the absence of the object. This movement underlies both my 'visualization' or 'tactile sensation' and the *re*cognition of the object when I see or touch it again. That is, when I envision (visualize) some object, it is not that there is a picture stored somewhere in my long-term memory, which I now pull like a book from the shelf to put into my short-term memory for closer inspection. Rather, it is the movement itself – the firing of the mirror neurons that also fire when the eyes move when I actually see the object – that allows me to make the object present again. And the same is true, as Maine de Biran realized over two centuries ago, for touch. But the resulting object permanence does not establish the manifold experiences I may have with the *same* object, that is, one and the same object that is given differently in different sensory experiences. The crossing-over experiment assists us in understanding that the intentionality is related to the same 'I can', which is the coordination itself of the different forms of sensory experiences. If someone has been blind and then becomes sighted, s/he will in fact have to acquire the crossing over between sight and other senses. This is so because seeing has not been part of the 'I can/will' that underlies all of the understanding of the world that I develop in the course of my life since birth. As we see in chapter 6, the source of the incarnate 'I can' is the result of an auto-affection that precedes all conscious cognition. I can only intend and will something when I already know the object of this intention or will that I can reach (for) this object; this knowing that 'I can' reach (for) the object is something given to me rather than being itself intended. If it were not in this way, there would have to be an infinite recursion where every intention would require another intention intending it. The received intent and will therefore antedate any intentional construction of anything that resembles knowledge of the world in the way metaphysical philosophers and psychologists describe it.

Interlacement Allows Awakening to Life

In the preceding section, I use first-person investigations to explore a hand touching a touching hand, with the limit figure of the hands touching each other touching. This is not a mere philosophical exercise.[7] It has very concrete applications in

[6] This reflection is extremely interesting, as it appears to be about touch, or rather, about not touching; and yet it analyzes the manner in which painters have treated the biblical encounter confronting Maria Magdalena and the Christ, who has just arisen from the dead.

[7] During the 1970s, the works of the Dutch artist M. C. Escher tended to be distributed and viewed frequently. A Google search with his name as search term immediately produces a large

the case of afflictions such as in the education of children stricken with congenital deafness and blindness. I provide the following account from the education of deaf-blind children because of its analogical relation to the first-person explorations that I conduct in the preceding sections. This analogy is possible because there are invariants; and it is precisely these invariants that the first-person methods are intended to articulate. That is, although we are learning something about self-relation and the making of sense in and with our own bodies, the analogy shows that our findings have concrete applications in the world and, therefore, that our findings from first-person investigations *are indeed generalizable*.

A Russian psychologist working with such children provides the following account of them, who display none of the 'natural' 'explorative' behaviors that classical psychologists ascribe to children: these children do not play with and investigate unfamiliar objects placed into their hands. 'In the manifestations and type of their behaviour children of this group resemble most closely "classical examples" of the deaf-blind, who have not experienced the "beneficial, revitalising influence of teaching, the divine spark", as seen by Arnould, Lemoine and many other writers in this field. These "inert masses" or "frenzied animals", as they appear to the outside observer, are shut out from ordinary life by the absence of aural and visual impressions. Passive and immobile, they would sit in the same spot for hours at a stretch, sometimes even in the same pose. They do not use their faculty of touch to investigate spatial relationships or to familiarise themselves with new objects: even the processes of eating, dressing and undressing and the satisfaction of their most basic physiological needs are only carried out after external stimulus, without which the processes concerned might be postponed in time until an extreme degree of need be reached, which in its turn would produce an outbreak of fury. They do not manifest even the most elementary urge for contact with other people' (Meshcheryakov 1979/2009: 53).

In *Awakening to Life*, the psychologist describes how deaf-blind children actually come to behave like other human beings, through a lot of painstaking work. Some of them develop to the point of eventually becoming university professors. One interesting aspect and essential component of the process of becoming aware can be noted in the episode that tells the story of how Rita learned to scoop up food – after having learned, in a long, drawn-out process, to take food from a spoon that was already filled. The process of scooping up food was difficult because, for these children, there is no apparent link between this movement and eating, at least a much weaker link than between placing the spoon in the mouth and taking the food from it. Already, to learn to take the food, Rita's hand holding the spoon was inside the hand of an adult, who guided the child's hand so that the food landed in her mouth. In a speech concerning the work of Meshcheryakov, the activity theorist Alexei Leont'ev notes that in 'these actions with objects which the child carries out jointly with the teacher and under his (manual) guidance provide the basis for acquiring gestures, the elementary language of communication' (Levitin 1982: 102). The gesture begins as a real action, which is the same as the original one but without the object, and eventually comes to take on symbolic properties. When

collection of his iconic work. One of the drawings consists of two hands, each seemingly drawing (touching!?) the other.

Rita was taught to scoop the food from her plate, she quickly learned to establish the consistency of the food and, rather than taking solid food with the spoon in her right hand, she would pick it up with her left hand and bring it to her mouth. 'Meanwhile her right hand with the spoon in it would remain quite still or more aimlessly without in no way furthering the eating process, i.e., the little girl was using her left hand in a purposeful way, while carrying out incomprehensible manipulations with her right on the teacher's insistence. In this way Rita was carrying out two parallel processes one of which had a goal while the other remained for her no more than an incomprehensible movement performed at the behest of the teacher. Subsequently, to connect the two processes the little girl, while holding the spoon in her right hand, was allowed to put food from the plate into the spoon with her left hand and then lift it to her mouth helping it along with the left hand. In this way a certain relationship between the movements of the two hands was established, movements which differed in their closeness to the natural act of eating' (ibid: 77–78).

In this episode, we see how for Rita there were initially two hand movements that had nothing to do with each other. The movement with the left hand brought the food to her mouth, but the other movement was performed for, and on the behest of, the teacher. The teachers assisted the child to make a connection by initially using the left hand to place the food on the spoon and then to accompany the right hand's movement by holding the spoon with the left hand. The left hand then could abandon its job once Rita learned that the spoon already did what the left hand had done. Its movement became independent from the movement of the left hand, which served, by reason of the contact, as a way of sensing by touch. The left hand no longer helped the right hand but in fact sensed its movement and that of the food on its way from the plate into the mouth. Even more interesting, we find in the narrative an instance of the permanence of an object, which, in the present instance, is the permanence of a tool. In fact, the nature of the spoon as a (reusable) tool became possible only when its independence and the independence of the movement was established. In much the same way as chimpanzees are known to drop the tools they fashioned to fish termites from their mounts, Rita dropped the spoon as soon as it no longer contained food. 'At first Rita used to let go of her spoon as soon as she had steered its contents into her mouth. Now that it no longer contained any food it had become an object with no purpose and the spoon was just dropped. She did the same with her cup: after sipping a little fruit-juice or milk from a cup, Rita would let go of it. Only after chewing and swallowing some food would she start looking for a new mouthful. Eventually Rita learnt to put down her cup on the table and to put her spoon down next to her plate. It was only through deliberately supporting the child's hand and gradually loosening that hold, that her teacher persuaded her to keep hold of her spoon, and not abandon it until she finished her first mouthful, in order then to scoop up and lift to her mouth the next one' (ibid: 78). In both instances, the cup and the spoon were just let go. Object and tool permanence was established at the moment when she could place the cup or spoon on the table only to pick it up again when she wanted to take the next sip or bite. Here we need to remember that the child is deaf-blind, and, therefore, the object is not available as soon as the child has placed it. The permanence of the spoon is the result of a social process, whereby the teacher first taught the child to

keep hold of the spoon until it could be used for the next mouthful of food. Once the re-use of the spoon was established as a practice, the child actually became able to place the spoon only to pick it up again when she needed it. At this point she had available what was required to make the formerly present and now absent spoon present again, that is, she had *re*presentations.

This episode exhibits the role of touch in learning to use a spoon as two movements come to be correlated, one of which senses the movement of the other. A form of signification thereby accompanies the auto-affection of the right hand through the reflected access that the touching left hand affords. When this auto-affection and crossing does not occur, the very behavioral and mental characteristics of humans as cognizing beings are absent. Because these deaf-blind children are bereft of the capacity to interact with the world by means of the long-range senses sight and sound, the special provisions required to bring them into human forms of behavior – the quotations are from the episodes of learning table manners – give us access to the process of phenomenalization normally hidden when sighted and hearing children participate in a sighted and hearing culture. The Russian psychologist suggests that whereas these children have the capacity for mental development, they are bereft of a human mind prior to the special interventions in his institution. In fact, the children in his account manifest no (social) need to be in contact with other people. Even more interestingly, they respond negatively to any attempts to touch them. They ultimately learn about objects only when adults place these in the children's hands, such as the spoon in the quotations, and, taking the children's into their own hand, guide the deaf-blind to touch and explore their feeding themselves. The children *learn* to *re*/cognize objects as such that make up a world while adults guide their hands to perceive through touch with one hand what they and the adult guides were doing with the other hand. In these experiments, the crossover described and explored in the preceding sections is part of the training – though not made thematic as such by the psychologist – that leads the deaf-blind children to develop a normal human mind.

From the experiment of the hands touching each other – and the parallel in M. C. Escher's hands drawing each other – we can draw even more conclusions if we attempt to understand the beginning of each relation. When there are no hands, how can one draw the other? How can such a system get itself into place? Similarly, if it takes the capability of touching (intentionally), how can one hand intend to touch another when the very intention is premised on the self-reflective awareness of the movement? To repeat, the movement can reproduce itself without requiring an ek-static form of knowing: we see this in the animal world where patterned behaviors develop without necessitating a human form of (ek-static) consciousness. The question is different. How can the movement become ek-static, for example, in the separation of the object from perception? We know that in early childhood development, this is one of the ontogenetic achievements. Meshcheryakov's work shows that something else is required: the generalized other through whose actions my own become significant.

I conclude this chapter with an excerpt from a letter that Maxim Gorki wrote to Olga Skorokhodova, a Russian writer and associate of Meshcheryakov who, very early in her life, had lost her eyesight and hearing: 'Nature has deprived you of three senses out of five, the senses with the help of which we perceive and under-

stand natural phenomena. But science, influencing your touch, one of the five senses, returned to you, as it were, what has been taken away from you. This shows at once the imperfection and chaos of Nature and the power of human reason and its ability to correct Nature's rude mistakes' (In Levitin 1982:115). It is not touch alone that provides the writer (in the view of Gorki) with access to human nature but science, that is, culture as understood by her teachers and the role and emphasis they place on culture with respect to individual cognition.

Conclusion

In this chapter, I engage in and exemplify first-person inquiries that exhibit the fundamental nature of the sense of touch. Without it, as the ancient Greek already realized, there would be nothing like animality generally and human nature specifically. The sense of touch, tact, is integral to contact, having arisen from contact. But, as I show throughout this chapter, contact also means contiguity, contagion, and contamination. This has yet-to-be explored implications for thinking and research education, on the one hand, and on the use of metaphors for learning, on the other hand. In touching, more so than in vision, we experience the passive aspects in the constitution of cognition. A full appreciation of passivity generally, and the constitutional role of radical passivity – passivity more passive than any passivity we can intend – in learning and knowing has yet to be worked out. There is a lot that first-person inquiries have to contribute to a fuller understanding of knowing and learning.

These findings are not just academic but have important practical implications in such fields as science and mathematics education. One of the great rallying cries in these fields has been calling for 'hands-on' experiences. Subsequent elaborations on the theme appeared to suggest that it is insufficient to provide for 'hands-on' experiences (alone) and that children also needed 'minds-on' experiences. In fact, most science teachers consider student laboratory tasks as a relief from what normally has to be done to really teach the subject matter: manual experience as entertainment and motivational tool rather than something constitutive of knowing itself. In this second rallying cry, it is implied that 'hands-on' does not mean learning, or does not mean learning of the kind useful in the sciences.

4

Hearing and Listening

> To listen is to enter that spatiality by which, *at the same time*, I am penetrated: for it opens up in me as well as around me, and from me as well as toward me: it opens me inside me as well as outside, and it is through such a double, quadruple, or sextuple opening that a 'self' can take place. To be listening is to be at the same time outside and inside, to be open *from* without and from within, hence from one to the other and from one in the other. (Nancy 2002: 33)

Many scholars have come to term our culture to be a visual-perceptual one. But in fact, the entire history of metaphysics is based on the primacy of sound (*phonè*), which, according to the ancient Greek, is the expression in humans of something that nature has imprinted on their soul/mind (Gr. *psykhé,* Lat. *anima*). The written letter as a signifier of the sound is specific to Western writing systems, and sound standing for the idea, has been the predominant chain of references from Socrates to Freud and Lacan. It therefore does not come as a surprise to find Western culture associated with the adjective *logo-phonocentrism* (Derrida 1967b). But spoken language, before the arrival of literacy and graphicacy, has been the dominant mode of communication. It is the paradigm of face-to-face communication, made possible by the very fact that we have ears. Lectures, the classical form of passing knowledge from one generation to the next, until this day, constitute the main mode of teaching high school and undergraduate classes at the university: they are based on speech and hearing. In fact, inattentive students are asked 'to listen' rather than to speak to their neighbor or occupy their time with something else.

In this chapter, I use the term 'hearing' when what we do is equivalent to understanding – as in 'I hear you' – and 'listening' to denote the act when we attentively orient to something or someone to figure out precisely because the sense of the said is not apparent, that is, as synonymous with 'to hearken'. When we do not hear, that is, if we do not understand, then we hear *something*, we hear a sound, without understanding what it is, where it comes from, what the source is, and so forth. This already points to the fact that our language is not sufficiently rich to

express the important differences that are covered over in the single and singular use of the verb 'to hear'. Thus, we hear with understanding that 'a motorcycle is approaching', but we hear a noise or sound in the dark precisely when we do not know what is producing it and where it comes from.

A Special Relation to Hearing

> It is not a matter of chance that we say, when we have not heard 'rightly', that we have not 'understood'. Hearing is constitutive for discourse. . . . Dasein hears because it understands. (Heidegger 1927/1977: 163)

Although humans would not be able to have (spoken) language without the sense of hearing: It is speaking that dominates research on knowing and learning. Thus, research reports on what students say rather than on what others hear. Yet, as the introductory quotation suggests, *hearing* is constitutive of discourse. We speak, because we hear; and we hear – e.g., a *motorcycle* approaching – because we already understand.

Deficit: Perspectives

During my first fifth grade – in Germany, a *Gymnasium* (high school or grammar school) – I lived in a boarding home because, at the time, there was only one bus that connected my village in the Rhön Mountains to the nearby (small) city where this kind of school existed.[1] One day, my mother visited me in the boarding home. We are standing in front of my locker in the hallway when she all of a sudden shook me. When I turned around, I understood her to ask me whether I did not hear her. She took me to the otorhinolaryngologist, who suggested that I had a painless middle ear infection (*Otitis media*), did not hear, and would have been completely deaf within a week. My teachers had not noted anything. Apparently I had compensated my disappearing auditory capacities by learning how to read lips. The teachers apparently thought that I was a dumb country boy because I did not react when they were addressing me from behind. I received treatment and forgot about it. I had not been aware of having lost my hearing.

Years later, I regularly went to see classical movies at Concordia University (Montreal, Canada). In some passages, I could not understand what was being said. At first I thought it was a problem with the soundtrack. But all of a sudden I realized that I could clearly understand Humphrey Bogart when he was facing the camera but I could not understand him when he was looking away from the audience. Again, I realized that I had lost – or perhaps never regained during childhood – part of my hearing but compensated for it by means of lip reading. I then found

[1] It may sound incredible, but it was only at that the time, the beginning of the 1960s, that indoor toilets and tractors for farming arrived in the remote villages such as mine.

out that this was also true in ordinary conversations, for example, while teaching. Any time students were facing me, I had no trouble understanding (hearing); but I had trouble when I could not see their faces.

I largely forgot about what some might call a disability until recently. In a fortunate unfortunate instance, I experienced the difference between hearing and not hearing. I had lain down for a nap. When I turned from one side to the other, I all of a sudden heard the ticking of a clock that I had not been aware of before. Later, when I turned back, the ticking had disappeared. I became interested. I turned my head on one side so that the ear was completely on the pillow: the ticking disappeared. I turned my head on the other side: I clearly heard the ticking. I immediately realized at that moment that with one ear, I was living in a silent world. There were things under certain conditions that completely escaped me, but that were accessible under different conditions. I lived in two worlds simultaneously, providing me with different affordances and constraints. The experience also teaches me the difference between the two experiences, the one with the twin silos and the one with the two auditory worlds. With the twin silos and visual perception (chapter 2), the preceding world is forgotten and available only through intellectual effort. Whereas with the twin silo experience, I had truly lost the preceding world, the one that existed for me before the discovery, I can relive the experience of the two auditory worlds whenever I desire. The world without the twin silos is but a memory, subject to fallibility as are all memories. This gives me an additional layer of understanding: In the world without the ticking clock, I have nothing to indicate to me that this world is different from the other one. There is no indication that I am 'disabled'. It is only in the comparison with the *other* that I notice the difference.

Cross-Modality

In the experience of an apparent gradual shift from hearing with the ears to lip reading, we observe an instance of cross-modality. In communicative exchanges with others, the eyes begin to do what the ears can no longer do. From the fact that this change was unnoticeable until its effect, at some later point, becomes drastically apparent shows us that there is an underlying oneness of the organism to whom it does not matter where the information comes from.[2] The person actually

[2] The experience of losing a capacity without noticing it is not so infrequent. It happened to me in another sense as well: vision. I noticed that something was wrong when, accompanying my younger brother to a German *Bundesliga* soccer game for which he had received tickets as a birthday present: I only saw colored splotches moving around the field but I never saw a ball. I returned home to tell my parents about it. They who took me to the ophthalmologist, who determined that I was shortsighted and needed glasses. None of my teachers had noticed that something was wrong and that I had trouble seeing what was written on the chalkboard. Even I was not conscious that something was 'wrong' and that I was 'disabled' to a certain extent, which needed spectacles to be fixed so that I could see normally again. Here, too, the change had occurred slowly and unnoticeably so that I had not become conscious of my condition. The shortsightedness became salient only when, in a special situation, the condition no longer allowed following the specific events.

does not distinguish between what is *actually* heard and what is 'heard' by different means. It is like scientists who represent visually information that they have received from outer space but which is not normally perceivable by the eye. Thus, they may represent in color the infrared or ultraviolet radiation that they do not normally see and produce images of galaxies that pull together all the information we obtain from all the forms of radiation that these emit.

But we also observe that the two maps – hearing and 'seeing' sound – do not cover each other completely. First, when people speak behind my back, or when I do not see their face, I may not know at all that someone is speaking to me, in the worst case, or do not hear and understand what the speakers are saying, in a less serious case. As the case of the ticking clock shows, I would not even know that there is a sound.

I have become attuned to problems or issues with the sound track on videotapes or television broadcasts. For example, more so than the people surrounding me I am aware of the slightest slippage between video track and audio track. The words I see and whatever I can hear with the remaining auditory capabilities is out of synchrony. When I am confronted with such a situation, it is like listening to a garbled conversation or more, like being part of a trans-Atlantic telephone conversation where one hears a reverberation of voices, a voice and its echo overlapping with what follows.

Another interesting phenomenon that comes with lip reading rather than hearing with the ears appears in viewing dubbed movies because whatever sound is perceived no longer corresponds with what the face reveals. Moreover, I have become sensitive to the relationship not only between voice heard and the movements of the lips of the speakers but to the relation of voice with all the other movements that speakers make. That is, the voice gives away aspects of the person, and a decalage or rather dehiscence occurs in the sensory world between the visual and the auditory modalities.

New Opportunities for Hearing

I had an interesting experience with classical music, which not only shows the cross-modality of hearing and other sensations but also, perhaps, opened up new possibilities for me to appreciate this kind of music. I grew up listening mostly to the popular music of the time. In my home, classical music was not really appreciated unless it was related to operetta, a genre often defined as 'light opera', where the adjective 'light' pertains both to the music as well as to the subject matter. After leaving home, I became interested in classical music, developing a taste that began with some lighter pieces and genres – Vivaldi's *Le quattro stagioni*, Beethoven piano sonatas, or a number of etudes by Frederic Chopin – and, over the course of a few years, developed a taste for all classical music (but opera) up to Gustav Mahler. However, I could not stand dodecaphonic music and much of what the 20th century had produced. It remained like this for many years, until, in 1995, I was invited to a concert that also featured *Les Amériques* composed by Edgar Varese.

At the time, I am sitting there in the last row of the long and narrow concert hall (the called *Berliner Sinfonie-Orchester*), the music begins quietly with a melody that could have been written by Debussy but then takes over and becomes – in its rhythmic changes and pounding drums – more like Stravinsky's *Le sacre du printemps*. All of a sudden, I feel transported into a different world. It is as if I am walking among giant boulders strewn over a landscape towering above me. I wind my way among them in association with the music. I allow my body to be taken by the music, resonating with the fierce dissonances, complex polyphonies produced by the percussion instruments. Each crescendo mounts another giant boulder towering over me and among which I walk as the music unfolds. At the moment, the music is entirely physical as the violent sounds entrain my entire body into an experience not unlike that I have when listening to the *Le sacre du printemps*: wild, raw, originary, primal. The experience at the time is one of a soundscape that overlaps with a landscape that I can feel with my body. In fact, the experience has both transported me into this soundscape and has been that of a landscape – the transport into and the nature of the sound being but two dimensions of the same non-self-same experience.

Clearly, the experience has been as much physical as it has been an auditory one. I left the concert hall with a strange sense of transformation. Not only had I enjoyed this experience but also I began to look for other music of the same kind. It turns out that the transformation extended to other pieces and composers. *Les Amériques* had changed *how* I heard and listened to music, opening up for me all the genres that had been inaccessible for me up to that point in time. Importantly, it was in listening to something heretofore inaccessible and disliked that not only this piece became accessible and liked but a whole genre, and with it, other genres of 20th century music (e.g., electronic music by K. Stockhausen and I. Xenakis, minimalist music, or dodecaphonic pieces). This experience, therefore forces us to reconsider how we think about change and learning, which require concepts that capture the change as such rather than as a result of external forces. The same Varese piece was accessible and inaccessible at the same time, shifting from inaccessibility to accessibility in the course of hearing and experiencing it. We may also say that the experience was syncopic, having been part of my preceding world when I could not appreciate 20th century classical music and my subsequent world, where it has become my preferred type of classical music.

Hearing and Listening in Transcribing

In the course of my research career, I have transcribed hundreds of hours of audio- and videotapes. Time and again I have come to be confronted with puzzles and interesting questions, especially when the normal modes of transcribing, based on understanding hearing, is confronted with trouble. At this point, when we no longer hear words but sounds, what is special about the normal mode of (understanding) hearing comes to the fore as we grapple with finding in the sound the intended word. In the following, I use as my object of exploration a particular instant from the videotape of which a co-worker made a transcription that somehow

did not fit to the rhythm in the speech I was hearing. The troublesome instant becomes an occasion for an experiment in hearing, as I attentively *listen to* find out what there is on the tape. I employ and thereby exemplify the experimental first-person method, which consists in varying some parameter to understand what the invariants are in our perceptual experience.

Understanding Hearing

Readers doing video- or audio-based research and who transcribe (have transcribed) themselves, particularly tapes that were recorded in less than optimal conditions – e.g., quiet room with only two participants present taking their turns at a time without overlapping – will be familiar with the phenomenon of missing words. Although transcribers hear that a person is speaking, they cannot make out *what* the speaker is actually saying. It turns out that another person might hear perfectly well what is being said. Even more interestingly, when transcribers who have trouble understanding are told what was said or what can be heard, they may actually hear precisely the suggested word(s). That is, the transcribers did not hear at all or heard another word or words and yet, when told, do in fact hear (i.e., with understanding).

The first lesson we can take from this is that we may frequently not hear the precise words that speakers are using but, because we (already) know what they are talking about, fill in whatever we do not hear.[3] Moreover, when we are familiar with a situation, we may actually hear what others do not understand precisely because we can anticipate approximately what a person might be saying, which assists us in hearing what is actually being said. Thus, in one research project that a student and I conducted together on physicists' reading of graphs from an undergraduate course in biology, he had tremendous difficulties hearing what the participants on the tap were saying. His transcriptions were full of question marks, each of which, by convention, marks approximately one missing word. Yet I had not trouble hearing and repairing the missing 30% of the transcription.[4] As a physicist, and having used the same graphs in research with biologists, I had developed a sense for what they were talking about. As a physicist, I am with other physicist from 'beforehand with the things that the said is about' (Heidegger 1927/1977: 164). In a similar manner, I conducted collaborative research in a fish hatchery, but actually had spent more time at the site than any one of my collaborators. Knowing what the fish culturists and workers normally talk about as part of their everyday work routines turned out to be beneficial in hearing what they were saying in recordings that my collaborators could not decipher.

---

[3] Filling in may also be at work in my own experience of 'hearing' by reading the lips. The process is also at work in the case of the blind spot, which we do not notice until we conduct a special experiment with an object that falls within the angle covered by the spot (for such a test, see Wikipedia on 'Blind spot').

[4] I use headphones and in the case of digitized tapes, listen in slower and faster play modes, or listen to it in the context of different software packages.

When we hear a human voice, the normal mode that goes with it is that we hear words. This is so because acoustic perception is grounded in hearing in the multiple senses of the word: hearing the sound as word and hearing as understanding. We do not hear sounds that we *interpret* as voices and as words that speakers spill forth. 'Even when speaking is unclear or the language is foreign, we initially hear *unintelligible* words, and not a multiplicity of tone data' (Heidegger 1927/1977: 164). That is, we do not 'construct' concepts while hearing someone else speak because 'sense was everywhere present' (Merleau-Ponty 1945: 210).

What does it mean to hear or, in its more attentional mode, to listen to someone else or something? It means, in fact, to open up to what is coming toward us and that we do not know what it will be. Hearing implies a form of resonance between the sound waves that the vocal cords and other speech modulating parts of another's body produce that subsequently makes resound the eardrums of the listener. The process of speaking and listening, therefore, is an entrainment of one (listener) by the other, much like two clocks on the wall can force each other into a common rhythm (as long as they are close enough together). But entrainment cannot occur when the two sounding bodies are too far apart so that resonance cannot occur. The speaker, therefore, to have any hope for being understood, has to be tuned to the listener, who, to understand, has to be tuned to the speaker. Resonance shows us that there is a mutual affection without which communication by sound would not be possible at all.

Troubled Hearing

Difficulties hearing what someone says on a recording may occur even when the transcriber has been present during the talk and even though the transcriber is familiar with the audience and with the speaker and his work. Leanna Boyer, who was a research assistant and later graduate student of mine, participated in two simultaneous ethnographic studies of a fish hatchery and a scientific laboratory (of which I also was a member). On the tape, one of the laboratory members presents some interim results of research with coho salmon that had been sourced in the fish hatchery. At one point, she transcribed a piece of talk as

> It's a very subtle curve and there's the varied temperature and you can see it's higher here, so I am pretty sure about a temperature effect that seems to be what what's mostly manipulating this.

Playing the tape allows us to hear the said, which is unproblematic and was unproblematic to the audience, as the remainder of the videotape shows. It is thought itself that the listener receives from the speech – much like Merleau-Ponty and Vygotskij described it – unless there is a problematic issue. For me, when I wanted to ascertain the said to subject it to analysis, one part of this transcription became an issue because something appeared to be incorrect. To have a correct transcription of the words, I had to *listen*, allowing an investigation of the very listening that exhibits its nature here.

I am interested here in the underlined part of the sentence. At the time when working on an article in which this section of the transcribed is to be included, I listen to the tape. I can hear the speaker say ‘temperature’; but there is something not quite right. There appears to be something missing following the articulation of ‘effect’ and before ‘that’, though it is at the threshold of the hearable. I also have a sense, though without being able to put my finger onto it, that there appears to be a trajectory in the intonation that is inconsistent with the word ‘effect’. But if I anticipate hearing the word ‘effect’, then it becomes salient, i.e., I hear the sound as such. The word ‘effect’ also is consistent with the sense of the utterance, which is about temperature as a variable that has an effect on the frequency spectrum of light absorption in the eyes of coho salmon. Because of this contradiction between the words and the intonation, I decide to make it the object of an empirical, first-person investigation. I really have to listen, and make this *listening* the topic of investigation, because ‘the one who “cannot hear” and “has to feel”, can perhaps very well, and for this reason, listen’ (Heidegger 1927/1977: 164).

When the soundtrack is played at half the normal rate, it becomes apparent that preceding the word ‘temperature’ there is more than ‘a’, but in fact something that we hear as a hesitation, often transcribed as ‘uh’. There is also a clear sense that the voice does not stop in ‘t’ of ‘effect’ but that something else is following. There is a rhythm to the speech that would be interrupted if there where to be an empty space in the sound pattern between what Leanna heard as ‘effect’ and the subsequent ‘that’. We learn from this that hearing does not only involve some translation from sound into words but also something like a kinetic melody that allows us to hear and fill in when there are interferences.

I enter the soundtrack into PRAAT, a software package linguists interested in phonetics use to analyze voice.[5] This software package allows me to display the waveform (upper panel), speech intensity (solid line), and pitch (dotted line) (Fig. 4.1). I can also select different parts of the speech displayed and play nothing but it. The first thing I note is that there is not only an ‘a’ but another sound, which I transcribe as ‘uh’ (i–ii) that follows the ‘a’. We see in the representation (Fig. 4.1) that the sound does not return to the baseline, which means that there is a transition from ‘a’ to ‘uh’. We might want to transcribe this as ‘a͡ʊh’. If I now bracket what lies between the vertical lines ii and v, then I can hear what Leanna has heard, that is, ‘temperature effect’ (line 1). But *listening* allows me to understand that there is something else between the verticals v and vi. In order to find out, I experiment by offering myself possible words that might fit into this slot. One is ‘here’, which would produce the sentence ‘I am pretty sure about a temperature effect here’, which is a reasonable and intelligible solution. Both effects, in fact, tell us something about parsing. The part up to vertical ii may be heard as one sound, as an extended ‘a’ that we might want to denote by ‘a͡a’. But, as the speech intensity and waveform show, there is a dip that separates the first and second parts of the sound. The part between v and vi played alone lies somewhere between a drawn out ‘or’ or ‘er’. If we now bracket the part between verticals iv and vi, then we can clearly hear ‘factor’, where the second part fades away, as denoted by the falling intensity

[5] It is a cross-platform piece of software and can be downloaded for free from the website www.praat.org.

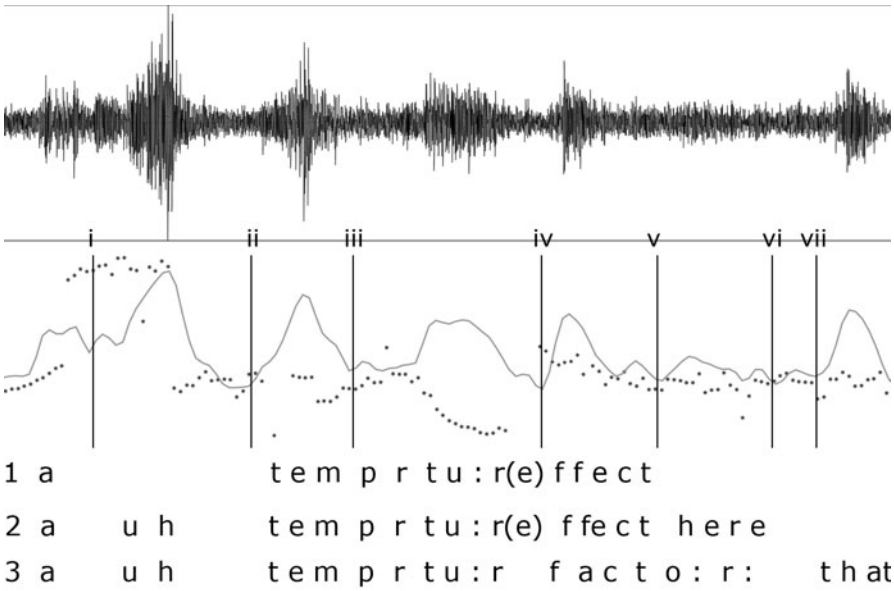


Fig. 4.1 An experiment in transcribing shows that what we understand to be said depends on where the ear parses and to what the ear is sensitive.

curve. When we listen only to the part between ii and iv, then we clearly hear the word temperature.

We now are in a position to analyze how hearing or not hearing the part between v and vi can affect what we hear in the sounds before. When it is not heard, then a reasonable hearing comes together in 'temperature effect'. This is reasonable because upon testing, the sliding transition between 'r' and 'f' can easily lead to the impression of the presence of an 'e'. A first possible solution to the added sound lies in the adverb 'here', which makes for a reasonable hearing of the sound before that is precisely the same as without the 'here'. But when the soundtrack is listened to with the parsing occurring at iv, then we can clearly hear the words 'temperature' and 'factor'. Conceptually, temperature factor is more appropriate than temperature 'effect' in the light of what is following: a clause that specifies the foregoing as 'manipulating' the phenomenon under discussion. Effects are the results of causes, not the causes themselves. Factors, when they are independent variables such as in this study, *are* causes.

I note above that there is something other in the rhythm I hear by listening to the tape than what Leanna's transcription provides. To find out, I use the software to mark the rhythm associated with the syllables and differences in loudness that we can hear and see (Fig. 4.2). If the marked place were without a word, there would be a missing beat, also marked by means of a point in transcript 4.1.

Transcript 4.1

```
a  u:h: temperatureffect (0.42) that seems tobe what
|   |     |       |    |     .     |     |     |   |
```

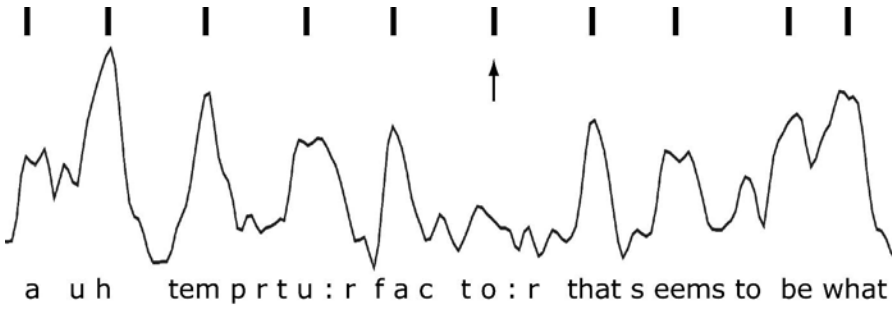


Fig. 4.2 The rhythm would be different if there were not a part of speech at the marked instant.

On the other hand, the rhythm is sustained when we hear the tape differently. Because I am sure there is something, I listen attentively to the voice around the place of interest until I get into its rhythm. I am saying the phrase together with the speaker as he talks himself along in his presentation. I am getting myself into resonance with him until we speak in unison. It may actually be better to express this in this way: I am allowing myself to be affected through contagion, that is, contact and contiguity, but also contingency, as the metric of the rhythm does not follow mathematical precision. In fact, rhythm is perceptible as rhythm only against the non-rhythmic. Like figure and ground, rhythm is perceivable as rhythmic only against that which it is not. Based on the rhythm that is achieved, particularly the drawing out and delay of the sound that is audible in the place marked by an upward arrow (Fig. 4.2), I first attempt to fill the empty beat by placing 'here' between the words 'effect' and 'that' in Leanna's transcript. Upon further experimentation, I come to the conclusion that it is more *sensible* to hear the word 'factor', where the last syllable is a bit drawn out.

Transcript 4.2

```
a  u:h: temperature  fac  to:r  that seems tobe what
|   |     |       |    |     |     |     |     |   |
```

In this experiment, I am listening (carefully) and thereby precisely not hearing the sense but looking for something else, here, the precise (nature of the) word that would transcribe the sound on the tape. I listen and have to listen because the relation between sound and sense that normally exists is not present in this case, pushing my hearing to its limit, listening for what there is to bring it into the realm of sense. That is, this episode shows how 'listening is listening to something other than sense in its signifying sense' (Nancy 2002: 62). For example, in this case I am listening to find the rhythm, even marking it in objective manner using a software package. No longer is it the thought of the speaker I hear, but I am listening for the rhythmic pulsation of his speech. But this change from understanding hearing to auscultative listening is precisely a crossing of the boundary from the understood to that which is not yet coded: 'Perhaps we never *listen* to anything but the non-coded, what is not yet framed in a system of signifying references, and we never *hear* anything but the already coded, which we decode' (Nancy 2002: 69–70).

Timbre

> Timbre is thus the first correlative of listening, and it is through it that we can even better approach what diverges here from a simple phenomenology. (Nancy 2002: 77)

Using the software package also makes me attend to another dimension of listening. While listening to the tape, I recognize the voice of the person presenting. I would have recognized the voice even if it had been played without my knowing who will be speaking. That is, there is something characteristic about the voice that allows me to hear *who* is speaking.[6] Yet the same software package represents particular aspects of the voice independent of who is speaking – including pitch (intonation), speech intensity (loudness), speech rate, and rhythm. These parameters, therefore, because they could be the parameters of anybody, cannot be what make this voice singular so that I would have recognized who spoke. This is what makes computer-generated voices, which are precisely the same under any circumstance, sound non-human. I even recognize and remember the other speakers, even though I have forgotten who else was present in the meeting. Upon reflection, we know that the same is the case in music, where we recognize the instrument that plays even when all instruments play the same melody from the same sheet of music. That is, apart from the melody (pitch, pitch contour, intonation), rhythm, intensity, and rate of play, there is something else that distinguishes the instrument and yet is unrepresented and, in the human voice, is irrepresentable: timbre. In speaking of timbre, we focus on that aspect of speech that remains after decomposition into all possible factors that we can think of – if indeed it were possible to consider timbre independent of all the other moments of speech.

But if timbre cannot be represented – in the manner my software package represents pitch, speech intensity, and other parameters of speech – and yet constitutes a form of communication – I do recognize the voice as the voice of *this* rather than another person – then it constitutes the communication of the incommunicable. This is so 'provided it is understood that the incommunicable is nothing other, in a perfectly logical manner, than communication itself, that by which a subject becomes an echo – of self, of the other, it's all one – it's all one in the plural' (Nancy 2002: 78–79). Yet when we think of musical instruments, there is something that all oboes share. There is, therefore, an aspect that we might refer to as timbre, but which does not exhaust timbre, for it is precisely the non-repeatable that allows us to identify the singular individual – much like concert musicians can distinguish one Stradivarius violin from another, and, especially, can hear the difference between a Stradivarius and some other high quality violin. That is, timbre is not a single thing, it is not a mere composition of the objective sound parameters – pitch, spectral envelope, pitch contour, change in spectral envelope, frequency modulation, amplitude modulation, prefix, and suffix – and therefore exceeds any determination of the sound of a voice or instrument by means of harmonics. Not surprisingly, noise, precisely what is irrepresentable, is an essential part of timbre.

[6] We recognize a computer generated voice – I can make my Macintosh computers read this text and they all sound *exactly* the same – which is non-human precisely because it is indifferent to the context and always the same.

'Timbre is par excellence the unity of a diversity that its unity does not reabsorb' (ibid: 79). Timbre, in the German language, is expressed in terms of color: *Klangfarbe*, which has become an English word. In direct translation, the term would be 'the color of sound'. In fact, it is not only onto the metaphor of color that timbre opens but also onto the metaphor of other perceptible registers: 'touch (texture, roundness, coarseness), taste (bitter, sweet), even evocations of smells. In other words, timbre resounds with and in the totality of perceptual registers. In this resonance, the mutual *mimesis* of senses, if there is one, does not distinguish itself from the already evoked *methexis*: participation, contagion (contact), contamination, metonymic contiguity rather than metaphoric transference' (ibid: 80).[7] Again, we find a cross-modality whereby the characteristics of the experiences related to one sense are likened, and share similarities with, the experiences of another senses. More so, in a footnote appended to the preceding quotation, the philosopher expands the implications that we can draw from the consideration of timbre: 'More generally, we should examine the contagious references of timbre to the registers of physical sounds (liquid, flow, rustling, crumpling, tearing), to that of animal voices (howling, growling, chirping, mooing), to those of materials (brassy, wooden), and finally to all those registers that solicits the description of listening to instruments or voices (what plucks or slides, what strikes, what vibrates) and even the spectacles of the bodies in the postures of instrumentalists or singers (plucking, sliding, swelling out, releasing, striking, touching' (ibid: 80–81).

Timbre poses us with another puzzle, partially exhibited in and answered by the quotations. I note above that timbre is the most singular aspect that allows me to *re*cognize the voice of our team member presenting at the meeting in the fish hatchery. Although I have forgotten the details of this meeting, I have not forgotten the voices, which I an attribute to the different people I have met there while doing my research. But if I recognize the 'owners' of the voices – because of the timbre, this aspect being the most proper defining the individual apart from other individuals, and, therefore, suggestive of a self-identity of the person – there is something that is awakened again *within me* that justifies the denotation of the event as recognition. If so, then this most singular attribute of the speaker is also an attribute (of my memory). I practically understand, through and because of personal experience that 'timbre, style, and signature are the same obliterating division of the proper. They make any event possible, necessary, and unfindable' (Derrida 1972: xiii). Timbre, as style and signature, constitutes therefore the very structure of expropriation. It shows that self-sameness and identity are but figments of metaphysics, because any form of contact also means contagion, contamination, contiguity, and, therefore, otherness.

We can conduct first-person experiments with our own voices. At present, I use my laptop computer to record my voice, reading a paragraph from a book on my desktop. You may actually do so prior to continuing. Record yourself reading from a text; then listen to yourself. Is this the voice that you hear when you speak? Even before hearing my voice, I know that it will be a voice that I know from other re-

[7] *Méthexis,* participation, is Plato's word for the contribution of the real in the constitution of the ideal. It is precisely because of the interlacement that *méthexis* denotes that the ideal has any pertinence and applicability for the real (e.g., Husserl 1969/1977).

cordings; but it is a voice that I do not normally hear in this manner. It has a timbre unlike all the other voices I know – yet I do not hear this timbre while I am reading a paragraph from the quoted Derrida text. The timbre of my voice – that which is most particular about my voice and allows others to know that I am speaking (on the phone) rather than someone else – *is inaccessible to me* while I am speaking! I remember from other occasions many years ago that even those aspects that are so distinctive about a voice that has first learned another language, its accent, is inaudible on the part of the speaker – who might, under certain circumstances, attempt to consciously make the accent disappear. That is, the very phenomenon that allows others to recognize my voice when they hear it on the phone or in some other situation where they cannot see who is speaking, is *inaccessible* to me – unless I seek assistance to access my voice through the mediation of a recording device. But this access is a delayed one, and, therefore, one related to representation. It does not make my voice present to myself.

I continue my explorations of my voice. I play the soundtrack of the read passage through the PRAAT software package that allows me to change the pitch, that is, the lowest main frequency of the voice. I add 50 Hertz. I can clearly recognize the same word being said and the program shows that in fact the mean pitch for the word 'tympanon' has changed by that value. But the voice quality has changed, even though we might have expected something to occur that resembles a musical instrument changing a melody by parts or even a whole octave. But this is not the case here. The aspect has changed even though I can hear the same raspiness in the second part of the utterance. When I look at the formants[8] of my voice for the same word 'tympanon', that is, the next five major frequencies, I note that these have remained precisely the same. What has changed, therefore, is the relation between the base frequency (i.e., the pitch) and all the other frequencies (i.e., formants) that contribute to making the timbre. That is, timbre, too, has changed.

Conclusion

In this chapter, I exemplify the use of first-person methods for the analysis of hearing. We may do so through a close analysis of what is involved in the experience of our hearing. This allows us to work out what any particular instance of it tells us about the invariants; or we may conduct experiments where hearing is subjected to variations, such as when we play a tape fast or slow or when we change the pitch. An important insight we gain is that our language insufficiently distinguishes between different modalities of hearing, that is, between *just hearing* sound (as if it were noise) or voice, *hearing understandingly* (when we access a thought), and *attentively listening to*. The analysis of hearing our own voice shows that precisely the aspect that makes us unique also is an aspect that we do not have access to without some mediation, and, therefore, points us to the inherent non-self-identity

[8] Formants are the major higher-order frequencies that a computer program uses to constitute a voice. Thus, pitch (also F_0) is the lowest and most dominant. The next higher dominant frequency would be F_1, and so on.

of all existence – ek-sistence, that is, standing out. Timbre in particular teaches us about expropriation or the problem of the proper.

The phenomenon of quite different perceptual capacities in the two ears allows us to explore issues that are frequently not available otherwise. Thus, for example, we tend to think about 'disability' by making between person comparisons, making statements about what one person cannot do that others can do. The phenomenon teaches us that the difference does not originate between individuals but that it is characteristic of the person who is non-identical with itself. Between differences are possible precisely because there are within differences, which are required for a phenomenon to manifest itself in different ways. Between-differences are nothing but comparisons of manifestations rather than of things – persons – themselves. The non-self-identity of the one is further underscored in the phenomenon of cross-modality, such as when lip reading 'compensates' for the loss of auditory capacities: what we 'hear' is the result of figure | ground differentiations that are possible only because the ground is not identical with itself.

5

Tasting and Smelling

> A gustative and olfactory sensation is not at first the knowledge of a taste or of a fragrance. . . . Before being a thematizing experience of an odor or a flavor, before the intentionality that already supposes the retreat of the feeling before the felt . . . sensation is enjoyment or suffering. (Franck 2008: 57)

In the three preceding chapters, the topics are what we might think of as the dominant senses. We use expressions such as 'I see' or 'I hear you' to signal that we understand what our interlocutor has said, and I may say that 'I am touched' when I have been emotionally affected by a story or situation. Medical auscultations tend to use sight (e.g., inspecting throat or ears), touch (muscle tone, tissue, swellings), or sound (e.g., listening to heart beat, resonance of lung cavity). But the senses of taste and smell enter the picture much more rarely; and the language related to these two senses is much less developed or metaphorized into other parts of language than those of the primary senses. In schooling, the tasks children accomplish tend to provide experiences for sight (e.g., science demonstrations, chalkboard notes), sound (e.g., lecture), or touch (e.g., 'hands-on' investigations). Again, little is done to develop or draw upon the ways in which these two other senses allow us to make sense of the world. There are, nevertheless dictions that draw on these senses, generally appealing to the affective tonality of experiences. For example, an athlete might say 'I could taste victory' or we might talk about being able 'to smell a rat'. We may also say that 'something smells bad', when we are suspicious of something without being able to 'put the finger to it'.[1] As these and other expressions show – e.g., 'to follow one's nose' to signify being guided by instinct – smelling and tasting are considered as lesser, more corporeal, instinctual, and subjective senses than the others, which allow much greater sense of agreement be-

[1] Which senses are metaphorically extended may actually differ between languages. For example, the German language has an expression that metaphorizes a good sense of smell to express that someone has good or extraordinary competencies of anticipation ('einen Riecher haben', to have a good nose for); they also express extreme dislike of a person by saying that they can't stand his/her smell ('ich kann ihn/sie nicht riechen').

tween people. Already for the ancient Greek, 'of smell and the object of smell it is less easy to speak definitely than of the senses above-mentioned. . . . The reason is that this sense in us is not exact, but inferior to that of many animals' (Aristotle 1907: 421a). Because taste is similar to the sense of touch, and because tact is the sense in which 'man' surpasses all animals, the human sense of taste was thought to be 'in a condition of greater perfection' (ibid: 421a). Although Aristotle lists a number of smell qualities, which he likens to those of taste – including the adjectives sweet, bitter, pungent, harsh, sharp, and oily – these are not as easily 'distinguishable as flavours so that they have received their names from these latter in virtue of the similarity in the things' (ibid: 421a).

Even though we do not tend to pay much attention to it, smell experiences are pervasive and tend to be associated with emotions and memories. We associate certain events and people with their smells and our emotional reactions toward them. Freshly baked bread, for example, tends to be a memorable experience for many people. Interestingly, although many people may associate a schooling experience, for example, with a particular smell, we tend not to be aware of the smell of our own homes though we might immediately notice distinctive smells when we enter the homes of others. I know that there is a particular smell about my home, which I sense every time upon returning from a trip (of sufficient length). On the other hand, when I bake bread or merely bring a yoghurt bucket full of berries from the garden, the entire house soon is perfused with the respective odor that I clearly perceive. I still remember my first chemistry teacher, in tenth grade, who did not allow us to place our noses above a beaker or test tube to smell. He showed us how to hold up the vessel and how, with a slight movement of the hand above the vessel, we can take in slight whiffs. He explained to us that in chemistry, the products of reaction might be acrid, strong, and even dangerous to our sense organs – a fact that teaches us of the affective and passive nature of the senses. We already understand that this sense, as all other senses, involves contact and passion.

A Tasting Excursion, an Excursion of Taste

Before reading this section, you may actually want to engage in some comparison tasting on your own. Take any two or more foods of the same kind and taste them. I am particularly fond of tasting olive oils, single-malt whiskeys, dark chocolate, and wines. We buy them for their taste and spend considerable time attempting to describe these foods. We have done the same with friends coming to our home, placing five or six small glasses with olive oil, asking our invitees to look, smell, and taste.

There are times and situations, when these two senses are primary, as related to the culinary arts, and then we often have to appeal to metaphors to describe a particular taste or smell. And when we read descriptions of particular tastes or smells, we often, especially when less familiar with food culture, can do and associate little with the words we read or hear. I found this out when, some 15 years ago after starting to grow my own fruit and vegetables, I became interested in food not just as a means of 'refilling the engine' and not just as a means of 'socializing' (as

is often said of Mediterranean peoples), but as a way of enjoying different tastes, flavors, smells, and fragrances. During a trip to Scotland, my wife and I began to enjoy single malt whiskeys. Initially, the number of them and the language that we found in some of the standard reference books describing each were bewildering. But today, and in the context of the first part of this book, descriptions are perfectly fitting – not in the least because they allow us to understand a range of phenomena about knowing and learning. For example, we might find a particular single malt whiskey described along five key dimensions:

Color Amber.
Nose Malty, spicy, mint-toffee.
Body Remarkably soft and smooth. Medium to full.
Palate Distinctively clinging mouth-feel, with long-lasting flavour development. Both sweetness and spicy, peppery dryness in its malt character. Nutmeg and berry fruit.
Finish Lingering, smooth, aromatic, clean. (Jackson 1999: 33)

Readers unfamiliar with the culinary arts and the description of foods will immediately notice that something other than smell and taste opens this description of a single malt whiskey: color. Whether it is whiskey, wine, olive oil, or chocolate, the visual description is an integral aspect of the food. In fact, in haute cuisine, presentation is a most important aspect of assessing (e.g., by the *Guide Michelin*) and evaluating foods. In the case of malt whiskeys, the color may actually configure what the connoisseur can anticipate. When the whiskey is very lightly colored, it likely comes from the lowlands and may, frequently, be characterized by the taste of vanilla, which derives from the American oak casks that previously had held (for 1 year) sour mash whiskey (made from corn). It is certainly not going to be a whiskey that has spent some time in casks that had previously held red wine, sherry, or port, all of which give the whiskey a distinct, sweet, and sometimes almondy flavor.

In the above quotation, as in my own description, readers will note a descriptive language that associates *this* whiskey with smells or tastes of other food items. For example, on the nose, this whiskey is said to be ‘malty’, ‘spicy’, and similar to ‘mint-toffee’. In each case, it is not a description particular and singular to the whiskey but draws on other food experiences that *this* smell or fragrance is similar to. Moreover, a particular description is not singular to one specific whiskey but can be found to describe several whiskeys, even though I can clearly pick out the differences between the two and attribute them to specific distilleries. Even within a group of whiskeys – such as those that are produced on Islay (a Scottish island part of the Inner Hebrides) that are easily distinguished from other whiskeys because of their peatiness and smokiness – can be distinguished one from each other. Any verbal description misses what is singular about the whiskey that sets it apart so that connoisseurs can attribute it to a very specific distillery. That is, in the same way that timbre escapes description and yet allows us to recognize a speaker in the dark, there are aspects of smell and taste that allow us to make distinctions even where descriptions fail.

Following the entry ‘nose’, there is another one that may surprise novices, but that wine lovers already know: ‘body’. Why would a description of a food item

include a description of the body? Here I mean not the fact that something is solid or liquid, though 'oily' may indeed be a descriptor in this category. Other descriptions include 'light', 'rich', 'refreshing', 'soothing', 'satisfying', 'crisp', 'creamy', 'rounded', 'big', 'silky', and 'firm'. Body and texture, are invoked in the reference to texture and 'mouth-feel'. Reference to extendedness and (surface) texture may have been expectable when talking about the sense of touch rather than about the sense of taste and about how something feels in the mouth. But then the expression 'mouth-feel' transgresses and expropriates the description, clearly pointing us to the cross-modality not only of taste and feel but to the cross-modality of all senses. A recent phenomenological inquiry on the body does indeed connect the two senses, clearly grounding both in the experience of eating and drinking as something that requires our presence in flesh and blood: '"This wine has body": It puts into the mouth a thickness, a consistency that adds itself to the flavor; it lets itself be touched, caressed and rolled by the tongue between the cheeks and against the palate. It will not be content to slide into the stomach, it will leave the mouth covered with a film, a fine membrane or sediment of its taste and its tone' (Nancy 2006: 153). In this description, the 'body' of the wine is related to the feel, and the language clearly metaphorizes the language associated with the sense of touch. This should, perhaps, not be so surprising given that taste, too, requires contact, contiguity, and, therefore, contamination and contingency. We use the tongue to do with the wine what we might do with an object in our fingers, touch it, caress it, and roll it around so that the wine comes into contact with the different parts of the mouth. We do so, because there are different 'feels' or 'impressions' that derive from the same wine, whiskey, olive oil, or chocolate depending on *where* it falls in the mouth and *when* it does so. For olive oil tasters, 'punch' or 'punchy flavor' are characteristics that clearly draw on the cross-modality between taste and the tact.

In the preceding paragraph on the body, I refer to the different parts of the mouth. The palate is, strictly speaking, the roof of the mouth, the structures of bone and flesh that separate oral and nasal cavities. But palate is also the expression that refers more generally to the sense of taste. It is the seat of taste. Although the book on whiskeys relates mouth-feel to body, in this particular description the first adjective uses the same term in the category of palate. Here again, the cross-modality of the senses becomes apparent – and, therefore, the differences within the singular unit 'person'. The second descriptor, in addition to calling on embodiment and con/tact ('clinging'), is strongly associated with temporality, employing both the adjective 'long-lasting' and the noun 'development'. That is, taste is not just some fixed quality but there is a temporality to it that is characteristic of taste. We already encounter temporality in the course of investigating vision, which requires the eyes to move to see anything at all, and in tact, where the hand is required to move to sense what a surface texture feels like or to discover the shape of something. Other temporal descriptors, which also have to do with the movement of the liquid through the mouth may include 'starts malty (sweetish when water is added)), becoming fruity-spicy (mustard?), with notes of seaweed and salt' or 'starts gently. Big maltyness', 'starts sweet, slightly syrupy, and malty, then becomes nutty, developing a very fruity, Seville-orange character' or again 'As the palate develops, oily grassy, and, in particular salty notes emerge'.

Temporality enters tasting in another way: I know from experience, and know that this is experienced also by professional tasters, that our sense of taste is much better or different in the morning than in the evening. The ranges of impressions that I get when tasting an olive oil are more varied and more intense in the morning than in the afternoon or early evening. That is, the *when* of the tasting experience also contributes to its constitution, which itself involves and produces temporality.

We note that together with the temporal characteristics of the category of palate, we find descriptors that are also attributed to the nose, such as the malt character and spiciness. The taster has added nutmeg and fruits to the list of comparison items that describe this particular whiskey. In these descriptors, nose (smell) and palate (taste) come to have the same character, again pointing to a cross-modality, this time between the two senses under consideration. This character therefore is the same – as per the same description – and different – arising in distinct modalities – simultaneously. This might not be all that surprising once we know that there are openings connecting the nasal and oral cavities. We know that olfaction is integral to the pleasure of eating – foods tend to taste bland when we have nasal congestion or when we hold our noses. We know this to be the case from an experiment that many children have conducted or are asked to conduct is eating an onion while holding the nose.

Two further adjectives evoke sweetness and pepperiness of this whiskey. The novice may not notice this immediately, but these descriptors actually bring in the spatial nature of taste, as sweetness is generally experienced at the tip of the tongue whereas pepperiness is registered at the very back (an important aspect when tasting olive oils, where pepperiness is an important and distinctive characteristic). Saltiness tends to be a bit back from where we taste sweetness, acidity and sourness is tasted on the sides of the tongue, whereas bitterness comes behind. In order to sense the complexity of a drink or food item, all of these sensitivities are activated when the food *moves* through the mouth. Movement means that there are both spatial and temporal dimensions to the gustatory pleasures. In the case of olive oils, pepperiness is tasted last and sometimes becomes part of the *after*taste, the taste that is hanging on when the food item has descended the esophagus. (It has its equivalence in all the other senses as well, afterimage, ringing, or echo.) Here, again, we cannot avoid but note the inherently diastatic nature of the senses and experience, because *fore*taste and *after*taste are part of taste. Professional tasters often attempt to provide equal conditions by eating or drinking special foods between the different samples, such as the apples that allow olive oil tasters to neutralize or recalibrate their taste buds.

The final category in the whiskey descriptions used by this particular guide is that of ‘finish’. Even before looking at specific adjectives used, the very notion of ‘finish’ invokes the temporal nature of taste, which is not a singular quality but one that ‘develops’, ‘lingers’, is ‘quick’, ‘tingly surge[s]’, is ‘lively’, has ‘late [dryness]’, is ‘deceptively long’, is ‘restrained’, or is ‘disappearing’. These temporal adjectives are in addition to others that add a variety of flavors and odors that already appear in the other categories, such as those associated with lemon, lemon grass, peat, pepper, smoke, or herbs. The author suggests that *finish* is more than just *after*taste. Drawing on musical and thus auditory metaphors, he describes it the category as a ‘crescendo’ that is ‘followed by a series of echoes’ (Jackson 1999:

30). The recollection of taste that comes with the aftertaste further enfolds what is present with the non-present, making both non-overlapping moments of the same unit of experience. As in the preceding paragraphs, the very descriptions used point us to the non-self-identical nature of this sense, invoking not only synchronous cross-modality but also diachronic dehiscence.

Comparison tasting of food is a great way to develop the two senses involved, especially when the testing is done blind (-folded) so that we have no other clues as to the origin of the particular sample. Experiment with olive oils, single malts, wines, or whatever else you may like to eat or drink: I have organized sessions at my home, where we comparison tasted olive oils, malt whiskeys, chocolates, and wines. As the taste and olfactory capabilities of the appreciative person develop, the differences between run-of-the-mill foods and drinks and those of quality become apparent. The connoisseur will seek out single varietals or single estate oils and chocolates, because s/he will appreciate the distinct flavors that come with each. Thus, for example, most olive oils are mixtures of oils from different farms and use different varietals. This in itself does not have to be bad, as we know from the most expensive Bordeaux wines or Tuscan olive oils. Initially, a newcomer will likely find the descriptions bewildering, as I had done, and wonder what in their own taste the description refers to. But tasting and smelling food items may be likened to learning a sport or a craft, where we begin with gross motor skills before developing the fine motor skills that make the difference between the different levels of expertise from novice to highly skilled. Experts have been shown to do better, for example, in olfactory experiments even when the differentiation of their descriptive capabilities is controlled for.

An Experiment in Olfaction

> Smell is in some ways the most mysterious of all the senses, due to the rich, indescribable nature of smell sensations. . . . While there is something ineffable about any sensation, the other senses have properties that facilitate some description. . . . Smell has little in the way of apparent structure, and often floats free of any apparent object, remaining a primitive presence in our sensory manifold. (Chalmers 1996: 8)

After returning from harvesting blackberries in the warm summer afternoon, I decide to do a quick olfactory experiment to get myself attuned to what I wanted to write in these pages on the next day. On that very morning I had abandoned doing what I had intended, using four different kinds of mint for my experiment. But my chronic sinusitis had acted up and, partly because having a stuffy nose, I could not even think about doing anything that would be reasonable. Now, in the warmth of the afternoon, with lots of fresh fruit on my kitchen counter, I wonder what I will be able to pick out and what the experience might be.

There is the yoghourt pail full of blackberries, the newly baked bread, and the bowl of fruit and tomatoes picked earlier (Fig. 5.1). I draw in to get a sniff: the bread predominates. I move closer to the pail with the blackberries and take an

Fig. 5.1 A range of ripe and freshly baked (bread), gathered (blackberries, tomatoes), or ripe food items (peach, nectarines, banana) on the kitchen counter provide an opportunity for an investigation in olfaction that becomes the basis of epistemological reflections.

extended draw of air through the nose before moving on to the bowl. Before I know it, I have taken a few rapid sniffs moving from the banana across the tomatoes, to the peach ending with a final couple of sniffs over a nectarine. I stop and reflect. Without thinking much about what I am doing, I have only taken a very rapid sniff near the bread but have taken a long and extended sniff over the blackberries. As my nose moved over the bowl in a continuous movement, I have taken very rapid sniffs as my nose moves across the ensemble of fruit.

The first thing that strikes me about my own movement is the image of the sniffing dog. We do not normally associate sniffing with a human being – though the books in my library on tasting olive oils and whiskeys do indeed have photographs of tasters at work, sniffing a glass of the respective liquid. Sniffing, its different temporal extensions and frequencies, is integral to the experience of smelling out the differences between different products of the same kind – comparison tasting of olive oils, whiskeys, chocolates, or wines, in my instance – or of different type. Sniffs are quantized, discrete samplings. But they do not change the quality of the smell – the blackberries smell as intensely as they do when I sample them in short sniffs. In fact, a recent article in a special issue on the chemistry of smell asserts that there is general agreement about the fact that the ‘sniff is as integral to olfactory perception as the eye movement is to visual perception. Just as oculomotor adjustments during the smooth pursuit of a moving object are an active process intimately tied to visual perception, so do the muscles regulating the sniff make constant adjustments to sniff volume and duration in response to the stimulus. Just as deviations in eye position can distort visual perception, so do deviations in nasal airflow distort olfactory perception. The sniff is as integral to olfactory perception as the eye movement is to visual perception. Just as oculomotor adjustments during the smooth pursuit of a moving object are an active process intimately tied to visual perception . . . so do the muscles regulating the sniff make constant adjustments to sniff volume and duration in response to the stimulus. Just as deviations in eye position can distort visual perception, so do deviations in nasal airflow dis-

tort olfactory perception' (Mainland and Sobel 2006: 181). Aristotle already recognized the importance of the sniff, as he understood that 'when not inhaling but breathing it forth or checking it, [man] has no sense of smell, no matter whether the object be far away or close at hand, nor even if it should be placed on the inside of the nostril' (Aristotle 1889: 111).

In the preceding chapters, we note that perception would be impossible without the movement of the body and eyes with respect to the objects perceived, the movement of hand and fingers across surfaces to sense their consistencies and shapes, and the movements that allow hearing to take place. In this chapter, perhaps unsurprisingly, we find that the movement is also a requirement for the senses of taste and smell: of food matters through the mouth and fragrant air through the nostrils. But the movements are of different types and the sense of smell derives from an overlap of the different active and passive movements of air through the nose and the movement of the nose through physical space. For example, in the movement of my nose over the kitchen counter, landscape (i.e., the distribution of foods) and 'smellscape' (i.e., the distribution of odors) come to be overlaid. But they are not identical, as the smell of one item still lingers while the second smell approaches. There is therefore a clear sense of spatiality associated with smells, associated with the distance from a single source – approaching the kitchen will intensify the smell of fresh bread – and across the kitchen when different, strongly scented products are co-present. The spatial movement of the nose is associated with a change in smell, whereby a particular smell becomes strong and prominent whereas another fades out. Fading in and fading out as we get closer or farther away is associated with a change in smell; and changes in smell are associated with changes in distance or orientation (e.g., if I turn my head, a particular odor will be less dominant).

I later ask: Why are there rapid sniffs as my nose moves the first time over the bowl and in an unreflected manner? I return to the bowl and, slowly drawing air in, move across it. There is a 'strange' blending, as if watercolors were running into one another. The two odors co-exist but are not ordered in terms of succession: 'They have a unity of homogeneity, but that is not yet order' (Husserl 2001: 182). Nevertheless, there is an order (of change) that is independent of the content, the odors that blend together. I give it another try, holding the peach and banana next to each other and, while enacting a single long draw, I move the nose across. Again, there is a transformation from the green banana smell to the ripe peach blending into each other to give a strange sense of odors 'bleeding' into each other. I do the same for the bread and the peach – and again, there is a sense of 'bleeding' fragrances. When I sniff rapidly across the different food items, there is change, too, but now the smells seem to be separated into parcels, associated with distinctions of the objects as these pass by below the nostrils. There are two experiences that are of epistemological interest. On the one hand, rapid sniffing gives rise to different units of smell, first the 'green banana' then the 'ripe peach'. On the other hand, the change from 'green banana' to 'ripe peach' that occurs as part of the long continuous draw constitutes change itself. This is a sniff unit that is non-self-identical whereas the preceding experience gave different units that replaced each other. In one instance, change is the difference between different units, whereas in the other instance, change is embodied in the same unit. This same unit, differenti-

ated within itself constitutes a new order: expropriation. It is because odors change that we perceive odors, and when they do not change we do not perceive them such as the characteristic smell of our own home. When sniffing rapidly, change is the result of the concatenation of sniff-units that differ, much like the illusion of movement is produced when a series of photographs is played sufficiently in succession to give the impression of a moving image. But this movement is not *internal* to the phenomenon, it is the result of an animation by the movie projector – software – projecting frame after frame at a rate sufficient to produce the illusion of *continuous* movement. In the other case, the change is not the result of concatenation of units but is internal to the unit itself. That is, when we learn through a smell, there is an inherent movement that we need to understand as constitutive to the process of learning.

This exploration actually allows us to make a connection to learning generally. In learning theories, the dominant approach is to theorize learning as the difference between knowledge as measured prior to and following an intervention (e.g., a unit, a curriculum). How this difference is produced is much less clear, and the going psychological theories talk about construction, on the one hand, and on the efforts by the teachers to motivate students, explain subject matter, and so on, on the other hand. In a very different approach, theories concerned with the cultural-historical nature of activities and social practices, the fundamental units are non-self-identical and embody change. In the former view, knowledge is static unless something changes it during some special period. This is a difference 'between a view of knowledge as a collection of real entities, located in the heads, and of learning as a process of internalizing them, versus a view of knowing and learning as engagement in changing processes of human activities' (Lave 1993: 12).

Apart from the physical movement, there is a second kind of important movement: that of the air flowing through the nostrils. These speeds differ: they are sometimes long and extended, at other times brief, saccadic intakes that one might have observed with dogs but that I have observed myself to enact. It is in fact the rapid sniffing as the nose moves sideward that allows the scent to change from the odor of a somewhat green banana to the nectarine, peach, and another nectarine. Each sniff is like a sample, and it is precisely this sampling rate that allows the *differentiation* of the smells as my nose moves over the bowl of fruit. Within the sniff-unit, the distinctions are too small to be noticed, which allows us to experience the unit as one category and, therefore, gives rise to the illusion of the self-identity of 'basic elements' of our experience.

Following the first reflection on my smelling experience, I return to the bowl with fruit to give it another try. There is no need for re-doing the bread. Its smell is so predominant throughout the room. I return to the blackberries to figure out what is so special about this deep, intense odor, which is also sweet, and I cannot help but think about as the 'black fruit' characteristic that we associate with fruity, American and Canadian West Coast wines. I stop over the banana for a while, re-sampling it repeatedly by taking rapid sniffs, while thinking about what it is that made me think of 'green banana' rather than 'ripe banana' or some other descriptor. I remember: On the day before, I had used an overripe banana in a smoothie, and the scent was distinctly different. Although this was a different banana in front of me, I envision it to have a similar trajectory through 'smell time', which would

make the 'same' banana smell differently in the course of its history on the kitchen counter. In fact, it would not be 'the same' banana, as it is precisely the chemical changes that give rise to the different odors over a period of day. This is an interesting exercise in ontology and epistemology, where our culture would identify these physically (hard to soft, green to yellow to black) and chemically (different odors, taste, feel) different entities not only by the same name but also attribute to them something like an 'identity' across the clear changes these entities undergo. There is therefore an inner continuity that (potentially) links different experiences. This inner continuity and thus unity of the material content 'is in the first place rooted in the most original continuity of temporal extension. All continuity with respect to content . . . is the unity of a continual fusion passing from phase to phase; but the content can only meld together continually in the continual process of becoming in the order of time' (Husserl 2001: 188).

There are other temporal dimensions as well, one deriving from the physical movement of the nose across the 'smellscape', the other associated with the temporality of the sniff. Whether short or long, a sniff is extended in time; and it is separated into parcels that arrive at different times and rates.

Smells can be remembered. I recognize the typicality of the ripe peach *as* ripe peach, associate the scent of the nectarine with the plums on the tree in front of my office window that are not yet ripe (thus, because I am writing during the month of August, this memory of my plums goes back at least to the preceding year), and compare the different smells of the two bananas, the sniffing of which was separated by a day. Changes in smell over time, therefore, are constitutive of time itself: change. Our understanding of time is deeply intertwined with the changing of smells from the sweet smell of a baby to the stench of death. We may smell the flowers of a peach tree, which later changes to the barely noticeable odor of the unripe peach, which subsequently exudes a heavy, inebriating smell of ripe fruit, before it changes into the putrid smell associated with becoming foul. Thus, '[t]ime in its course binds together the earth and the laboring hand of man; man creates this course, perceives it, smells it (the changing odors of growth and ripening), sees it. Such time is fleshed out, irreversible (within the limits of the cycle), realistic' (Bakhtin 1981: 208). We also know that there are particular smells associated with the different seasons of spring, summer, fall, and winter. There are different smells available on a hot summer day versus on a summer day following an infrequent rainfall event. Once gain, our very understanding and sense of temporality is shaped by smells that are associated with the stages, progressions, seasons, and developments of life.

As my nose moves across the fruit bowl, I detect differences between the peach and the nectarine – even though textbooks will say that they are from the same species but constitute a different cultivar group that differs in one gene coding for the difference in skin type: fury and smooth. Yet whereas the peach, in this case, has a clear and unmistakable fragrance of a ripe peach, the nectarine has less of this fragrance with an admixture of a ripe yellow plum, such as the ones growing in my garden. I take the two fruit into my left and right hands, respectively, sniffing first one, then the other. I turn each fruit around wondering whether they will smell differently at different places – including the slightly damaged spot on the nectarine where it has started to brown. But in each case, sniffing turns out to re-

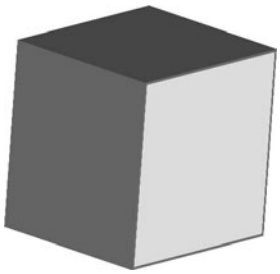


Fig. 5.2 A cube in the manner geometry theorizes it never is experienced. It always only presents one aspect against all the others possible – in vision as in tact.

turn a constant smell independent of the orientation. When I make a fruit salad on the following day, I open up each of the two fruit to compare them again. The smell on the inside is the same as on the outside. The upshot of this investigation is that there are no hidden aspects to smell in the way I report them in a recent book on the visual and tactile experiences with cubes in a second-grade mathematics classes. Whereas inside and outside clearly are distinguished by the senses of vision and touch, the fragrances of the two fruit remain the same when I open them up. In the case of vision and touch – as Merleau-Ponty already suggests – there are different views and knowing a cube means that we know what happens to the perspective when we move around the object or move the object itself. Similarly, the cube is never given to touch in its entirety (Fig. 5.2): we do not (consciously) experience – i.e., see or touch – the 8 vertices, 12 edges, and 6 sides simultaneously. Here it is important not only to think of the hands touching eight vertices, which, if the cube fits the hand, can be felt. Rather, it is the 'nature of eightness', 'twelveness', and 'sixness' that we cannot experience – apart from the fact that whatever we experience never is a geometrical cube, as any real cube is but a natural object of the kind that historically has given rise to the idea of a cube with certain properties that in the natural world cannot ever be realized. The experience of a cube is given us in a *succession* of sensations, a finding reified in recent neuroscientific research on the neuronal patterns in the representation of space around us (Rizzollatti et al. 1997).

The result of sniffing out the peach and nectarine also shows that there is no differentiated fine structure to the smell of each: the smell is given at once and as a whole. That is, whereas we may shift attention in other senses to move from coarse to fine structure – e.g., the shape of the handle versus its surface characteristic investigated in chapter 3 – the same is not what we find in the case of the sense of smell.

Related to our engagement with objects of consciousness, Husserl (2001) notes that we *are affected by* them: a particular colored figure may come to affect us, becoming dominant in our consciousness, and this attention is a function of both consciousness turning toward the object and the object's aspects that surreptitiously demand for and appeal to our attention. With respect to sounds, it may be the noise from a passing car or the notes from a song that affect us, bringing the object to prominence and, in turn, contributing to the becoming prominent. In the case of smell, 'prominent odors' have the same function as 'particular colored fig-

ures' or certain sounds that become prominent because we turn to them, but we turn to them because they have been more prominent among all the other possible sensations in the respective sense modality. The phenomenon of affection is understood as 'the allure given to consciousness, the peculiar pull that an object given to consciousness exercises on the ego; it is a pull that is relaxed when the ego turns toward it attentively, and progresses from here, striving toward self-giving intuition, disclosing more and more of the self of the object, thus, striving toward an acquisition of knowledge, toward a more precise view of the object' (ibid: 196).

In the case of smells, however, there is more than the affection of consciousness. We may indeed pursue a smell that stands out, attempt to understand its source and effects. But above all, we tend to be emotionally affected by smells, turning toward or away from them. We tend to find smells disgusting (decaying bodies of road kill, farts), intoxicating (certain perfumes), or enticing (perfumes, food [e.g., smell of fresh bread]).

The sense of smell also raises the question whether there are *re*presentations of smell. I may think of my office at the university and can visualize it: the shelves with the differently colored books, the two desks, windows, video, table, and chairs. But is hard to 'visualize' its odors – without confusing stuffiness with a university office, the wall-to-wall carpets, and the humidity and dust that it tends to harbor. Clearly, I *re*cognize smell, as the present inquiry shows. *Re*cognizing, however, does not require representation, as this sense of having smelled, seen, felt, heard, or tasted before depends only on a reactivation of prior sensations, which in fact constitutes the immanent knowing of these sensations. Representation means that I can activate the sense in the absence of the smell. But the fact that we associate smells with independent objects, that is, their relation to particular kinds of objects, points to a degree of cross-modal support in representational activity. I may not be able to actually generate the smell of lemon, but I can *anticipate* the different odors that will be in my nose when I go to the different types of mint in my garden. If I smelled different mints in a blindfolded experiment, I would be able to say from which part of my garden the mint came.

Coda

The preceding investigations show that there is something bodily to these senses, which require the person to be right up next to their phenomena, as in touch. Both taste and smell are integral to our experiences in the world, being associated not only to the affective dimensions of experience – as if these could be separated from experience as such – but also to our understanding of space and time. If I know that I have to turn to diminish the intensity of a smell that I do not like, or cover my nose, this is so because there are *internal* connections in knowing related to movement and orientation in space, on the one hand, and smells, on the other hand. There is not some cognition of space independent of the cognition of smell. The two are integral parts of knowing so that there is an *inner* connection between these two, as there are inner connections between any combination of sense modalities and cognition.

Idealist, metaphysical epistemologies and classical psychology – which have given rise to constructivism – have little place for sensual experiences, especially those of taste and smell. This lack of appreciation goes far back in the history of ideas, and was clearly articulated in idealist aesthetics: 'the sensual of art only concerns the two theoretical senses of vision and hearing, whereas smell, taste, and touch are excluded from the artistic pleasure. For smell, taste, and touch are directly associated with the material as such and with the sensual qualities thereof; smell with the material volatilization through the air, taste with the material dissolution of substance, and tact with heat, cold, slipperiness, and so on. Because of this, these senses cannot be related to the objects of art, which are contained in their real independence and do not admit a mere sensual relation' (Hegel 1835: 51–52). The investigations in this chapter show that these two senses contribute to the constitution of those experiences that tend to be thought of as being more important to cognition, especially in mathematics and science, such as space and time (which Kant was taking as a priori to experience).

I find it interesting about senses that are not as common as others (e.g., touch, sight) that their investigation can teach us a lot about the limitations of the metaphors that we use for understanding knowing based on the dominant senses. In fact, there may be much common sense and unscientific understanding underlying how we think about knowing and learning because we over-generalize from the experiences of touching and seeing. In the philosophy of the sciences, this has led to a questioning of the visual metaphor, according to which mind and knowledge were simply mirrors of nature. Sight and touch experiences continue to be the dominant resources in the epistemology of the educational sciences. Investigations of taste and smell may actually assist us in rethinking some of the misconceptions that continue to dominate the research on knowing and learning.

II

MUNDANE EXPERIENCES

Much of and in our mundane lives does not require conscious awareness. We walk without thinking about the ground upon which we set our feet, our footwear, or about walking as a process (we walk rather than placing feet). The sciences of learning tend to downplay the role that these experiences play in knowing and learning generally. In fact, there is a general attitude to think life in terms of representations, some of which as denoting facts ('declarative knowledge') and some of which as denoting how to do things ('procedural knowledge'). And when it is inopportune to approach the issues at hand in this manner, then what people do is reduced to 'rote' or 'tacit knowledge'. Framing issues of knowing and learning in this manner lends itself to those approaches where only what can be represented counts as a (legitimate) form of knowledge. Representations are things that can be stored, either at a short-term or at the long-term. How some acting person accesses what is in storage tends to be treated as unproblematic, even though we are all familiar with situations where we have forgotten something and, despite all intention to look for it, we cannot find it; and then, some time later, we remember what we had forgotten even though we do not even try to do so. Moreover, we do know *that* we have forgotten something but do not remember it. Why and how do we remember and forget? How can we theorize remembering and forgetting? These are issues that the first-person analyses in chapter 6 pursue.

During the analyses of memory-related phenomena in chapter 6, it becomes apparent that there are phenomena that question the very usefulness of the concept 'representation', because we are sometimes aware of 'something' but not of 'some thing'. That is, the representational status of a situation is not of the kind required for rationalizing thought. It is only when the situation becomes significant (takes on significance) that it is available for theoretical thought. In chapter 7, I use such an instance to depict how first-person methods draw out invariants from an individual case and then show how it can be made to work together with third-person methods for the benefit of the latter to generate theoretical understandings.

In some instances of our lives, we not only do not require conscious awareness but also conscious awareness of our situation is completely absent; in fact, the type

of experience would not exist if we were consciously aware of something. This occurs when we are totally absorbed in/by some activity, when 'time passes' without our noticing. In fact, not noticing and the absence of conscious awareness come together, for we only remember those things that are available *again* in and to consciousness, those things that can be made present again, that is, that can be represented. How do we think (about) and theorize this state of absorption? How does this state of absorption relate to those parts of our life characterized by conscious awareness of/for the situation? How can there be transitions between the two forms of being in the world? Being/presence and the presence of the present are the topic of the inquiry articulated in chapter 8.

In educational research on learning, the perhaps most underrated aspect of human life are the passions. Pain, suffering, love, hate, ailment, affliction, seizure, excitement, agitation, intense emotion, outburst, rage, temper, strong affection, impulse, desire, exaltation, intense enthusiasm, and zeal all are part of everyday life. These do not just shade cognition from the outside but everything we do, everything we think is integrally tied to and involves the passions. Moreover, the passions also include all those experiences where we are subject and subjected to outside forces and influences, that is, life itself. Yet research on learning does not take into account the pathic dimensions of life. These dimensions derive from the fact of our having/being a living and lived body – i.e., that we exist in flesh and blood. That is, research on learning, by focusing on *re*presentations alone, essentially pursues a metaphysical agenda. In chapter 9, I exhibit the first-person method in the analysis of concrete experiences of crisis (transformation) and suffering (chronic illness) to draw out invariants of human experiences generally and of the pathic aspects of learning specifically.

Every waking hour of the day, we think and speak. Some 80 years ago, already, there have been suggestions that traditional psychology does not properly account for the relationship between thinking and speaking (Vygotskij 2005). The classical model is built on the idea that speaking reproduces what has been imprinted in the soul/mind (Aristotle) and what is present in the mind (e.g., the 'mental structures' and 'mental models' of constructivism). Speaking then constitutes an external representation of (internal) mental events. This view is but another instantiation of a metaphysical agenda that privileges ideas (ideals) over the contingencies of material life. Close first-person analyses of speaking events show, however, that thoughts do not precede speech. We find our thoughts *in* our speech. In chapter 10, I use a particular case to illustrate the first-person method at work in the analysis of the relation that ties together speaking and thinking.

6

Memory

We tend to take remembering as an unproblematic phenomenon – unless we try to remember something that is not instantly in our mind, at which point the process becomes problematic. When we forget something – to bring lunch to the office, the name of a street – we attribute it to a failure of the mind without reflecting too much about the phenomenon. Remembering may be taken in the way we think about taking something from a cupboard or bookshelf. Take the following exchange in which a colleague asks me about where I bought a particular bottle of wine.

– In which liquor store did you get this bottle of wine?

– The one in Broadmead Village.

In this instance, I answer without hesitation, remembering the particular store in which I have made the purchase. I recognize the question as pertinent, for the selections of the different liquor stores in my town are different. Memory is an important aspect of mundane, everyday life, when those getting older complain about not remembering so well anymore, when students' do an 'all-nighter' to 'cram' for examinations and subsequently brag that on the day after they have already forgotten everything, or when we go shopping and forget an important item or forget to put that item on the shopping list. In this chapter, I exemplify the first-person method by means of a series of investigations relating to memory, remembering, and forgetting.

Recognizing Something Forgotten

In the learning sciences, researchers generally use the term 'representation' or 'mental representation' as a main category for theorizing how the mind works. But what does such a category imply? How does memory work when we apparently have forgotten a 'mental representation' and yet, upon seeing some situation again, recognize that we have seen, heard, or known it before? A representation is some

entity that stands for a thing, phenomenon, or situation. But where is that representation when it apparently is out of sight? The idea of a representation is that it makes (allows making) present again in the here and now of the instant some idea or phenomenon that is not present itself. What is a representation when it is apparently unavailable? In the course of the two investigations in this section, we come to the understanding that it is the reproduced and reproducible sequentiality that matters: immanent processes that reproduce themselves and provide me with memory.

Memory in Context

In chapter 2, I describe my stay at the *Hanse Institute of Advanced Sciences* where I conducted extended first-person experiments and investigations in learning something new. It turns out that many of my research notes focus on memory and on remembering something long forgotten. I began to take note of a number of phenomena related to memory.[1] One entry on the second day of the experiment describes aspects of remembering and forgetting. Even today there is sufficient detail in the account that I wrote more than 12 years ago to allow me locating the farm and the Y-fork described on a Google satellite map.

> Day 2. As I am riding along, there are features in the environment that I have not remembered yesterday at home after the trip, but which I nevertheless recognize the moment I approach them. As I come around the Y-fork, I remember that I had seen from here the child on the bike and with the dog ahead of me. They then turned into the farm some 200 meters further on. I remember the field with the freshly sprouting grain plants though I had not remembered them at home. Thus there are things that despite the complexity of the experience, I re-cognize even before I reach the place, that I start to anticipate when I get within reach. But then there were other farms, other signs, other features that I seem to see for the first time. . . [E01p15]

In this account, the first sentence tells us about experiences in general: There are repeated instances during this second trip that I have not written down – not remembered when doing so – after having completed the trip on the day before. I have not remembered those features even though I had done my best to do so, because this was the whole point of the experiment: remembering as much as I could. On that first day, following my trip, I actually sat at my desk attempting to visually retrace where I had been so that I could write down as many features as possible. But there was little that I did in fact remember. On the next day, during the trip, in several instances, one of which is then referred to in an exemplary fashion, I remember something just before I actually get there. In the described example, it is a

[1] In that chapter, I write about having set up a 20-day experiment intended to study learning something new. Riding the same circuit repeatedly, I was writing down after each trip what I remembered to have seen, and prior to each trip, make a list of things I anticipated to be seeing (again).

child on a bicycle accompanied by a dog, who had been just ahead of me after I turn left at the Y-fork. Just after the Y-fork, I remember the child, bicycle, and dog but had not remembered them the night before when I wrote my notes and had not remembered them before leaving on this day to make this trip for a second time. Moreover, on that second day while the images of the little girl on the bicycle with her dog return, I also remember that there will be a farm some 200 meters further on. Even today I remember that I have to make another turn and then will be, a little further, at the gates of the local army barracks. On that second day, I recognize and remember a feature while somewhere along my trip in the 'neighborhood' of that feature that I will be experiencing shortly after even before I actually reach it.

Why, we may ask, do I not remember these features when I am at home, whereas I do remember them during the trip but before I actually see them? The account shows that this is not the same for 'all' features, for there are many phenomena that I do see for the first time during later trips – such as the twin silos or regularly spaced white posts along the highway that feature in chapter 2. There are actually other experiences that we have in everyday life that share a lot of similarity with the present situation, and which may be taken as analogies. For example, I sometimes doze off or begin thinking about something else while reading some text, a book or an article in *Science*. When I return to the text on the following day without knowing where precisely I have left off, there are instances when the text 'rings familiar'. When I go on, I realize that I have already read this part. But not all pieces of text give rise to this sense in an equally strong form. But eventually I come to a place where everything is new, often where a new heading begins – which are the places where I had broken off reading, if there are had been reasons for breaking it off. Similarly, we *re*cognize parts of a melody that we have heard only once before without being able to remember the entire tune or even parts of it. But we can often anticipate the next few notes, as I have experienced during a pause between two movements of a symphony or concerto. I have also had the experience that upon hearing a tune on the radio, I begin humming another tune when the former ends. I subsequently realize that it may have been the next song of the same band on a particular album or that it may have been a song by another performer but it has been the next song on an audiotape that I recorded from the radio.

Returning to this second trip, it is as if I am recognizing, all of a sudden, a place that I have been before and know what will come next as long as this 'next' is not too far away. It is a replaying of sequences of images. Some images may trigger a sequence of images even though I had not been able to recall them. There are traces, fragments that lead to a replaying of past sequences in the same way that we hum on based on hearing a few notes even though we have forgotten the melody. At the time of the experiment, the (memory) traces are not strong or deep enough to allow me to recover them at home on the first afternoon. But over time – I have done the trip for 20 days in a row – the traces become sufficiently deep to give rise to the memory when I re-read the research notes of the time. It turns out that the memory is especially good and verifiable for those events that 'marked me': these 'remarkable' events can be 're-marked' today, that is, made present again.

This episode tells us about the relation of presence and the capacity to make some presence present again at another place and time. Although I am present on the stretch between the Y-fork and the farm, where I see the child on the bicycle and the dog, I cannot make this presence present again while sitting at my desk following the trip on Day 1 of the experience. The 'trace' is not strong enough: I cannot yet activate the images on my own and therefore cannot use them to point me to the original event. In fact, therefore, the trace has already disappeared. But I know that I have been here before at the instant when I *re*cognize the environs and then *re*member to have seen the girl and that following her farm I have to take a right turn where I then would see the gates of the barracks in the not-to-far distance. At that time, during this new presence in the place, the old presence returns in the form of a memory. Spurned by the actual images, not only does this fragment of the old presence return but also the images that temporally followed that former presence. The whole sequence is playing as soon as the first image appears, just as a melody in my mind unfolds as soon as any part of a familiar tune comes to be reawakened.

This remembering in context, therefore, is the beginning of memory, where there is an immanent memory. This form of memory is insufficient to stand on its own, yet it is sufficiently strong to return when activated by another presence. Familiarity with the setting, therefore, much better than 'representation' (in the psychological and cognitive sense) describes the development of the capacity to remember and think. The form of memory initially is immanent to the movement of images itself.

In such an experience, a person appears like a tablet, where some original experience leaves a trace that then somehow sinks into the past only to be resuscitated by a subsequent experience. This image of the trace is problematic when it is thought like a representation, which would take us back to metaphysics where there are structures in the human mind and body that stand for other things. Sigmund Freud introduced the idea of a magic tablet (slate), where the trace left by writing on it is erased by a pull on the sheet between the writing surface and the wax below. This is equivalent to having new experiences such as the ones that followed on the day when I see the child and her dog. These subsequent experiences write over and erase the preceding one so that when I arrive at my temporary home, I cannot write anything about the girl and her dog, which, in essence, I have forgotten (about). The magic tablet is an analogy that has permitted Freud to show how something apparent in consciousness can disappear – equivalent to forgetting – but remain in the unconscious of the person, as the impression in the wax itself remains, but is overwritten and changed by subsequent writing. This process of writing, therefore, also changes the person, as previous markings in the wax of the magic tablet come to be transformed and disfigured.

It has been suggested that this 'Freudian concept of the trace has to be radicalized and extracted from the metaphysics of presence that still keeps it (in particular in the concepts of the conscious, unconscious, perception, memory, reality, that is to say, also of some others)' (Derrida 1967b: 339). To arrive at a productive metaphor, we need to understand the trace as erasure, of its own presence, constantly threatened by its irremediable disappearance. This consideration shows us that we need to think the original experience, my seeing the girl on the bicycle and the dog

in this way, as a trace that is erased by the remainder of the experience on that day to such an extent that it is not and no longer can be made present when I am at my desk attempting to note *everything* that I have seen on this trip. This erasure is the fundamental experience and the few observations that are indeed retained, through repeated tracing, are the exception rather than the norm. Moreover, they are themselves subject to erasure, as we can see from the fact that the experience disappeared from my active thinking until I re-read the narrative of the event while writing this book. At that point, based on the description, the images associated with the trace returned – though not with their original vividness. 'This erasure of the trace is not only an accident that can produce itself here and there, not even the structure necessary for a determinate censure that threatens this or that presence, it is the very structure that makes possible, as a movement of temporalization and as pure auto-affection, something that we may call the suppression in general' (ibid: 339). When the thought of the trace is radicalized in this manner, we actually have a tool for 'the deconstruction of logocentrism but also a reflection that works more positively in different fields, at different levels of writing more generally, an articulation of writing in the everyday sense of the trace in general' (ibid: 339). These fields that would benefit from a radicalized thinking of the trace include, according to the author, psychopathology of everyday life, the history of writing, or the becoming-literary of the literal.

We already observe the disappearance of memory with the trace in chapter 2. There I show how the very appearance of the twin silos makes disappear the world that has existed for me, and which I have inhabited before. After the experience, I could no longer think of a world without the twin silos, even though until that ominous seventh day, there had been no twin silos in my life.

Memory in the Hand

When I grew up, adults often said to children to make a knot in the handkerchief as a form of reminder for something else. This, of course, as some of us found out, means remembering what the knot stood for. I have found myself in the store with the handkerchief in my hands but have forgotten *what* the knot was supposed to be a reminder of. Although the knot is in my hand, I have forgotten what I was to purchase for my mother. Curiously enough, there may be a form of memory in the hand itself, or any body part for this matter, which remembers something even though my conscious mind has long forgotten (about) it. Here is an account of an event, which happened a few years after graduate school while I was teaching at a private high school outside of Toronto.

One day in the office next to my classroom, I decide to call my former doctoral supervisor. But as I turn to the telephone, I realize that I have forgotten her telephone number. I try to remember it. But I cannot access the number in my mind precisely because I have forgotten it.[2] I turn my eyes upward and toward the ceil-

[2] This episode actually is of much greater interest than I can explore in this place. Already St. Augustine asked himself the question how it could be that I simultaneously forget something and

ing, as if the number were somehow available there. I realize that when I look up a word in dictionary, I pull the latter off the shelf and leaf through it until I have found the page where the item is. But it is different with the telephone number. I cannot *aim at* retrieving it in the same way. As hard as I try – whatever the signification of 'trying hard' may be – the number does not come to me. I visualize my supervisor's face, the university, instances when I have called her during my years at the university, her home, and a variety of other instances from my life at the time. I am at a loss. I decide to call the telephone directory assistance in the state of Mississippi where she lives. I do remember the traditional directory assistance, which would be 1-601-555-1212. I begin to dial 1, for making the long distance call and then dial while articulating to myself 6 ('six'), 0 ('o'), 1 ('one'), for the area code. My hand and fingers continue and, as the latter push the keys almost despite myself, a familiar melody begins to emerge from the receiver. The phone on the other side rings, and then *her* voice tells me not only 'hello' but also that my hand indeed has found the forgotten number. (The reasons for my hearing her voice rather than the voice of an operator can be found in the analyses of chapter 4.)

Two issues stand out. First, I have forgotten the telephone number; but I have not forgotten that it is the phone number that I now have forgotten. Second, the very *re*presentation that was to make the dialing process present again – so that I could consciously call her up – has itself disappeared but the process has remembered itself.

In this episode, my fingers remember a telephone number that my conscious I has forgotten and cannot recall. I do recall another number that begins with the same area code and which would have put me in contact with someone (i.e., the operator) who could have given me the number of my supervisor as soon as I had provided the name of the other party. My fingers dial a number that my mind has forgotten. Normally, this would have happened by typing the number I recalled, made present in my conscious mind at the instant of dialing, and then directed my fingers to do the dialing. This would have constituted a mediated access, because my mind could have been said to do all the work, recall the number and then provide the fingers with the instructions for dialing. The telephone number would have been a sign that mediates between my mind and the fingers: in fact, psychologists would have said that I used it as a representation, call it up from long-term memory, and use it for present purposes. But, to push this analogy a little further, looking for a phone number – or anything else for this matter – that I have long forgotten is like going into a storehouse looking for a kind of thing the specific instance of which I do not even know if it is there. Where would I look? How would I know which one of the many items I see in the storehouse is the one I am looking for?

---

remember that I have forgotten it. The only thing that we can conclude from this is that 'I have kept by the same memory the image of the forgetting without the forgotten object; this forces me to conclude that my memory, the most intimate of my consciousness, doubles itself, because it reveals equally well what overcomes forgetting as that which succumbs to it' (Marion 2010: 39). This also means that I am not in complete control over myself but have to submit myself to the immemorial and undo myself into an originary unconsciousness.

In my account, I note that at the time I am 'trying hard'. What is it that one can do when the very thing one requires as the object of intention is not available? I cannot ('mentally') reach out and pull the number from a shelf precisely because I do not know where to look for it. *If* I have a telephone book or an address book with telephone numbers, I can take my supervisor's name, look it up, and then find the telephone number next to her name. That is, I take another sign, her name, matched with the telephone number in a look up table. This name then becomes a mediational device in my accessing the right telephone number. In my trying to remember the number by thinking of familiar situations concerning my supervisor as well as the techniques we use to find a number when we do not remember it point to a fundamental issue: We know that we have forgotten something because in the total picture, the network of relations of significance, there is a void. Representations, these entities that allow us to make something that is absent present again, work because they work in concert. It is only as a totality of relations that these entities do the kind of work that psychologists ascribe to them.

'The number does not come to me'. Note that I use the passive construction in this account. In all the considerations of memory, educators seemingly forget that if something does not stay current in the conscious mind on its own – the familiar things, the names and birthdays of our closest relatives – then we use other mediating devices to have access to them. Address books have been designed such that we have rapid access to those addresses and phone numbers that we use less frequently and therefore do not remember as easily. But when we use this tool, we still have to remember something: the name of the person that we want to write to or phone. The address book would be relatively useless if we did not remember the name of the person or whether we had entered the corresponding phone number. That is, the things we are familiar with on a day-to-day basis tend to be *present at hand* and do not require our conscious attention. They are seemingly present. It is precisely when such an item as a telephone number is absent, as well as the device that would provide me with a look up table, that the nature of memory comes into relief. As the subject of remembering, *I am given* the thing – phone number, name of person, street name – that is made present again precisely when I recall the number or name. Without this thing, number or name, I cannot make present again what is required to do such a simple thing as call my supervisor.

The story does not end here, as we see in my account. There are possibilities of remembering even when the things have been lost that allow us to make present again what it takes to do what we have done before. There is a popular saying that we never forget how to ride a bicycle, even though, if we have not done it for many years, it may take a little while to do it well again.[3] In the present instance, it is the hand itself that remembers the phone number. Once I start dialing, the hand and fingers continue on their own. The fingers remember in moving: the movement *is* their memory. It is like what happens when we produce the first tones of a tune and then the melody unfolds on its own, coming from our mouths even though we had

[3] Scientists are working on the problem of explaining why and how we remember certain motor skills even when we have not practiced them for a long time. In 2009, a Scottish team of researchers reported in *Nature Neuroscience* that they have found a kind of nerve cell that plays a key role in forming memories of motor skills.

forgotten (about) it. During the event retold in my account, my right hand and its fingers begin a *kinetic melody* while typing 1 - 6 - 0 - 1 and then the tune continues on its own in the same way that my body did not forget to ride a bicycle even though there have been several periods where I did not ride one for years, up to over a decade. I do not actually require the explicit memory for each of the digits or the melody as a whole. At that instance in my life, the melody plays itself once I begin with the first few 'notes' that I remember.

The mentioning of notes brings us back to the original account. There I write about hearing the *familiar* melody in the receiver co-temporaneous with the fingers dialing the number. As I hear it, I do remember the tune that corresponds to the telephone number even though I would have been unable to recall it (the tune). In that situation, I recognize the tune when I hear it. The kinetic melody that my fingers play is reflected in the auditory melody that I hear – in a situation not unlike a person playing the piano might rediscover a forgotten tune as soon as the hands come to play the first few notes of it without the conscious mind being aware of what the hands are doing.

The term *kinetic melody* has been used to describe the writing process: 'In the initial stages, for example, *writing* depends on memorizing the graphic form of every letter. It takes place through a chain of isolated motor impulses, each of which is responsible for the performance of only one element of the graphic structure; with practice, this structure of the process is radically altered and writing is concerted into a single "kinetic melody", no longer requiring the memorization of the visual form of each isolated letter or individual motor impulses for making every stroke' (Luria 1973: 32).[4] In the way the hand and fingers remember writing a word, my hand and fingers have remembered dialing the telephone number that I otherwise have forgotten. The same apparently is the case in the process where 'the change to writing a highly automatized engram (such as a signature) ceases to depend on analysis of the acoustic complex of the word or the visual form of its individual letters, but begins to be performed as a single "kinetic melody"' (ibid: 32). Those readers who type well may actually have experienced such phenomena when they find out that wanting to write one word their hands have written another one. In this case, a different kinetic memory plays itself out. Such changes from conscious writing to kinetic melodies are typical for the development of other higher psychological processes as well. The neuroscientist suggests that the organization of these kinetic melodies is different in that it no longer depends on other areas of the brain, those, I would say in my words, that do the mediation. For example, the 'participation of the auditory and visual areas of the cortex, essential in the early stages of formation of the activity, no longer is necessary in its later stages, and the *activity starts to depend on a different system of concertedly working zones*' (ibid: 32).

I am not a neuropsychologist, nor am I particularly interested in finding out what this or that neuron or part of the brain does when scientists use various kinds of equipments to produce representations of my incarnate me. What I am interested

[4] The idea of kinetic movements also appears in the work of Maxine Sheets-Johnstone (2009), who borrows it from Luria in making an argument for the primacy of movement, which she derives based on the phenomenology of dance movements.

in is describing phenomena that I (we) live and to derive from them knowledge that better accounts for what we do than common sense and its reification in many scientific (psychological) models of how we know and learn. What is interesting, though, is the fact that the close analysis of how the telephone number is in my hand is leading me to a form of description that has a high degree of similarity with the descriptions provided by researchers who take a very different approach. This is analogous to the situation that we find about eye movement – our first-person investigations lead us toward understanding fundamental processes of knowing and learning if we only engage in slow and unbiased, critical reading of primary experiences. It has to be noted, in passing, that Luria is different from most Western psychologists in that he looks at the functioning of the brain *in the context of societally motivated activity*. That is, he does not just isolate brain cells and study them, but, realizing the program of a concrete human psychology (Vygotskij 2005), he theorizes the most fundamental processes *in the context of* processes at the level of culture and society.

Specters

In the preceding section, we see how original experiences 'sink into the past', traces that are overwritten by subsequent experiences, traces too weak to re-evoke past experiences. We *should not* think of these traces as permanent in anyway, but as continuously overwritten and changed – leading to the changing ways in which we view original experiences that sink into the past (Husserl 1980). Freud's analogy of the magic writing tablet, thought in a radicalized and radicalizing way – not as sign, but as the writing | erasure dialectic – provides a useful analogy for this process and allows us to move away from a metaphysical conception of knowing and learning. The analogy also allows us to think through another experience, which I have had during the experiment in learning that took me along the same circuit of country and dirt roads for 20 days in a row. This episode exhibits yet another dimension of memory that further elaborates the analogy of the trace. We may look at or hear something and have an impression of having seen this or something like it before but cannot pinpoint the original experience. At the time, I capture the following notes in my research notebook.

> First my eyes seem to be drawn to the thing, hold on to. Then, as in the case of the road sign 'Landwehr', I begin to think about the etymology of this compound noun – *Land*, land, ground, country and *die Wehr* [f], defense, *das Wehr* [n], weir, dam. I wonder if it has anything to do with a dam built by locals during the Middle Ages against some invaders coming from the side of the land. And finally, an even more striking re-cognition, I had a professor by that name. This second realization, re-presencing, came later, perhaps two or three seconds after my regard has been sucked into the word, I have noticed it, re-marked it as something that seemed familiar. Can I know whether something is re-markable? Perhaps I first re-mark some place, and then note it as remarkable. In this way, my vision is always re-vision. Each thing is

> seen in terms of something else, each thing is a projection of the past, the past that makes present. I seem to re-member those places and things that my eyes were sucked in previously, and much less those that I was aware more superficially, more in the background.
>
> Related to my experiences with re-marking particular places, signs, aspects of my trip: What aspects of the world (objects, actions, events) are salient so that they are re-marked at another point in time, at some later point? In my own situation, this seems to be connected to experiences that I associate with earlier other experiences. That is, events that I already re-marked from an earlier time.
>
> When I ride along and pick out a particular house and discover that it bears resemblance with a house I have lived in for an important period of my life, I was already pre-disposed for 'picking out' this rather than some other house. My perception was already biased in picking this, 'biased' or predisposed because of the experience. Similarly, when I found myself thinking about the name 'Landwehr' that I had seen on a road sign, first in terms of its etymology, then I remembered it as the name of my solid states physics professor, and the day after as the name of a street where I had once lived . . . my perception is already predisposed.
>
> There is something like a haunting memory. My gaze is drawn in without that I know why. Something appears to resonate, to be familiar. Yet I do not know why. I cannot give 'Landwehr' a place in my past. But it haunts me at this moment.

In this instance, I see a street sign with the word 'Landwehr' on it. The experience is one of affection. It is not just that the sign is seen and passes, but the seeing is associated with an affection that is contagious, making me 'hold on to' the thing. As the final paragraph in the quotation shows, excerpted from a note written a few days later, there is something haunting about the word 'Landwehr', which, as the first paragraph in the quotation shows, I cannot quite explain. It makes me think about the origin of the word: a form of defense against invaders from the landside of a town (e.g., located on a river). The note provides evidence for an experience of feeling pulled into the engagement. Then, all of a sudden, there is recognition: it is the name of a professor whose lectures on solid states physics I had attended some 25 years earlier.

The episode shares similarities and differences with that when I encounter the girl on the bicycle and her dog. In that event, I immediately remember her as I am nearing the place where I had first seen her. The trace is re-awakened as is the one of the surroundings, now without the girl, are written anew. There is no apparent time intervening and the image phenomenalizes itself apparently in an instant. In the case of the road sign imprinted with the word 'Landwehr', it takes some time, filled with a sense of being haunted, until the *re*cognition instantiates itself – the realization that a professor who once taught me had the same (rather uncommon) last name. When I attended university, of course, I have had no problems recognizing or recalling his name. He was an internationally well-known professor; and one of his postdoctoral fellows, who taught our advanced laboratory course in solid-state physics, received the Nobel Prize in physics some 8 years later. But over time, I forgot about the professor and his name. Whatever trace there had been, it

had been overwritten many times since my university days. When I do see the name again, it is 'strangely familiar', but I cannot locate why this would be so. In fact, the initial engagement with the word-name suggests that it might be the etymology that was at the origin of the affection with this object. Then follows the recognition that 'Landwehr' was my professor's name. This recognition and even the reappearance of the trace cannot be explained by the notion of agency. The experience is one of a donation, where something I (the conscious one) have forgotten reappears for me on its own, without and despite my intention. It is the seeing of the name that triggers this reappearance.

There is another interesting and instructive phenomenon in this narrative. At the time, I write that the 'Landwehr' is the name of a street I have lived on. While working on this section of the book, I search Google maps and find out that none of the streets I have lived on has this name. Now 'Landwehr' or 'Landwehr Graben' (moat) is not just a name, it is also a noun denoting the structures that towns and cities built during the Middle Ages as part of their defense systems against intruders. I did live in an area where there had been a moat once upon a time, now filled in and covered by a park around the entire city. Moreover, about 100 meters from my old high school, where I had been attending fifth through eleventh grade and the two years of college level bears the name 'Landwehrstraße' (street of 'Landwehr'). That is, at the time I originally wrote the notes, I was convinced to have lived on a street that bears this name; I was so convinced, in fact, that I did not bother looking up whether such a street actually exists in the city.

This phenomenon modifies and radicalizes any idea that might have arisen from the episode with the girl on the bicycle with her dog. Based on this episode and the way it presented itself then, and the fact that I apparently remember it to the present day, might give rise to an idea about memory that is precisely that of metaphysics, where certain traces – e.g., letters or sounds – come to stand for things and ideas. If the *trace* were of this kind, we would not be able to understand why it exhibits the features apparent in the present phenomenon. Why would there be a signifier (the trace) changing its signified without apparent reason? The present experience and analysis shows that the very (classical) idea of the trace needs to be rethought in terms of the analogy of writing, erasure, overwriting – and, therefore, continual transformation of any trace. I remembered the word 'Landwehr' as the name of a street, but, as shown here, it was not at all the name of a street that I had lived on and therefore should have remembered more clearly. It's a spectral reappearance, a ghost, which, as something that has survived. I had been in the street that actually bears this name – I now believe that a classmate lived there, and I have likely taken it or passed its beginning frequently – but without the search on a map, I would not have been able to locate it. 'This survival also is a spectral return (the survivor always is a phantom), which remarks itself and stages itself from the beginning, at the instant when the posthumous, testimonial, and scriptural character of the narrative comes to deploy itself' (Derrida 1986: 182).

This investigation shows that we should not see in an indelible, constant experience, a trace, some stable feature that the individual later *interprets* differently. If we were to make this theoretical move, then we would have developed no further. Rather, the experience (trace) *itself* changes such that we never have access to an original experience. With *re*presentation, therefore, also comes a *de*naturing, a

change in the nature of, and a denaturalization of the living and lived experience. I return to this issue in chapter 8.

Forgetting and Moira

In the preceding sections, I present and analyze episodes that contain various aspects of memory. These episodes show that experience does not leave an indelible trace, which becomes or could become a sign for some events. Approached in that way, we find theories whereby individuals 'interpret differently' the experiences they have had or, rather, the traces that these have left. There is a problem with this approach typical for hermeneutic phenomenology, where differences in the relation between past events and the person are theorized as 'subjective' interpretations that change. There are no signs or original experiences, as our first-person inquiry shows (as well as the writings of J. Derrida on the topic), because the very phenomenon of writing also means erasure, overwriting, and change even as writing goes along. That is, we should not think of the writing of a trace that stands for a while in its original beauty before it disappears. Rather, thinking about writing as a spatio-temporal process that what it just has written as it goes along more often than note erases what happens. This then forces us to *explain* those instances where a more stable trace actually appears to form. In the case of the girl on the bicycle with her dog, returning to that part of the countryside around Delmenhorst made traces of the trace appear, though not definite and which, already on that first day, could have been changed much in the same way that the trace 'Landwehr' has changed over time. Returning to the same places strengthen certain aspects of a trace; but much like the tracks left by vehicles in the road, the traces are re-written, changed with the next passage. This erasure is, as we see above, a movement of temporalization and auto-affection. This auto-affection allows me to *re*cognize in the manner described above.

In the preceding sections, my analysis shows that we need to think forgetting at the same time and together with remembering. They are different sides of the same coin. The trace both enables remembering something all the while it erases this something. On the one hand, when I try hard to forget something, an embarrassing instant in my life (at the time of working on this book, a traffic ticket I received for passing cars on my bicycle to get ahead the first in the left-turn lane) or a painful event, the very attempt to forget retains the event in my active thought. The harder I want the event to disappear from my consciousness, the more persistently and saliently it remains. Although I want to get the thought about the traffic fine behind me and out of my mind, it stays there – longer? – the more I try to abandon the thought. This has helped me, as a child, at least part of the way to the grocery store, when my mother wanted me to get something. I am thinking about it, repeating the list of items over and over again as I cross the meadow and walk up the hill to the store. But then I may have been distracted by something, just as I arrive at the store, and I have forgotten what I had gone there for (to buy). I have had to return home and ask my mother what it was that she wanted me to buy. (Of course, it would have been easier to actually use a pencil and leave a relatively permanent

trace on paper. But this is not the same kind of writing.) In this early episode, then, as long as there is repetition, the traces become temporarily permanent only to be destroyed by a subsequent thought right next to the store.

We are all familiar with the techniques and technologies of collective memory: commemorations. Every year, wreaths are laid at war memorials and volunteers sell poppies to be attached to the lapel. It is a form of keeping memory alive. It shows that there are symbols that point back to the event that is not to be forgotten. These symbols – memorials, poppies, or gravestones – are the very reason why we do not and cannot forget. Words and images, that is, things that make events of a different presence present again in the now-presence, have the same function. We tend to call them *re*presentations – things, beings, that can make another presence present again.

Just as remembering is given to me, I have to accept forgetting as a gift. Just as with going to sleep, the harder I try forgetting the harder it becomes to actually forget (and to fall asleep). Conversely, because writing is accompanied and indissociable from erasure, any thought and experience may vanish immediately. Remembering it then has to be accepted as a gift.

Presence and the Presence of the Present

> In effect, how is it that I cannot only forget but also remember *that* I have forgotten that which I nevertheless have forgotten. (Marion 2010: 38–39)

'To remember', from post-classical Latin *rememorari*, remember, composed of the classical Latin *re-*, again + *memor*, mindful (of), remembering, unforgetting, grateful, commemorative. *Memor* itself derives from the Proto-Indo-European root *(s)mer-*, to remember, care for. This same root becomes, in Greek, *moîra*, allotment, fate, destiny. *Moira* (capitalized) has an interesting role, according to the pre-Socratic philosopher Parmenides: 'for the same thing is thinking and Being' (Fragment 5).[5] He later elaborates, 'thinking and the thought that it constitutes are the same. For without what is, in which it is expressed, you will not find thinking; for nothing else either is or will be except that which is, since *Moira* [fate] bound it' (Fragment 8, 34–37). A later philosopher of change quotes and then comments on this fragment: '"Thinking and what thinking is about are the same. Because not without beings, in which it articulates itself (manifest, *en hô pephatismenon estin*) will you find thinking; for it is nothing and will not be anything outside of beings [Seiendes]". This is the main idea. Thinking produces itself; what is produced is a thought; thus, thinking is identical with its thought, for it is nothing outside its being, this great affirmation' (Hegel 1979: 290–291). But there is a tension between what is articulated and Being, that is, that thinking and that which it produces as the said are different. *Moira* bound it into one. Thinking is the same as being, but

[5] The fragment . . . *tò gàr autò noeîn èstín te kaì eînaî* ('for the same are thinking and being') (Parmenides 1906: 117) appears as number 5 in the edition I perused but is generally quoted as Fragment 3. A German and three English translations of the Parmenides text *Peri physeos* ('On nature') can be found at URL www.parmenides.com/about_parmenides/ParmenidesPoem.html.

thinking is found only in what is said, which is, in what *only stands for* thinking (Heidegger 2000). In the process of finding something, thinking itself is change; because what it finds is the result of its own prior activity, thinking rewrites itself continuously: its writing constitutes erasure.

We also find a hyphenated version of the word: re-member, to put together again, reversing the process of dismembering, adding a new member. Member, from Latin *membrum*, limb, constituent part of a 'body'. Writing is a process of erasure, dismembering the organism at hand.

Moira allows us to understand that presence is erased when it is made present again in the form of representation. The representation destroys presence at the very instant it makes present, but without representation, no presence can become present again. The trace that is erasing itself is a better metaphor for the process of Being, because it erases its proper presence. If a trace were ineffaceable, 'it would not be a trace, it is a full presence, an unchangeable and incorruptible substance' (Derrida 1967b: 339). The failure of metaphysically thinking researchers is to mistake presence and the things that make a former presence present again. Thus, for example, researchers tend to model the problem-solving process in terms of representations as if the presence of the person in the situation could be set equal to and modeled in terms of representations. It is as if presence required *re*presentation, which it does not because only the non-present requires representation to be present (again). It is precisely because full presence is impossible that there is a gap between what traditional research on thinking, learning, problem solving and the likes and the events that they believe to be researching. It is precisely why researchers who draw on hermeneutic phenomenology as method fail to recognize that there is a difference between narration and the content of narratives.

Shortcomings of Hermeneutic Phenomenology

The difference between the first-person methods advocated and described here and the approach commonly denoted by the term hermeneutic phenomenology is clear. Although we do indeed find acknowledgments of the changes that occur between an experience and its account, the changes are possible rather than inherent. In one chapter describing methodology and the method of hermeneutic phenomenology we can find this description:

> Despite my instructions to not interpret their experiences – 'just write them down as they happened' – the students' lived-experience descriptions had been interpreted long before I asked for them on paper. Furthermore, as experiences are put in writing retrospectively, they probably are reinterpreted in the light of the present. The relationship between the phenomenological life-world and the hermeneutic theoretical world is not only obvious but also inevitable. That identical events can be experienced and interpreted in completely different ways, by different people, is an immense challenge for human science research. Is that not what creates a sense of true wonder: to

> look for the ontological being through the ontic being, the universal through the unique? (Henriksson 2008: 43–44).

The author notes that there is a difference between experiences and the lived-experience descriptions, *despite* her instructions to the narrators. She notes that the experiences *probably* have been 'reinterpreted' in the process of writing. The difference between the orientation toward the 'original' experience that this author takes and the one I take consistent with the writings of Derrida is clear. In the quotation, an original trace is assumed to exist that is 'reinterpreted' differently over time; the reinterpretation may or may not occur, leading to differences within and between people. These changes are challenges only in the approach where experiences are taken as traces to be interpreted in the way scriptures are. The concept of writing that comes together with erasure – writing that erases itself as it progresses – leads us to the understanding that no trace whatsoever will be identical to a previous trace. The trace, as a way of denoting writing, is equivalent to forgetting so that it needs to be explained what memory can be and under what conditions. Experiences do not form original texts (traces) that remain in their self-identity to be subject to changing interpretations. Writing and erasure are processes; memory that is interpreted differently is state. If we want to understand life as a process, we need to use a radicalized notion of the trace developed in and through analyses of memory phenomena rather than in terms of traces that are somehow stable features carved into the memory of a person. Moreover, the 'obvious relationship' between the two worlds, the phenomenological lifeworld and the world of representation has already been thought in the concept of *moira*, which constitutes the contradictory unity of presence and the presence of the present.

The Folly of Metacognition

The pinnacle of the folly to think presence in terms of representation exists in the idea of metacognition. Here, not only is the presence of the person in the situation thought in terms of representation – representation replacing and being equivalent to presence – but also mind is theorized to be present to itself, again, in terms of representation. That is, in metacognition the working mind is thought to represent itself to itself, analyze it, then correct itself – and all of this is happening while the mind is occupied doing what it is supposed to do, for example, learning or getting the mundane work of the day done. The investigation described about the (left) hand touching the (right) hand that touches should dispel any belief that full presence – i.e., awareness of touching a surface, and awareness of the touching – is possible. It was the master theorist of the mind who realized the fundamental problems and aporia that are inherent in the idea of self-presence:

> How the I who think differs from the I that intuits itself (as I can at least imagine other ways of looking at something), and yet be one and the same subject with the latter; how, therefore, I am able to say 'I, as an intelligent and *thinking* subject cognize myself as an object *thought*, so far as I am, moreover, given to myself in intuition – only, like other phenomena, not as I

> am in myself, and as considered by the understanding, but merely as I appear' – is a question that has in it neither more nor less difficulty than the question 'How can I be an object to myself' or 'How I can be an object of my own intuition and internal perception?' (Kant 1787/1956: 151 [B155–156])

That is, there is a fundamental problem in the idea that the thinking I gives itself in its entirety in its intuition, that is, precisely at a distance and as *ob*-ject, that is, as something thrown (Lat. *iacēre*) before and against (Lat. *ob*-) myself. The folly of this became quite clear to me when I was asked to write a review of an edited volume on metacognition (Roth 2004). It turns out that there were up to 40 errors per page – typographical, grammatical, and conceptual. At a minimum, one would have thought that researchers working on 'metacognition' would be a bit more metacognitive about their own writing processes.

7

On Becoming Significant

In chapter 2, I describe the method associated with an experiment *explicitly* set up for learning something unknown before. I wanted to better understand learning *processes*, which sensitized me to the need to be aware of not only *what* I was coming to know or the *how* I was coming to know but also the presuppositions in the forms of awareness associated with each new realization. In chapter 6, I analyze – and, thereby, exhibit the methods for doing so – experiences where something seemingly forgotten is recognized, such as a particular Y-fork, a stretch of road through grain fields, and a farmhouse. The sense of familiarity, which is different than when we experience something for a first time, is precisely what allows us to *re*-cognize the phenomenon; in fact, it allows us to cognize the cognition *as* a re-cognition. We experience the phenomenon as apparently the same again. It is a return that appears almost literal despite the fact that things have changed since the previous day. But there are other returns that are even more spectral – such as the image of the girl on the bicycle with her dog when I take the left turn on the Y-fork. She is not actually there, yet in the context of turning on the Y-fork, passing the fields, and seeing the farm, the image of the girl reappears like a ghost. In chapter 6, I also point out that the concept of trace needs to be rethought radically, not as a signifier that denotes some signified currently absent or not otherwise available, that is, an event or an idea. If the trace were thought in terms of a sign, carved into our bodies, then this would require the co-presence of signifier and signified. We may be noticing something vaguely without being aware of it or its signification. We see in chapter 6 that it is better to think of the (memory) trace in terms of erasure that comes with the process of living. But an experience of having seen something before, the experience of *re*cognition, allows us to understand that the concept of *trace* must not be thought in terms of co-presence of signifier and signified, sign, or total presence. In the preceding chapter we also see how something we see – the road sign bearing the word 'Landwehr', or rather, the word-trace itself – imposes itself to become salient and significant. In this chapter, I deal with the phenomenon when something *becomes* significant. The analysis of the process allows us to understand the erasure of a trace that has not yet completely occurred.

In this chapter I am therefore concerned with an interesting phenomenon, which further questions standard approaches to the psychology of learning. Even when we are vaguely aware of something, it may not enter our full awareness (consciousness) where we then could take it into account in our decision-making. That is, simply having something present on our retina and even noticing the presence of something is insufficient to change our actions. What we see is only in a process of awakening and does not yet have behavioral relevance to the situation at hand.

The Story of the Flat Tire

The following account, which is also the object of the reflections that follow, occurred en route from the *Hanse Institute* to the university in the neighboring city, a distance of about 23 km. As soon as I arrived at the university, I wrote the 'Story of the Flat Tires'. It became an occasion of repeated instances of reflections. In fact – and readers may take this as an advice about methodical – it was written in a different electronic file first, and then loaded into my working file of the subsequent reflections *as a file*.[1]

> May 22, 1999
> *Story of the flat tires*
> I ride a long the road and jump with my bike of the bicycle path onto the road. At this point, my rear tire explodes and is flat faster than it takes me to come to a halt so that I roll on the rim for a while. I take the wheel off, remove the tire, remove the inner tube and inspect it. It has a long tear, about 8 cm. I cannot fix it with my little kit, and I have left my spare inner tube at home. I leave the inner tube in place by not removing the valve. I inspect whether in the region of the tear there are spokes coming through the lining, for the tear seems toward the center, on the inner part of the tube.
>
> I walk back to the town center and get a new inner tube. While placing it back, I vaguely notice that some of the tire wall has detached from the wire that goes under the rim. I wonder whether I should go back to the department store and get a new tire, but decide to buy one in the big specialty store in the nearby city where I might get something that is just as the one I have (for my 'special' mountain bike) – and perhaps eventually. I mount the inner tube, inflate it enough by hand to ride comfortably, I ride the 4 km to the next gas station on my way. As I inflate the tire, it explodes. I notice that the tire has a tear. I expect the inner tube to be torn at that place.
>
> 'I put the pieces together': The inner tube has protruded through the place where the wire has come off the tire and exploded when I jumped off the bicycle path. It has exploded again when I put a lot of air into the inner tube.

In the first part of this narrative, we see a person at work who tends to do a lot of cycling and who is used to not only repairing a flat tire but also to check the

[1] Even today, more than a decade later, I have to click on the story to open up the file that contains the actual text.

Fig. 7.1 This photograph of a tire clearly shows the coiled wire bead on the back part and the way the tire is shaped to fit and hold onto the steel rim. In the episode recounted here, the tear appeared just below the wire.

possible sources for the flat. For those who cycle a lot know that if a pin, nail, or piece of glass is stuck in the tire walls, it will cause a hole in the inner tube as soon as the latter is repaired and inflated again. Other possible causes include a loose spoke that sticks through the rim and punctures the inner tube. These are but fleeting thoughts associated with my hopping off the sidewalk with the bicycle and pouncing on the road, because the tire blew right at the moment when the wheels hit the street. Moreover, we see that the search for a possible cause involves leaving the inner tube partially in place during the checking process by not removing the valve from the whole through which it is pushed toward the center of the wheel. If this is not done it would be difficult to match the problem in the inner tube – puncture or tear – with the region on the tire that need to be checked. The details of this investigation, or rather their exact nature, is not important. What is important in the present context is the fact that there is a very thorough investigation at work not only to find the damage but also to locate its possible source. This investigation reveals that there is a tear, which becomes salient as such because it is too large to be fixed with the patches in my repair kit. The damage stands out because it is not of the kind that cyclists normally find, a little puncture or a valve that no longer holds. Indeed, it is a very long, 8-centimeter tear. It requires me to walk back to the city center, a couple of kilometers, to purchase a new inner tube.

As the narrative continues we then find out that ‘some of the tire wall has detached from the wire that goes under the rim’. This is a statement about what is called, in the proper technical language, ‘the bead’ (Fig. 7.1). This part consists in most cases of a wire[2], visible in Fig. 7.1, and holds the tire tightly to the rim as soon as there is enough air pressure in the inner tube. At the time, a fleeting thought crosses my mind at the time to return to the store and purchase a new tire. In fact, it is only a flicker of a thought without the gravity to make some significant difference to my decisions. As the narrative shows, I decide to purchase one in the

[2] It nowadays may also consist of Kevlar.

specialized bicycle store that I tend to pass on my way to the university in the bigger city. At this point, therefore, the narrative shows that something has been noticed *vaguely*. But it is also apparently from the narrative that this something is not a major concern. There is an indeterminate realization that the detached wire requires fixing. But this part of the 'problem' can wait for the moment and would be addressed when its time had come. It is not a real problem, or at least, it is not something urgent to be addressed in the here-and-now of the situation.

The problem appears to have been solved: I complete the repair, pump sufficient air into the inner tube to inflate it to the point that I can ride, and I continue on my trip. I know that there will be a gas station where I can fill it with air until reaching the 65-psi pressure that I normally inflate the tire to. I ride the next four kilometers without any problem. At the gas station I use the air hose to inflate the tire to the desired pressure: there is a loud bang. Orienting toward the wheel, I notice a tear next to the bead. It is precisely at this point that I am led to anticipate that the inner tube will be torn at that place as well. It is exactly at that point that the causal relations underlying my problems become salient and evident: The inner tube is damaged precisely at the place where the bead had come of the tire wall.

From the original account and my narrative analysis we can take that there was nothing like a deliberate problem solving process at work. This would have required that 'the pieces' *are* 'together'. The analysis shows that 'the pieces' did not exist as such because whatever there is at the time, it is no more than a vague and indeterminate awareness of some situation. But the relation between the bead and tire-wall separation does not yet exist for me. It does not exist while I repair, because at that point it only gives rise to a fleeting thought of purchasing a new tire some time down the road (literally and metaphorically). In fact, while writing this analysis, I realize more than once that the fact of telling the story makes the events appear more salient and determinate than they really have been at the time. The very fact that I put the events in words makes them salient and significant in ways that they have not been in the situation – which points us to the very nature of this phenomenon, which is not well expressed as soon as words are used. Moreover, the subsequent ride from the point of first repair to the gas station does not give rise to doubt the decision: it is unproblematic and I anticipate the exchange of the tire at a later point in time.

'I make the connection' between the exploded inner tube and the separated bead only when the event reoccurs. That is, this description explicitly shows that I acknowledge the making of a connection where there has not been a connection before. At this point the separated bead becomes salient precisely at the instant when I look at the tire. It has been noticed before, but not as a salient, event-precipitating fact that would (should) have changed what I am doing at the time. In fact, as the ride between the first repair and the gas station is smooth, I do not even think about the events and my walk back to the town center. We may even surmise that if there had not been a second flat tire, the separation of bead and tire wall would have remained inconspicuous and eventually might have been subject to erasure as everything else.

In this episode, we therefore see a shift or rather a transition from normal everyday coping in and with the world to the theoretical gaze upon it. Normally something like a bicycle tire does not even enter our conscious deliberations while we

ride the bicycle; we do not look at a bicycle tire with a theoretical gaze. It is part of the bicycle, which is but a tool for me to go about my everyday life. There are no particular concerns that arise from its operation. It is almost transparent to what I do, like the eyeglasses I wear but do not notice – unless there is some trouble, such as when these are dirty or otherwise protrude into my consciousness (e.g., when they are absent). Ordinary everyday taking care of business is grounded in our familiarity with the world; and, pertaining to riding a bicycle, I do not attend specifically to the vehicle as I go about doing what I have to do – just as I do not attend to the shoes I wear while going for a walk. In a way, I am lost into this familiarity with the world. This is normal everyday coping in the pursuit of mundane concerns.

The situation changes when something that I use turns out to be broken. It then changes its modality from being literally ready-to-hand to becoming an object that is present *at* hand. The adverbial *present-at-hand* is a translation of the German 'vorhanden', which literally means 'being before the hand', an *ob*ject, something thrown before and outside the subject. It is the object of conscious intention, the theoretical gaze, present not only as such, but also present in the representations I use to think about the situation. There is a problem with the tire and I attend to it. We notice in this description an initial change to deliberate coping. In the situation, I then go about the 'normal' business of fixing a flat tire, vaguely noticing as I go along that there is a situation different than normal – the 8-cm tear – and I also vaguely notice the stretch of tire where bead and tire wall are separated. But my gaze is not a theoretical gaze that would have represented and analyzed the situation fully. There is a presence of the situation that is not represented in a determinate manner. But there are deliberate actions such as going to town to purchase an inner tube, replacing it, and an anticipation of the purchase of a new tire sometime in the near future. This, however, does not lead, as we see in the description of the episode, to a theoretical understanding. Such theoretical understanding, the point when 'I put the pieces together' follow a total breakdown, the renewed and violent explosion of the inner tube, which, as repeat event, prevents me from continuing my journey to the university and therefore requires my full attention.

In this changeover from everyday coping in the world to full attention directed toward some aspect in it, the status of the separation between bead and tire wall also changes. Initially it is noticed, but only barely, vaguely, and indeterminately and, therefore, determinatively. When something can no longer be used in the normal way it becomes apparent, noticeable, and remarkable; it comes to stand out, stick out; and it attracts attention ('fällt . . . auf') (Heidegger 1927/1977). The noun *Auffallen* tends to be used in this case, a term that translators render in English as 'conspicuousness'. But this English noun corresponds to the adjective 'conspicuous', clearly visible, easy to be seen, obvious, striking to the perception, obvious, plainly evident, eminent, noteworthy, and remarkable. It is evident that the English translation is much stronger than what the semantics of the German implies, which appears to be suitable to describe the situation in which the separation between bead and tire wall is noticed, but is not experienced as something 'striking', 'plainly evident', '*clearly* visible', or eminent.

The next stage in the modes that a tool may appear is *Aufdringlichkeit,* which appears in one Heidegger translation as 'obstinacy', but which, in the present con-

text, should at least include the standard dictionary translation of 'obtrusiveness'. In this manner, then, the term captures an essential dimension of the experience with the separation between bead and tire wall. The transition of the manner in which this part of the bicycle appears in the episode and relates to me includes: inconspicuity → vague noticing → conspicuousness → obtrusiveness. Whereas the twin silos (chapter 2) became obtrusive, the separation of bead and tire wall do not initially; moreover, whereas the process of phenomenalization become accessible to me then and there, the phenomenalization of the vague appearance of the tear becomes salient to me only *after* the second explosion of the inner tube. It is only in this very latest stage that the bead–wall separation *qua* separation is obvious and plainly evident as a fact that it can enter and be taken into account by theoretical reflection: it has become determinant. In the present instance, this reflection does not take a long time following the explosion at the gas station, as 'the pieces' are more 'falling into the right place' than having been 'deliberately put together'. But this initial sense of the causal relation between the flat tire and the tear between bead and tire wall is immediately replaced by full theoretical reflection

For theoretical reflection to occur, the 'pieces' need to stand out as such. They need to be present as entities that can be 'put together' and related in an explicit way. Theoretical reflection requires abstraction of properties from the situation, which are then deliberately manipulated in and by theoretical reflection. It is only when the separation becomes a represented thing in itself that it may serve as a signifier for something else. In fact, the separation as a signifier – i.e., an entity that stands for something else – also means that it is a thing in itself. In this episode we observe precisely the emergence of a circumstance into becoming a sign in the context of other signs that explain, from a theoretical perspective, the exploded inner tube.

From this episode and its analysis we learn that one may notice things, even orient our behavior, without these things having to stand out as signs in theoretical consciousness. For example, we do not have to reflect and interpret the red lights lighting up at the rear of the car ahead of ourselves but we simply push the break pedal. We do not 'interpret' the red light at the pedestrian crossing but upon noticing it, we simply stop. We walk when a green color lights up below it even without paying special attention to the red and green while we continue in a conversation with the person next to us. These are indicating things in a relation; but they are not *references*. The separation between bead and tire wall points to something – here, an anticipated exchange of the tire – without being a reference, a sign for the causal relation that led to the explosion of the inner tube. We see here references and relations that *are not* pointing. This is so because 'every reference is a relation, but not every relation is a reference. Every "pointing" is a reference, but not every reference is a pointing. This implies: every "pointing" is a relation, but not every relation is a pointing' (Heidegger 1927/1977: 77). We can most easily and clearly express the relation between the three terms relation, reference, and pointing by means of a Venn diagram (Fig. 7.2). This diagram makes it very clear why the above-articulated relations, even though they use the auxiliary verb 'is' that also expresses equality, are *a*symmetrical. This asymmetry is brought about by the different quantifiers 'every' and 'not every'. Thus, there are some relations, represented by the white area, that are not references; but all references, represented

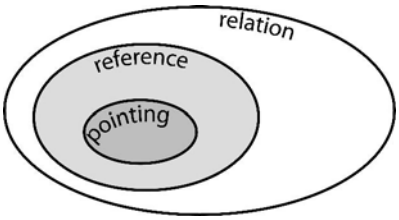


Fig. 7.2 This Venn diagram affords understanding the inclusive relations between 'relation', 'reference', and 'pointing' that lead to statements such as 'every reference is a relation but not every relation is a reference (e.g., there are white parts that are not included in the slightly grey-shaded reference set.

here by the lightly grey-shaded area, are included in relations. This therefore justifies the statement that 'every reference is a relation', because it is included the larger set, while 'not every relation is a reference', because some of the latter are not included in the former.

Applied to my instance, we observe a *relation* in that I notice the separation between bead and tire wall, but this separation, is neither a reference to something else – e.g., the exploded inner tube – nor a pointing – e.g., to the causal relations between the separation and the exploded tire.

What we discover in such a moment of breakdown and the sequence of modalities from inconspicuousness to obtrusiveness are not so much the properties of the thing – here the bicycle tire and the way it is constructed including its walls and the bead – than the nature of the normal ways in which we use something. I do not normally think about tires other than before I depart for a trip, at which point I inflate the tires to the desired and manufacturer-recommended pressure. The tire becomes an object of attention only when there is trouble, a flat, or when, for this or that reason, the pressure itself emerges as issue. For example, my road bike uses very high pressure (120 psi), which may make the ride less comfortable when the road becomes uneven. The high pressure then protrudes into consciousness as 'hardness of the ride'. On the mountain bike, the maximum recommended pressure (65 psi) is ideal for riding on the road, but may become a nuisance off-road, where a more moderate pressure leads to greater traction.

Investigations such as the present one are important in my work concerned with understanding and theorizing how people learn mathematics and science anywhere along the human life span. This particular investigation raises serious questions, for example, about a common practice in the teaching of science: demonstrations. In chapter 2, I point to an investigation in an Australian high school revealed that students from the same class were divided about just what could be seen in a demonstration – a majority (n = 18) saw movement whereas a minority (n = 5) did not see movement in the same demonstration. The present inquiry suggests that even if the students had been aware of something in the demonstration, this does not also imply that it was significant, pointing them to some theoretically relevant connection between a 'fact', the relevant 'concepts', and the theory that pulls them together. What the students noticed in the situation may have had the status of a relation but constituted neither a reference nor a pointing. In the same manner, one of the professor present in this Australian high school class while the students were

writing down their observations and explanations did a 'thumbs up' to the students. Many students noticed it and smiled without realizing that this same hand gesture actually was a hint to the 'right-hand rule' that physicists use to explain the phenomenon that the students were supposed to see. But this thumbs-up gesture, while constituting an explanation to the physicist, a pointer to the correct response, was just a thumbs-up without any implications from the student perspective – just as the separation between bead and tire wall had been noticed without any behavioral (thought) consequences.[3]

The present investigation has been necessary because I am able to observe in it precisely what is required to understand the process of becoming significant, the different modes of the 'fact', which, *in fact*, is not a 'fact' but some contexture. I am convinced that asking the students in the Australian classroom would not have allowed me to come to this realization and understanding. Indeed, I know this to be the case because at the time when I gathered the first-person data, I also analyzed tenth-grade students in a physics course. What I can see on the videotapes differs from what is revealed in the interviews with the students. The interviews do not provide the data that I require precisely because the situations of interest tend to slip before ever reaching the level of conscious awareness and representation. This investigation therefore also shows that in everyday coping we do not represent the world to make it present again – we relate to it in the present. Thus, even if my intent is not to publish a first-person investigation, it constitutes an important means for better understanding the phenomena I am interested in and the questions they raise but that cannot be answered through third-person methods.

Methodical Note At the time I made the original notes and wrote first analyses thereof, I produced copious notes intended not as recordings of 'fact' or newfound knowledge but as a device for arriving at new understandings. For me, *writing* is a productive, knowledge-producing rather than knowledge-reproducing effort. I tend to recommend to my students to keep their 'private notes', where they can write anything, make the most inane statements, for the purpose of learning. If this writing occurs in electronic form, they can then always make use of some text they have already written. But I may never make use of a particular text because my new understanding does not require it, allowing me to write better texts once I decide to use something for an article or chapter. In the next section, I present some of the notes that immediately followed the writing of the 'Story of the Flat Tire', initially at the university and later on after I have returned to my residence. In this situation, I understand 'writing' precisely in the way that I use this category in chapter 6, as writing the new while erasing the old: New understanding (birth) is replacing (death of) the old.

[3] Readers should have noticed the analogous relation between the two situations, one arising from my first-person investigation and the other deriving from a third-person investigation of students learning physics. In fact, readers may have been vaguely aware of such a relation without making it the central aspect of their thought. In this case, the phenomenon I describe and the experience of the reader are of the same kind.

From First-Person Method to Third-Person Method

Working up the notes and moving on to use an experience and its analysis to understand a phenomenon of interest is a way of doing research consistent with the idea of *writing*. This initial writing is unedited and uncontrolled, that is, originally not intended for an audience other than myself – or not for an audience prior to being carefully edited. Hereby I am less concerned with 'appearing dumb' than I am with the responsibility that comes with putting text 'out there', where these are no longer mine but, in finding counter-signatories, produce effects. As an act, therefore, my writing has effects that I am answerable for – in the same way that I am answerable for any other act (Bakhtin 1993). The following notes therefore should be read with all the required caution, because these correspond to initial 'gut level' reactions that were not 'censored' by reflective, theoretical consciousness. These notes constitute a form of finding my way in the thickets of things, a form of finding the 'animal in the foliage'. I do share them here as an example for what such 'raw' notes might look like before they make it, in more or less edited form, into a research account.

There is a second reason for presenting these notes here: They exemplify my method as a whole, which uses first-person experiences and their analysis to inform third-person observations. This is especially important in those contexts where there are many pre-constructions that prevent access to the underlying relations that could explain the phenomenon of interest – for example, why students do not learn from 'hands-on' investigations or why students do not learn from demonstrations.

In the instance of the 'Story of the Flat Tire', the notes were numbered alphabetically, collecting a series of free-writing samples. The first three numbered entries clearly are attempts to articulate that there was indeed something noticed but only barely so, without significance. This may also be taken from the fact that I have no recollection of the woman mentioned in the analytic narrative, yet the original event, the first blow out of the inner tube, still is so vivid that I can see in my mind the train tracks that I had just crossed prior to its occurrence. The image is so vivid in fact that I am able to locate the precise place where the event took place on a Google map and the associated satellite image – even though it dates back more than 12 years.[4] On the map, I also find the gas station and the store, a little off my trajectory, where I bought the new inner tube and tire after having had to walk quite a distance.

> a. When I inspected the tire, I had a thought that the tire had been poked by the spokes. I did not pursue the idea, for the lining was nicely in place.
>
> b. When I replaced the inner tube, I did notice vaguely that the tire had come loose from the wire that forms its rim. Yet this was not salient in my

[4] In fact, as I am looking at the satellite image, I not only find the route I used to take more than a dozen years ago but also recognize very specific places along the route and begin to remember other locations and contextures very much in the manner described in chapter 6. One place in particular turns out to be interesting: a roundabout where I got hit by a car. The map version does not show this roundabout, which is clearly recognizable on the satellite image, which shows that the roundabout is partially hidden by an overpass that crosses through its diameter.

Fig. 7.3 This schematic image of a glow lamp clearly shows a gap between the two electrodes. Yet Birgit notices it for a first time, with surprise, only after having tried for a long time to make the experiment work – though it was not because of the gap, which is a constituent and necessary feature of this device.

> thinking about the incident. I simply decided to buy a new tire in a good bicycle shop in the big city. I noticed the detached piece, but it had no significance. It was a little noticed structure from the background noise of experience. No more noticed than the woman next to me who had left her hand bag on her bike and having walked away, or the older lady with a traditional bike that had metal fenders over her chain in the way bikes used to be made.
>
> c. So there are instances where we notice something from the background as something – without nevertheless relating it to other things currently salient or without making inferences. In this case, after the fact I was able to put together a perfect explanatory framework for both exploded tires. The first one in fact became understood in a new way, and integrated with the second way.
>
> d. After the first incident, I did not expect another one like it. Thus, the experience did not prepare me for the next one just minutes of bicycle ride later (though an hour in real time given that I had to walk back to town to fix my bike).
>
> e. After the second incident, I attributed a different meaning to the first one. I wrote, 'I put the pieces together'. In a sense, this is what happened that the different patterns that in fact emerged into my consciousness now came together into a coherent story rather than being disconnected moments salient in my perceptual window.

The notes that follow show that after writing several entries about the changing nature of my relation to the tear, I then began to relate the story and the primary analysis to an episode I had observed on the videotapes from a tenth-grade physics course where students studied static electricity. The videotapes show a group of students attempting to charge different substances with electricity by rubbing them against other substances, just as the teacher has demonstrated it to them. The teacher then has taken a little glow lamp (Fig. 7.3), which lights up when there is static electricity. (The lighting up is taken as evidence for the presence of static electricity.) However much this group of students tries rubbing two substances, the lamp lights up only rarely and sporadically. Eventually one of the students, Birgit, takes the glow lamp into her hand, brings it closer to her face, stares at it for a while, and then notes, 'The filament is broken'. It is precisely in her search for a cause of the failing experiment that the gap between the two electrodes of the filament becomes apparent, allowing her to notice it *for a first time*. She then uses this fact to explain why she cannot get the experiment to work: the tool, here denoted by 'filament', is broken. It is the breakdown that provides the context for the gap to emerge as a salient and relevant fact. My notes relate the two events, my mishap

with the damaged tire and cognizing the significance of the separation between bead and tire wall, on the one hand, and the emergence into consciousness of the gap between the electrodes of the glow lamp, on the other hand. *That is, I am analogizing, making or evolving correspondences between the results of the first-person inquiry and those of the third-person inquiry.* In the subsequent paragraph in my research notes, I then address an issue that I often face in discussions with my colleagues, who tend to argue that the students 'should have known'. I use the episode and my analysis to show that I could not have known unless the entire theoretical framework had been in place and were known to me – or, in this context, to the students. My colleagues easily brush aside students' experiences and observations. It is much more difficult for them to maintain their argument when the case involves a mature scientist such as myself – even though a considerable number of them, especially those with psychological training, still brush off such first-person descriptions because 'these are too subjective'.

> *Relating it all to physics learning*
> f. If we follow students who do something, such as Birgit who notices the gap in the wire inside the bulb. Why should it be relevant? And yet she notices it in the way I had noticed the wire detached from the remainder of the mantel. But this 'fact' was not significant enough to have an effect on my decisions. I noticed it in the way I notice many things. It was not even a strong noticing, it was more like an awareness, 'Oh, there is something that has come loose. I should replace it eventually'. In the same way, Birgit noticed the gap in the electrodes of the lamp. It was only after the experiment did not work in her attempt (after the many attempts of her peers) that she considered it as a possibility for the failure to produce an effect where they expected effects.
>
> 'Considering as', a relative of 'seeing as'? The as-structure of knowing and acting? (check Heidegger)
>
> g. It is easy to say after the fact that it should have made a difference in my actions. I did not, for I did not have the urgency that I would have had had I known what I knew after. That is, the urgency and signification of that what I had noticed was possible only after the fact, at least in my case. Someone with more experiences relating to bicycle tires might have known right away. But in this sense, I am more like the physics students. And how should they know the relevance of some noticing from the many novel noticings that protrude from the background noise of experiences as they engage in the activities they are asked to engage in.
>
> h. Finding relevance from experiences in a first-time through seems impossible. But students often find themselves in situation where they deal with 'phenomena' (noticings) that have a first-time-through nature. How are they to know whether and how some noticing is significant in the physics world of relations and not just a piece of noise, a coincidental event? A random noticing as there are many in our everyday experience. To notice some event as significant, we need to know the network of significance: we need to know what we are supposed to learn. If we do not know the other things that make a network of significant relations, how are we to know whether some noticing is in fact relevant? But we cannot test every little noticing in every net-

> work of significance with which we are familiar. (In my own case, even though I am a handyperson, even though I have considerable life experiences, the detached wire was not salient enough to change my decision and immediately purchase a tire and put it on. Even though someone might say afterward, or even at the same time had they observed me, that I should have known, in my world the tear was not a sign bound up with other signs, with the possibility to let me inference that the first blown inner tube was already due to this tear.)

Paragraph h articulates what is necessary for a fact to gain its weight – it has to be part of an entire network not just of significant relations but also of signifying, that is, of pointing relations. Only what the theoretical gaze views and pieces together is important to understand the true impact of a 'fact' as fact. The initial analysis unfolds further dimensions, including that similar experiences have had behavioral consequences in my own life. I also attempt to understand the event in terms of 'ontology' (paragraph l), that is, the entire set of *salient* things – i.e., *re*presented things – and processes that are perceived as such and enter the conscious deliberation.

> i. The second time around, and particularly as I had seen that the inner tube blew at the place of the tear, every thing came together. Now I constructed a story in which the first event and the second became related. They had the same causal explanations. I constructed a network of significant events that explained the first part and the second part of the story. Now the tear was significant and I will likely re/member it for some time to come.
>
> j. One question of course is whether the same inferences, the same network of significance would have come together for me had I not been aware of the relationship between the blown inner tube and the tear. Thus, we cannot infer a causal relationship between my second and my first experience. I was fortunate in the sense that the second time happened when I was in a position to see the tear while the tire blew up. Whether I would have created the same relations of significance is open and cannot be answered.
>
> k. Because of my experience with tires, I now always check for the holes before removing the inner tube in order to find possible glass, nails, etc. that might still be in the tire and would therefore cause subsequent damage to my inner tube. I check particularly given that I just have had a case like this where, despite my checking with the inner tube removed, I did not find the piece of glass that caused the first flat with the consequence of having two flats within a day. I could not sense the piece of glass by touching the tire, but only upon searching after the second time that it had burrowed into one of the thick knobs of the mountain bike tires and protruded to the inside only with highly pressurized inner tubes and with someone sitting on it.
>
> l. When we talk about networks of significance, does this mean that the 'nodes' of this network have to be thematized events and objects? In my bicycle incident, this seems to be the case. What was significant was also thematized. The following ontology obtains: Ω_2 = {inner tube, tire, wire bead, mantle, wire bead and wall detached, blow-up$_1$, blow-up$_2$}. The story goes: The tire blew up because the inner tube protruded through the tear and

thereby was able to blow up. In this story, the elements of the ontology are in a particular relation to allow particular causal relationships. After the first time, this ontology obtained: Ω_1 = {inner tube, tire, wire bead, tire wall, wire bead and tire wall detached, blow-up$_1$}. This ontology is almost the same as the second one. But, I added the wire and tire wall detached now, after the fact, whereas after the first time, it was only one of the many noticings.

m. When students find themselves in science classes (and probably any others they attend), there are possibly flares of [many] noticings that they make. Whereas some of these might be such that the observer would put them together into a net of significant relations, for the agent-in-her-world this does not have to be the case. The individual noticings (when they in fact are made) do not have to fit together into a scientific or science-relevant narrative. It would therefore be an error to observe students (in real time or on video) and complain about their 'inability' to notice that which is salient for the observer, from the outside.

n. Trouble (disappointments) probably arises when we expect students to make particular noticings. Such, we would make more realistic if we knew how to see the world through the eyes of the students rather than through our own which are pre-disposed by what we already know to be significant. Thus, from the perspective of the knowing teacher, we can evaluate whether a particular preparation will make some scientific effect possible, and we know how to detect it within the background noise of all the other experiences that we have as part of our being-in-the-world.

o. Narrative, salient narrative. Significance is related to narratives, that is, the possibility to link nodes (objects, events) into a more encompassing whole. Rather than having individual disconnected noticings, these come together being linked into a narrative where some events e_1 at some time t_1 are related to other events e_2 at time t_2. Narration is related to thematization, to objectification, the say-able, the said. If it is not said, does not exist in a propositional way, it does not fit into a narrative, and therefore does not make a network. We have to have nodes that are connected. Each node being something that is salient in itself, or at least something that is being noted so that it is part of a proposition.

p. A narrative can still have different propositions which are not linked by the reader, but that could be, especially when we employ an inferential engine. Detective stories are such that they 'come together' once one knows propositions from later parts of the narrative, but the facts already mentioned in the beginning could be used to piece networks. Though often the ones that appear are such that particular events are made salient which are not salient in the explanatory story. So there is always the possibility that we see nodes as salient which do not take part of the explanatory.

q. If students see something that they consider salient, which protrudes, but which is not part of the scientific network of significance, but that they wish to make part of a narrative, this can considerably hamper any attempt, take a lot of time without the possibility to arrive at some coherent story.

Although I have not directly made use of these notes in my subsequent writing, they have allowed me to write myself into an understanding that has erased any

previous forms of thoughts that I might have brought to issues of learning generally and learning in 'hands-on' and demonstration settings in particular. It took half a decade before I actually come to write the book on learning, which uses many of the data collected during that period not only on student learning but also on first-person perspectives on learning derived from experiences of learning.

Readers should take note particularly of the fact that I am using the first-person investigation as a means to interrogate the presuppositions that many (science) educators bring to the study of learning. By taking note of the processes of phenomenalization, I learn about learning something new and, here, about how we come to notice something as something as compared to being vaguely aware of a slight disturbance in the world as it normally is.

Coda

In this chapter, I exemplify the first-person approach by analyzing how something moves from being vaguely to being fully present in awareness. This trajectory is part of a more comprehensive phenomenon: the transition of things that are ready-to-hand to the state of being present-at-hand. When things – objects or tools – are ready-to-hand, they are not made present again in consciousness but rather they are present. It is because things are present that they can be used as *pragmata*. It is only when these same things are *re*presented that they (can) function as part of the theoretical gaze. In fact, the theoretical gaze takes its character from the use of *re*presentations, which also points us to the remove that theory takes over praxis. This chapter, therefore, also exemplifies why praxis is not a simple application of theory. The latter would require a bringing into contact the theoretical concept and the practical situation, which is the way Kant thinks about the relation of thought to the world. The present investigation shows, however, that in praxis, we do not *re*present the world, make it present again, but rather we are immersed in the world, which is present as such and without representations.

From a methodical perspective, the events described and analyzed here show a particular attention to the process of becoming aware. This is a period that we generally do not attend to. In fact, in everyday pursuits we may be unhappy with ourselves for not having sufficiently paid attention and therefore for not having realized the nature of the problem. But, as the analysis in this chapter shows, we cannot attend to the problem when there is no reason to capture the situation in theoretical terms. The situation shares similarity with the story of the girl on the bicycle, whom I do not remember after the trip and therefore do not write about in my research notes. However, I do remember her on the second day just as I do remember the first instance when the tire blows up again.

8

On Being and Presence

As a teacher, I have observed students in my classes being so engrossed and absorbed in what they are doing that they do not notice the time that is passing. When I hear someone say, 'Oh, we are already done!' or 'The class is already over?', this is an indication to me that they have not been aware of the time as it was passing. It is precisely this unawareness of time passing that we attempt to capture by using the construction of the verb 'to be' with the past participle of the verbs 'engross' or 'absorb'. We can think of the students to be in a state where they do something, like conducting a science investigation but where they are not aware of the situation as such. They are absorbed in the situation and do not objectify and think about time – which they do when they are not absorbed and wish some lesson to be over. I remember times during my middle school years when I looked at the second hand of the clock on the wall behind the teacher and the lesson appeared to be interminable. Similarly, the afternoons of Christmas Eve, the hours before receiving our gifts, turned out to be interminable and I could never actually fall asleep to take the nap that my parents had ordered us to take.

Research generally might short-shrift the phenomenon by suggesting that the students engrossed in the science activities 'are (self-) motivated' and leave it at that; and researchers might describe me as an unmotivated student who was not interested in the lesson but who was hoping it would pass by watching the passing of time on the clock. The problem is that the very conceptualizing of knowing and learning as a conscious activity prevents us from thinking (about, of) those situations where students most and best do what we desire them to do: fully engage with the task designed to let them learn. Moreover, impossible in a state like this are all the attributes some psychologists want from students: self-awareness of themselves as learners. That is, not only are students supposed to be engaging in making thematic the learning object but also their own learning (process). All the ideas about meta-cognition and its importance as strategy for learning are based on the notion of making present to oneself the activity of thinking (cognition). But when I am engrossed in something I cannot inherently make present to myself the engrossment, because this would mean that I am aware of my engrossment, which

would precisely stop the engrossment. We already encounter a similar phenomenon in chapter 3, while investigating touch, which shows that we are intentionally oriented either to the hand touching the mouse pad or to the hand touching the hand that is touching. We may also orient our intentional effort toward the feeling of the object or on the relief that the object touched is providing to the itching part of our skin. That is, the very way in which many learning scientists think (about, of) and theorize learning covers up an issue that should be of the most interest to us: the relation of presence and its difference from the presence of the present. In this chapter, I exhibit first-person methods by investigating presence and Being (*Sein, être*) and their relation to representation and beings (*Seiendes, étant*).

Being Absorbed

There are many instances in my daily life when I am completely absorbed in something. I am so completely involved that the personal pronoun 'I' and its pronominal forms 'my', 'mine', and 'me' no longer exist in the experience. In fact, I am not just absorbed on occasion but take it as an attitude: I deliberately allow myself to be absorbed. It is an attitude to life characteristic of Zen, which aims at presence rather than the making present of the presence. I do so across many, very different aspects of my daily life:

- 'I' am riding the bicycle for quite some time already and all of a sudden realize that a period of time has gone without 'my' 'noticing' 'the environs' or 'the time' 'passing' – 'I' can provoke the falling away of presence by focusing, for example, on the repetitive movement of my legs and feet pushing on the pedals;
- I have gone into the garden to weed. I pull a weed, pull a weed, pull a weed . . . and all of a sudden I realize that two hours have passed without 'my' 'noticing' the situation, *that* 'I' 'have been pulling' 'weeds', *where* 'I' 'have been pulling' 'the weeds', not even of an 'I' that has been the subject of the weeding;
- I am on a hiking trip. For the first couple of days, there are many thoughts racing through my mind. Later, I catch myself every now and then realizing that a long period of time has passed without 'my' 'noticing' 'anything' and that 'I' am unable to recall anything of the walk. If there has been anything at all, then it was a dim sense of 'walking';
- I sit at my desk, writing . . . until I suddenly realize that the morning has passed without that 'I' have gotten up once. Although 'I' have written more than 6,000 words, 'I' 'have not been aware of' 'time', 'myself', or 'my surroundings' – though there has been perhaps a dim sense of a process of 'writing'.
- I fall asleep only to wake up many hours later without ever recalling anything – unless I had woken up or, upon waking up, remember a dream.

All of these experiences share some common features. First, the many quotation marks suggest that our language is ill-suited to the attempt to capture those 'experiences', which, as such, are not present to ourselves other than, perhaps, in some 'dim sense'. The 'I' that appears in these descriptions is unable, in the state of absorption, to think 'I' in the same way, a person who sleeps or who is dead cannot

say 'I'. Second, the instance of the slipping away generally tends to be unavailable just as the early parts of the coming out of the 'state'. The transitions have synchopic quality because they belong to two very different and mutually exclusive states: conscious awareness and non-awareness. Third, the 'period' between the slipping away and returning to consciousness of presence in the present is not experienced as period at all, is not captured in any way by language in the normal way that we intend it. There is a complete unavailability of the period, which is inaccessible to consciousness by nature, just as sleep is a state that we cannot access by means of consciousness precisely because it is characterized by the absence of consciousness.

Methodical Note Even the simplest aspect of everyday life may allow us to gain deep insights into phenomena of interest. In my situation, the interest is in knowing and learning, being aware and coping, or presence and representation. The key to understanding these phenomena better is to pay attention to the dimensions of the phenomenon that we normally do not attend to, which leads to the fact that we do not properly understand it. Thus, cognitive psychologists tend to theorize knowing in terms of representations, which makes the very phenomenon of everyday coping disappear.

There are some indicators to the period of slipping away, that is, the period of transition from conscious awareness of the present to the absence thereof. First, in the above-mentioned types of activities, there may be occasions when the actual slipping away is preceded by episodes of partial slipping away or brief periods in which consciousness has slipped away and then returns. Most notably, however, I have experienced a transition while falling asleep, a transition that is precisely felt as 'falling'. There is a sense of presence but also no hold on presence any more – just as in an episode related to illness featured in chapter 9, where complete passivity takes over the person. It is an experience of noticing without interference, without holding on to reality as it slips away.

It is apparent from what we actually do remember that something has happened. On the bicycle, I find myself in some place different from the one I remember having consciously attended to last – in the same way that I recall the green light I had passed prior to finding myself on the sidewalk bleeding, together with my crushed bicycle, finding out that an old lady had run me down from behind. I recall some before and some after, but nothing in between. In the first situation, I know it is not the result of an accident, a medical state of 'being unconscious' and suffering from the consequences of a concussion, such as in the second case. That is, there are states of conscious awareness of the present; and that aspect, the presence of the present, I do recall. In the same way, I remember going into the garden and beginning to pull weeds, only to find myself with a lot of vegetable garden cleared of any weed at what turns out to be some time later. On the hiking trips, as while cycling, there is a physical distance between the place that is present to me at the time and the last location that I can remember as such. Finally, there are many pages of text between where I consciously took note of myself as sitting at the desk and the instant that my presence in front of the computer is again available to me in my conscious awareness.

From the cycling experience I know that getting into the state of complete absorption tends to occur on very familiar roads, and when I do become absorbed while riding in unfamiliar terrain, I may miss a turn-off, as one of the episodes in chapter 2 illustrates (p. 36). In the garden, too, being absorbed arrives while operating in and on familiar terrain, where there are no unforeseen 'obstacles' that bring conscious awareness back. Similarly, a telephone call or ringing door bell would take me out of the flow of writing – though people sometimes enter my office without my becoming aware of their presence, which means, the absorption is so profound that the noises that accompany their arrival are insufficient to generate affection, allure on the ego, and prominence of the advent of another person.

These forms of experience show that together with the presence of the present comes the ability to recall that former present; what has not been or made present is not available to conscious recall afterward. This also means that I had to have noticed the girl on her bicycle with the dog on the first day, which allows me to *re*cognize her, whereas the twin silos emerge into my consciousness as a first – they have never been experienced as present before. We may therefore speak of two forms of presence. The first is pure presence, whereas the second is presence that is made present to itself. Making presence present again involves two moments: (a) the deferral between an inherently ever-changing presence and the capture of any finite period *as* something that is present and (b) the means of making some presence present again, *re*presentation. Conscious awareness requires the latter, a structural form that allows the present to be made present again to consciousness any time and anywhere.

An interesting paradox arises from the fact that 'being absorbed' means an absence of awareness of/for the present. How can I intentionally enter a state of being that is characterized by the absence of an intentional object? It is a paradox that we live, for example, when we try hard to fall asleep and, precisely because of this trying hard, cannot fall asleep. We also experience it when we attempt to forget – e.g., the passing of a person or an embarrassing moment in our lives – and precisely because we think about it we cannot forget it. Consciousness holds onto its *ob*ject precisely at the moment when it attempts to get rid of it. The form of relation, the subject's intentional (transitive) engagement with the object renews the presence of the object. That is, non-engagement can only be achieved when the object is allowed to withdraw, when consciousness no longer holds on to it. In my accounts, we observe a state of repetitiveness: pulling weeds, pulling weeds . . ., focusing on the churning of the legs, or focusing on the ideas that emerge from under my typing hands that are not present to myself. To aid someone in falling asleep, popular wisdom recommends 'counting sheep' or 'counting stars'. Focusing on breathing or imagining a white wall with eyes closed are other techniques that allow sleep to come or a state of meditation to open up, which is also characterized by the non-making-present of presence.

In Buddhism, the mantra *Om Mani Padme Hum* may have precisely this same effect that arises from the possibility to let go that comes with repetitiveness. Tai chi masters also have developed techniques that provoke a transition into pure being, that is, a form of presence that is not made present to itself: Relax, breathe, feel the earth, and do nothing extra. This ostensibly simple technique is nonetheless not easy to apply in the practice of tai chi or any other practice, including edu-

cational practices, if only because what is sought is becoming one with nature. These four techniques are inseparable: 'To *relax* completely, breathe, feel the earth, and do nothing extra with your whole body. To *breathe* fully, relax, feel the earth, and do nothing extra with your whole body. To *feel the earth,* breathe, relax, and do nothing extra with your whole body. To *do nothing extra,* breathe, relax, and feel the earth with your whole body' (Lee et al. 1996: 26). Eating, sleeping, walking along a wall with a cup full of milk, teaching or any other action can be undertaken in this spirit. A state of optimal relaxation, controlled breathing, unity with the natural environment (and with others), total concentration on what one is doing so as not to be dispersed (doing nothing extra) describe the fully focused state of persons engaged in the present with their whole being.

The state of pure being is not completely empty because, when consciousness explicitly returns, there is a resonance of what has been, an echo, a feeling of well being that dates from the period of non-presence of the present. Resonating means that something else reaches into the present in the form of an echo, but precisely because there is an echo, something else has been, which itself is not accessible in the way the echo is. We know from science that dreams are not generally available while we are dreaming. We remember only those that we have while waking up – according to dream experts, we do not remember most dreams, and some of us remember seldom or not at all remember the dreams even though sleep specialists can objectify and measure their presence. The dream I remember upon waking up is such a resonance. It testifies that there are some underlying processes that occur without being accessible themselves. Dreams therefore indicate that 'falling asleep is not a loss of consciousness, but the conscious diving of consciousness into unconsciousness that it allows to rise within itself while sinking into it. The truth of this immersion overflows and carries off any kind of analysis' (Nancy 2007: 24). The categories of resonance and echo allow us to have a sense of what has happened, states that I have experienced as *cycling, writing, weeding, hiking,* or *sleeping*. I use the construction 'that are experienced as' and then use a gerund because it avoids the articulation of a subject of the sentence that intentionally does what the verb form specifies. In absorbed coping, I do not think of 'I', this state is precisely characterized by the absence of the 'I' in the experience. As I am writing these lines, I am convinced that this is the reason why, prior to doing this research, I have used precisely this construction to capture what is happening during complete absorption.

Falling asleep is an interesting phenomenon because most of the time it happens without our conscious noticing the process.[1] The transition between being awake, knowing that I am awake, and being sleep, not (generally) knowing that I sleep is so fast that I do not notice how the state of presence to myself and that of non-presence to myself change over one into the other. There are instances, however, when I am so tired that I fall asleep on the couch in the family room. The sensation

[1] In the title *Tombe de Sommeil* (Nancy 2007) is translated for the English version as *The Fall of Sleep*. In fact, 'tomber de sommeil' means 'to fall asleep'. In the title, 'tombe' may be the first or third person form of the verb 'tomber', to fall. But 'tombe', as a noun, denotes something different: a grave. *Tombe de sommeil*, therefore, is the grave of sleep, just as the search term 'la tombe de «name»' will yield the graves and grave stones of the person whose name we use in the search (e.g., the grave of Jim Morrison in the Père Lachaise cemetery.

frequently is precisely one of falling: into a deep dark hole. At other times, there is a sensation of fading in and fading out. In a few instances, there is a sense of falling together with a second sense of being jerked around and a sudden return to full consciousness, at which point I realize that I have been falling asleep.[2] There is an instant in this experience where I can stop the falling by focusing on staying awake. Similarly, I can decide to let go and fade completely away. There comes an instant where I am barely aware of the falling before 'the lights are out'. In falling asleep, 'I am falling there where I am no longer separated from the world by a demarcation that belongs to me during all the time of my wakefulness and where I am myself in the same way that I am my skin and all my sense organs. I am passing this line of distinction, I am sliding as a whole to the most interior and most exterior of myself, erasing the partition between the two' (Nancy 2007: 19–20).

'There is' 'weeding' ('cycling', 'writing', 'hiking'). 'There' translates the German 'da' and 'is' constitutes the present form of the third person singular of the verb 'to be', which translates the German verb *sein*. 'There is', therefore, is a form of *Dasein*, 'being-there' (literally, *Dasein* translates as 'there-being'). 'Weeding', as absorbed activity, constitutes a form of being (there) in which the presence of neither subject, nor its activity, nor the transitive object of activity are made present (again). 'Weeding', as absorbed activity, is a form of absorbed coping. There is a relation between absorption and the fundamental ways of being in the world, which is characterized by an 'unthematic, circumspect absorption in the references that constitute the handiness of the totality of useful things. Taking care always already is what it is on the basis of a familiarity with the world. Dasein *can lose itself* in what it encounters in the familiarity and can be numbed by it' (Heidegger 1927/1977: 76, emphasis added). That is, this situation is not characterized by the making thematic of things that are 'at hand', which means, which are made present to consciousness through some form of representation. The error of much of educational psychology and the learning sciences consists in taking those things that are at hand as the way in which the world exists in everyday coping. However, the way in which the ordinary everyday things appear changes when their presence comes to be made present: Thus, 'that the world does not "consist" of what is at hand can be seen from the fact, among others, that when the world appears in the . . . modes of taking care what is at hand loses its worldliness so that what is revealed is objective presence only' (ibid: 74). In this quotation we see a difference being articulated between Being (*Sein*, *être*), on the one hand, and the making present of being by means of representations, beings (*Seiendes, étant*). The error of metaphysics has been to confuse presence (Being, Sein, être) with the devices to make presence present again, representations (beings, Seiendes, étant). But in this quotation we find out that the world does not consist of the representations.

All these descriptions of falling into or allowing the arrival of a state of pure being involve the dialectical tension of agency and passivity. I can do certain things and engage in certain behaviors that allow the desired state to emerge but I

[2] Some car drivers apparently fall asleep without noticing it, continuing to drive as if there were no problem; others do notice that they have been fading out and then begin to wipe their faces, stop to have some coffee, or stop to go for a walk. That is, both experiences are fairly common: one in which we do not notice and therefore do not experience falling a sleep and another one in which the falling itself becomes apparent to us in our consciousness.

cannot do it directly by making this state the intentional and transitive object of my actions. I have to allow this state to emerge and have to allow myself to fall into it – whether it is absorption into cycling, weeding, writing, sleeping, or any other absorbed active form of being.

Some studies do focus on states of absorption. These tend to be denoted by the term *flow,* which also characterizes the state of optimal performance (e.g., Csikszentmihalyi 1990). Flow has been defined as 'the state in which people are so involved in an activity that nothing else seems to matter; the experience itself is so enjoyable that people will do it even at great cost, for the sheer sake of doing it' (ibid: 4). That is, I am in a state of flow: (a) when I am completely absorbed in what I am doing to the point that I forget (about) myself, when Self has become transparent (in the sense of invisible, like the lenses of my eyeglasses) to Self; (b) when I manifest a sense of joy, well-being, and happiness these are states that are available to my conscious awareness only through the echoes they leave; and (c) when I would not want to do anything else if I were consciously aware of the state.

Being and Being

'Being' is an interesting, confusing, but also productive word the potential of which has yet to be developed for thinking (about) and theorizing learning. One website calls it the most 'protean' word of the English language because of its nature to be slippery, irregular, and changing. Of interest to our deliberations at this point are two of its forms: noun and present participle. For the noun form, the Oxford English Dictionary includes 'Existence in relationship to some place or condition; condition; livelihood, living, subsistence, position, standing in the world; home, dwelling, place of abode. Existence, the fact of belonging to the universe of things; occurrence; (physical) life. Existence, as a property, substance, constitution; essence. Something that exists; living creature'. The verb form 'to be' underlying the present participle includes the senses 'to exist. Take place, come into existence, to take its course. To be the case. To sit, stand, remain in stated circumstances'. These two different sets of senses of the word play an important role in philosophical thinking. In classical Greek, German, and French – the three languages in which a lot of this thinking has been done – actually distinguish the two by using two terms. The noun form of 'being' appears as *ón* in the sense of *tà ónta*, *Seiendes*, and *étant*, respectively, whereas the corresponding verb forms would be *eìnai, Sein,* and *être*. English translators tend to use the plural form 'beings' to set the noun apart from the participle form – thereby creating other problems in translation.

Linking the two modalities of 'being' is the concept of *álétheia*, unconcealedness, disclosure, truth, the state of not being hidden, the state to be out in a clearing, factuality, and reality: 'In bringing into the state of not being hidden of being [Seienden], it brings about the seclusion of being [Sein]' (Heidegger 1977: 337). Because the Greek *ón*, as the English 'being', can be heard as a present participle and as a noun, the conflation characteristic for the entire Western metaphysical philosophy has been prepared: 'The participle *ón* is the word for that which in

metaphysics appears as transcendental and transcendent transcendence' (ibid: 344). This is so because in the noun form, 'being' denotes what is, things in the physical world, facts; it also denotes thoughts and words that are taken for real. That is, things are used to think the processes 'existing', 'taking place', and 'coming into existence'. The noun form cuts up the world in a particular, concrete way. This is what has led to the term *ontology*, the science of things. But in the present participle form, 'being' points to process, living, and changing. This process is precisely that which is not present because hidden, undisclosed, and in seclusion. That is, ever since the Greek, Western philosophers have used the one, 'being' in the noun form, things signifying things, to think the other, living and ever-changing processes, 'being' in the participle form. But of course, the noun form also has its being (present participle).

In the Asian tradition, the difference between the two forms is explicitly thought. Thus, the *Tao Te Ching* opens by working out the difference between names and the things named, on the one hand, and the invisible and nameless from which everything springs[3]:

> The Tao that can be told is not the eternal Tao.
> The name that can be named is not the eternal name.
> The nameless is the beginning of heaven and earth.
> The named is the mother of ten thousand things.
> Ever desireless, one can see the mystery.
> Ever desiring, one can see the manifestations.
> These two spring from the same source but differ in name; this appears as darkness.
> Darkness within darkness.
> The gate to all mystery. (Lao Tsu 1972: One)

Here, Tao takes the place of 'being' (present participle). It is the beginning of everything *there is*[4]; it is the mother of the real things we encounter. But the name, 'being' (noun) does not really name 'being' (present participle). The name, one of the ten thousand things, is associated with the ten thousand things – but, as such, it cannot capture the eternal 'being' (Tao). That which can be told and talked about is not the real 'being'. The teaching continues by stating that this truth reveals itself only when we are desireless; it does not reveal itself by intentionally aiming at it, because this, like the sleep we intend, makes the phenomenon disappear. Desire, that is, intentionally trying to access 'being' reveals only manifestations ('beings'). The mystery, 'being' (verb form), and its manifestations (noun form) 'spring from the same source' but differ in name – for the ancient Greek, *tà ónta* and *eìnai*. Lao Tsu also makes thematic the absence of the 'I' in pure being (verb) when he says 'Creating, yet not possessing,/ Working, yet not taking credit./ Work is done, then forgotten' (ibid: Two). There is no 'I' who could say, '*I* am working', there is no 'I' who could say, '*I* am creating', there is no 'I' who could say 'This is *my* crea-

[3] Life as the invisible and nameless also is central to a material phenomenological approach to the body, flesh, and incarnation (Henry 2000).

[4] In the construction 'there is', 'there' is a dummy subject, so that the expression translates as 'to exist'.

tion', and there is no 'I' who could say 'This is *my* work'. The philosopher describes, 'Work is done and then forgotten' just as cycling is done and then forgotten, weeding is done and then forgotten, or writing is done and then forgotten. That is, the event is forgotten precisely because of the absence of things (representations) that would allow making the former presence present again.

Methodical Note We may draw on the descriptions of experience that others provide, such as the writings of Lao Tsu. However, we must not stay with the surface level readings, for in this way we only get at properties of language. The intent of the analysis is to get at properties of the experience that is only obliquely and falsely pointed to in the account. Our reading of a text, therefore, draws on our own sympathetic and empathetic experiences that come to resonate in the written account. I am not analyzing the *Tao Te Ching*, but rather my experiences captured in the words of the seminal text.

A good example of how the metaphysical approach – the one that mistakes the ten thousand things for Tao – influences the ways in which scholars theorize in education, the learning sciences, and psychology is knowledge and learning. Thus, knowledge is thought of as a state. Prior to some intervention – lecture, 'hands-on' laboratory experience, tutoring session – the student is said to have knowledge (structures), which we may denote by K_1. Following the intervention, knowledge is measured to be at the level K_2. What a student has learned is theorized in terms of the difference Δ between the two states: $\Delta = K_2 - K_1$. That is, rather than thinking learning as a changing process of change, it is theorized in terms of the difference of states. Each of these states is a manifestation, and therefore is not the situation itself. But we do not generally experience ourselves in static manner: we are continuously involved in the ever-changing process of life.[5] To think the process, categories are required that *encompass* change, that is, the categories have to embody the *difference* that is constituted in change (e.g., learning). To return to the example, what we need are categories in which quantities cannot be reduced further without destroying the unity. That is, if we want to think change, we need to think them as something non-self-identical, something like '(K_1, K_2)'. Because it is non-self-identical, this category may exhibit itself in contradictory ways. In the example, it might be as K_1 or K_2. This is possible because we no longer think *before* as separated from *after*, but we think the two as part of the same unit – which, for cultural-historical activity theorists, would be *activity*.

Historically, there have been thinkers of difference since the early Greek. Heraclitus was one of those first philosophers, influencing current thinking with his idiomatic 'You cannot put the foot into the same river twice'. Another philosopher

[5] Even work at the assembly line can be experienced as flow, as workers become absorbed by what they are doing (Csikszentmihalyi 1990). When they do not become absorbed, it is because 'people do not heed the evidence of their senses. They disregard the quality of immediate experience, and base their motivation instead on the strongly rooted cultural stereotype of what work is *supposed* to be like' (ibid: 160). Here, the author uses 'immediate experience', which I denote by 'being' (present participle), and he uses 'cultural stereotype' to denote what I use to talk about 'being' (verb), denoted here by 'being' (noun).

is Hegel, 'the only philosopher of the Occident, who experienced the history of thought in a thinking way' (Heidegger 1977: 323). Karl Marx was the first philosopher to create categories that embody difference in itself such that they can and do describe phenomena that manifest themselves in contradictory ways.[6] For example, in thinking commodity, Marx introduces the category of *value*, which may manifest itself as *use-value* or as *exchange-value*. Classical philosophers want to think the difference between these two manifestations as a function of the point of view – in barter, a bag of grain is exchange-value for the farmer, but use-value to the tailor; but the frock is exchange-value to the tailor, whereas it is use-value for the farmer. Marx suggests that value can manifest itself in different ways only if it already constitutes difference in itself. This is analogical to the physical phenomenon of light, which manifests itself as wave or particle because of its contradictory (complementary) nature, not merely because we take a different point of view. In recent philosophy, 'writing' (*écriture*) is one such category that allows us to think change, because it is directly associated with process (see chapter 6). Writing and erasure are two different manifestations of the same process: writing constitutes a physical process and, as non-self-identical category, is useful to think and theorize change – most important among these, for me, learning.

Such categories are required, most importantly, to understand the phenomenon of consciousness itself. This is so because, as the descriptions and analyses of *cycling, weeding, writing, hiking*, and *falling asleep* show, to understand what is happening we require ways of thinking the disappearance and reappearance of consciousness. We need categories that capture both sleeping and wakefulness simultaneously, which is the only way that we can capture the transitions denoted by 'falling asleep' and 'awakening'. These categories capture those points that are syncopic, no longer sleep but not yet full conscious awareness. The sense of falling and the dreams we 'remember' upon awakening are such syncopic phenomena because these straddle the divide between 'being asleep' and 'being awake'. There is no causative agent: in the first instance, focusing on falling asleep prevents sleep to come and, in the second instance, in the absence of consciousness, there is no agent who could have caused the awakening. Both situations truly are saturated phenomena, events, which means that they cannot be explained by cause–effect relations (Nietzsche 1954). In music, a syncope (syncopation) occurs as a temporary displacement of rhythm so that one type of rhythm changes into another and, at that point, the two different rhythms are the same – the syncope belongs to both and therefore constitutes difference. The sameness of the night – i.e., of being, which the ancient Greek thought as *tà pánta* ('the whole') – meets the difference in

[6] Almost contemporary with Marx, Friedrich Nietzsche, too, overcomes metaphysical ways of thinking when he proposes that events cannot be understood in terms of causes and effects: 'We finally comprehend that things – therefore also atoms – do not cause: *for they do not exist* – that the concept of causality is entirely useless. – From a necessary series of states does *not* follow their causal relation (– which would mean their causative potential makes for the jumps from 1 on 2, on 3, on 4, on 5). *There are neither causes nor effects*. Linguistically we cannot detach ourselves from this. But this does not change things. When I think the *muscle* separate from "its effects", then I have negated it' (Nietzsche 1954: 767–768). Nietzsche thereby overcomes the distinction of causes and effects, which cannot explain the nature of events, which always are in excess of causes (intentions) (Marion 2010).

itself of the day, which the ancient Greek thought as *tà pollá* ('the many'). This is therefore precisely what the first chapter of *Tao Te Ching* tells us in its above-quoted distinction between Tao, the 'hidden deep but ever present' (Lao Tsu 1972: Four), inaccessible 'being' (present participle), and the 'ten thousand things'. 'Being' (present participle) can only be experienced as *tà pánta*, as 'the pre-conceptually experienced being [*Seiendes*, noun] as a whole' (Heidegger 1977: 342). The experienced dream is part of night, the remembered and recounted dream is part of day.

At the beginning of this section I suggest that confusing the two dimensions of the term 'being' might have productive dimensions. This is so because, like its ancient Greek equivalent *ón*, it can be thought as comprising the difference between the two, the static (noun) and the dynamic (verb). *Being*, then, constitutes difference in itself – the term is not identical to itself because it harbors difference. This difference is the source of possibilities, a space, which Plato thinks by means of the concept *khôra*, a term that is also employed in recent philosophical discourse because of its generative possibilities. *Khôra* is a spacing, precisely that which is produced in *writing*. It does not belong to being (noun) or being (verb) but according to Plato to a third genus (Derrida 1993). Writing is indeed the concept that allows us to think the transition between those situations in our lives when we are consciously aware of the presence and those when we are so absorbed that we are not consciously aware of presence.

We can use these considerations to analyze and understand the phenomena articulated in the preceding section. Being absorbed means (pure) being (present participle, *ón*) and presence, tout court. It lies in seclusion, where it is undisclosed and inaccessible, just as are the instances that are part of *cycling, weeding, sleeping,* or *writing*. To make presence present again requires *re*presentation, that is, beings (noun, *tà ónta*). These beings constitute the disclosed, the things that appear in the clearing when we perceive them in this or that way by means of our senses; these are the ten thousand things of the *Tao* that stand out against the ground. They make things appear in a clearing; they are the appearance of things. But they do not explain what happens in their absence, when things precisely do not appear as things, in absorption, when even the 'I' disappears and only process remains, which we know about through its resonance into the conscious present: *riding, weeding, hiking, writing, sleeping*.

From Being (Presence) to Being (Representation)

For many years I have been returning to *Sein und Zeit* and *Tao Te Ching*. But I read without understanding – without the understanding from which I write these lines, an understanding that allows me to look back and see that I have read without understanding. In fact, it was unclear to me what Heidegger wanted to think by means of the difference between *Sein* ('being', verb) and *Seiendes* ('being', noun). For that matter, it was unclear to me to what experience Derrida orients us with such categories *writing* (*écriture*), *trace*, *khôra*, or *supplement*. But one day, I was struck, as if by a lightening bolt. I understood. But this understanding had not been

actively pursued. It was given to me in an instant of insight. It was a gift, which I willingly came to host.

On that day, a female friend and I had gone to a nearby butte where, from a little promontory of rock, we could overlook the vale. When arriving there, we first sit down, taken by the view of the valley from that place glistening in the light of this beautiful summer day. We begin to become absorbed with one another; we begin to make love. I vaguely remember being taken out of absorption by an occasional plane passing overhead – instances when our situation, naked on the promontory, pushed itself into my conscious awareness, making the presence there present again. But those instances are brief, as my thematizing consciousness slides away again into the ground of being. I remember merely sensing the possibility that someone looking down could see our naked bodies, our absorption in the embrace. And then consciousness recedes again.[7] It is total absorption: no consciousness, no beings (things), no representation, no making present of the present or our presence. Any notion of presence vanishes. And then comes the time where absorption has ended. We awake as if it were from a deep sleep. We realize that the afternoon has passed and it is time to return. On the way back, she begins to talk about the afternoon, attempts to put the experience in words and to place it in a sequence of other events that make our lives. As soon as she begins to talk *about* the experience on the mountain, as soon as she attempts to make the event present again by means of language, the spell of the afternoon, which has continued to echo in my body, vanishes. But just as the spell is vanishing, I realize that the words ('beings'), the very attempt to articulate being (present participle), makes being disappear. The words ('beings', noun) become the *tomb* of 'being' (verb). In that very instant, I understand, all of a sudden and without my doing, the dehiscence/displacement of 'being' (present participle) and/by 'being' (noun). Talking about the event, taking symbolic mastery over it by framing it in narrative form, attempts to possess it. But such a move can reveal only its manifestations and misses precisely the nature of 'being'. I furthermore realize that if anything I may have experienced no longer belongs to me once it is put in words, which are everybody's words. And so: if there had ever been something like 'my' experience, it has been lost and has become the experience possible to everyone.

In this chapter, I show how first-person methods, exhibited in the process, allow us to come to grips with one of the deep mysteries of humanity. It also allows us to understand an essential aspect of insight learning, which comes precisely at an instant when this form of learning is not intended. In fact, the intention to learn about the mystery of 'being' (present participle) and 'being' (noun) would destroy understanding that the former precisely hides when we take the latter as tools to find it. But the entire analysis in this chapter rests upon this realization, this insight, given to me at an instant when I was actually not seeking such understanding. In fact, the English word 'understanding' is problematic in that it is ambiguous with respect to understanding something theoretically, in terms of concepts and

[7] Remembering this is possible precisely because of the presence of representations that make the presence thematic. I do not remember those other periods when consciousness had taken a leave while 'being absorbed' – in the existential sense of being in a particular situation as much as in the passive sense, something is absorbing me.

their relation, and practical understanding, which is closer to having the sense of a game. The episode in the preceding section has provided me with the practical understanding, a sense of the fundamental difference, which cannot be captured in words, because these lead to the disappearance of the difference.

From a methodical perspective, the chapter exemplifies the slow reading of events and processes and precisely those dimensions that withdraw instantly – unless somehow recognized in the change that is occurring. To engage in any form of analysis that leads to further (theoretical) understanding, we need to notice these withdrawing phenomena first. The chapter also exemplifies the use of analogy that accompanies the analysis of a single case and, in the process, exhibits the invariants that allow us to (theoretically) understand the similarities between different forms of experience.

9

Crises and Suffering as Sources of Learning

Current learning theories tend to focus on the intentional learning of curriculum contents. They never make thematic other human experiences. Yet in everyday life, we (a) experience disorder, pain, and afflictions to our bodies; (b) feel emotions, including the strong ones denoted by the nouns desire, hate, fear, anger, rage, affection, love, and enthusiasm; and (c) are subject to external forces and agents. All of these experiences denote various forms of – and collectively are referred to as – passions. The passions are an important, if not the most important form of human experience and perhaps the constitute experiences that are most foundational for the way we are. Their considerations, as form and content of experience, take us beyond the limits of what learning theories currently in vogue can explain in terms of human knowing and understanding. We understand pain precisely because we have been subject to pain prior to all thoughts about pain, prior to any conceptual development of any kind, including the concepts of pain. Someone who has never experienced pain may be able to hear the word when the sound /peīn/ is produced; the person may even be able to construct sentences using the word 'pain'. But they would not be able to experience *com*passion, suffer together with another person and *participate* in her suffering. This is so because they would not know how suffering feels. But, without culture, I do not know how to talk about how I feel. This is so because 'I cannot identify the behavior of the other as choleric without adopting at first an exterior point of view over my own affects, that is, from this other himself. Only under this condition can I understand this carnal manifestation of another as choleric' (Franck 1981: 157). This also means that the conscious self-presentation of experiences – a self-presentation in consciousness – that I have in flesh and blood are interlaced with the forms of descriptions, collective *re*presentations, that I have available. We see this at work at the end of the preceding chapter, where I write about how the singularity of the event on the butte vanishes and becomes nothing other than a collectively possible experience, which, for this very reason, no longer is mine. My pain, however, is my pain, and nobody else can feel it. All they can share is the talk about pain.

The passions, including experiences through the senses, *are given to* me, come to me through the unpredictable forces of the environment upon me. I do not have to intend exploring something through touch if I can anticipate what it is to touch the substance; I do not have to taste a whiskey, olive oil, or other food if I can anticipate that I will not like it. Learning means confronting and subjecting oneself to the unknown. In Part I of this book, I exhibit methods for exploring the senses, which constitute one aspect of the passions. In this chapter, I am more concerned with other forms of passions that we often do not think about until we actually experience them – such as the experience of suffering some illness or the experience of a life crisis. In these cases, I do not really know what suffering or experiencing a crisis feels like unless I have felt it myself. This is so because I know and practically understand suffering and crisis, as all other passions, only through experiencing them. Otherwise I only have symbolic knowledge and, literally, 'do not know what I am talking about'. For there is no other way of incarnate knowing what it is to suffer than through suffering, no other way to know addiction than through living an addiction, and there is no other way to know how joy grabs hold of the incarnate body as a whole than through the intense sense of joy.

The passions may therefore teach us something; and they do so in ways that the theories we know today, built on intentionality and representation, cannot explain. This is so because '[f]rom the perspective of intentionality, non-intentional experiences or real contents of experiences – whereby experiencing and experiences, sensation, and the sensed become one – are nothing other than formless and functionless materials that contribute nothing to the constitution of an object' (Waldenfels 1999: 40). From such intentionalist perspectives, therefore, suffering and experiencing crises are nothing but qualities that cannot be ascribed as properties to some entity or process. In this chapter, I exemplify the first-person approach by means of two analyses, one focusing on suffering and the other one on crisis.

Pathos, Empathy, and Sympathy

Throughout my life, I have been a very active person, someone who took things into his own hands. I had never been 'afflicted' by something that I would have experienced as such. Most people who have come to know me also would say that I am a 'strong-willed' person, very much in control over himself, and task-oriented. As a world-class athlete, I have carnally experienced what the popular diction 'no pain no gain' denotes. Pain, therefore, has not been an experience that made me stop in view of some ultimate result. As an athlete, I repeatedly moved across the threshold of pain, winning some championship, but subsequently being unable to walk because of exhaustion. Training was often hard, and there were instances in which the idea of giving up emerged into consciousness – but I have never allowed such an idea to take hold. Outsiders, such as television viewers and sports journalists often use the expression 's/he is suffering (right now)', but I have not experienced such instances of suffering themselves. They only have symbolic knowledge of such instances, perhaps arrived at through the metaphorization from other experiences. Despite all of these experiences, some of which have driven me

to extreme exertion, I have not really known suffering until one summer day in 2002, during an instant when I find myself robbed of every bit of intentional agency that I have had.

On that day I have come to the university to teach. I am in my office when, all of a sudden, an immense feeling of fatigue is flooding and overcoming me. The sensation is strong, stronger than any fatigue I have ever experienced. Something is overtaking me, stronger than any 'I' or 'me'. I wonder what to do but cannot hold onto or enact any of the fleeting thoughts invading me at the time. The sensation is so intense that I am completely overwhelmed. I am no longer able to consider any thought. Strangely, I experience myself in this situation, as if watching myself. There is a complete absence of intention. Standing in the middle of my office, I consider lying down, but cannot; I consider sitting down in my office chair, but cannot take the decision to do the two steps that would get me there. I actually realize that I am aware of what is happening without being able to do anything for my intentionality to return. I cannot seek help or plan what to do next. Any intentional capacity I might have had in the past has left me at this moment. I give up and allow myself to drop. Two hours later I wake up on the floor, in the middle of my office, right where I remember having stood when the event began.

Several weeks later, during the same summer, I am subject to another, very similar episode. I am at home, in the center of my kitchen. An incredible fatigue is surging within and overcoming me faster than I can think. Before I know it, my intentionality has left. From where I stand I can see the couch in the family room. It is but ten feet away from where I stand. But I am unable to take the decision to walk to the couch and lie down. As before in my office, I abandon myself. Falling is the last thing I remember. Upon waking up, I find myself lying on the floor in the middle of the kitchen.

In this experience, all will has vanished. I cannot decide on realizing the simplest one of the fleeting thoughts, such as taking a few steps to lie or sit down. I experience as my self abandons itself, in the way it abandons itself while falling asleep (into sleep). Whereas sufficient awareness remains for taking note of what is happening, there is insufficient capacity left within me to do anything about it. I am *subject to* forces that I cannot control or to which I can offer some resistance. I am *subjected to* an experience that I have nothing left for to mount resistance. I can only let go, as the result of the last little bit of intentionality and agency left in the situation. When all of these have gone, there is still one thing left: the capacity to suffer, to experience passivity, being subject to experiences and subjected to forces and conditions that we have no control over whatsoever. That is, whenever everything else is gone that makes my everyday normal consciousness, being subject to the conditions, suffering, and pathos remain until there is no sense of anything left. During the sleep, there is no 'I' that could be subject to suffering, pathos, or conditions. What remains when 'I' come to my senses again are the recollections from the instances preceding the departure of consciousness. The very fact that I can recall these instances points us to their syncopic nature, where sufficiently enough remains to provide echoes in my conscious experience.

I am now thinking about the experience of birth, which we do not and cannot experience in a conscious manner. It is the perfect example of an event, inherently unpredictable – on the part of the parents, doctors, or the child, subject of the event

(Marion 2010). It is an instant of my life where I am literally thrown into the world without the capacity to experience it in the way I experience today. I am enabled as a subject precisely at the instant when I am most subject to the conditions and literally e*jected* (thrown) from the womb. The foundation, therefore, of the knowing and agential subject begins precisely in the total absence of agency, in an instant of passivity more radical than any form of willed passivity associated with non-action. Thought in this way, the pathos and the pathic are the origin and source of two opposite forces: 'wanting to' and 'having to' (von Weizsäcker 1973).

The verb 'to suffer' derives, as so many other words of our language, from the Latin, where it existed in the form *suffere*, to submit to, endure, to suffer. It is a composite word consisting of the particle *sub-*[1], under, underneath, at the bottom of, below + *ferre*, to bear, bring with, endure. The prefix, derived from a preposition, points us to the fact that the *sub*ject is under the effect from the outside, is under something that it has to bear, endure. *What* we suffer, therefore, cannot be understood from the perspective of the sufferer, who, being under the effect of something else, also is subject to and subjected to the experience. In fact, the etymology of 'subject' – from *sūbicere*, to place below, to place under, based on the verb *iacere*, to throw, cast, hurl – should point us to the fact that we are 'under the dominion of' something or someone else, 'thrown to the lions', as Christians were during the Roman empire.

When I ride home after having finished teaching on the day of my collapse, many fleeting thoughts enter and leave my mind. I am thinking about the members of the various First Nations bands that I see almost daily upon riding through their villages, about their teenagers who attended classes in the schools where I did research. The villages are not nice and tidy as those populated by the dominant Western-style culture just a little further down the road; and the teenagers do not engage with anything while they are in school, but merely sit as if letting the events go by. At this instant, while I ponder my collapse earlier on during the day, a sense of empathy overcomes me, as the thought crosses my mind that their experiences in our world may be like mine: being subject and subjected to conditions over which one does not have any control whatsoever and about which one cannot do a single thing. I think about drug addicts, and about our cultural non-understanding of what it means to be addicted. Perhaps someone who needs a next shot is in a situation as I have been just prior to sliding to the ground, when I can just note what I experience but cannot do anything about it. Is this sense of being subject and subjected to something similar to what the child molester or other sexual offender experiences when they cannot but commit what we denote as perpetrations of the law?

Since these experiences, my understanding of the world has changed. Whereas previously, I could see the world only through the lens of agency, these and similar episodes taught me that there are situations that we experience not as intentional subjects of activity but that we experience as patients, the pathic subjects who are subject to forces that they do not control on their own and who are subjected to situations that they cannot but suffer. We may talk about a 'crime of passion', but

[1] The 'b' in 'sub-' changes to an 'f' under certain conditions, such as when an 'f' follows in the subsequent word stem.

cannot really understand, through compassion and empathy, what it is to be subject to this spell; and, consequently, whereas we may be able to gain symbolic mastery over this type of experience, we cannot have sympathy or empathy. Etymologically, the term 'sympathy' derives from Greek, *sumpathés*, having a fellow feeling, a compound word from *súm*, having the same form + *páthos*, suffering, feeling. Who has ever had sympathy for a person who has committed murder in and out of passion? Who has had sympathy for a thief? Who has had sympathy for a person who, despite already weighing over 300 pounds cannot but stuff himself with more food, thereby gaining even more weight? Why is it so difficult to feel sympathy for a drug addict? At this moment on my way back home from the university, I think: precisely because, as the etymology suggests, one has to *feel* what the other is feeling, and without feeling what the other feels, we cannot feel in the same form!

'Empathy' is a relatively recent word translating the German *Einfühlung* ('empathy'), literally meaning '[getting] into the feeling [of another]'. The structure of 'empathy' emulates that of the word 'sympathy'. *Em-* translates the German 'Ein-', in, into, whereas the second part, 'pathy' is based, as in sympathy, on the Greek term *pathós*. Empathy is subject to the condition outlined above that I cannot recognize the pathos of another until I have seen my own pathos from the perspective of another. That is, empathy, in the same way as sympathy, requires that we have experienced the specific form of passion, for otherwise the *em-* and *sym-* parts of the phenomenon denoted by the terms cannot be ascertained.

Understanding Agency | Passivity

A catastrophe constitutes an event in which a current order or system of things is subverted and overturned. A crisis, therefore, is of syncopic nature, because we have a turnover from one order to another order that occurs in a single instant. Precisely because the old order is subverted, it can neither explain nor anticipate the new order. The new order is created precisely in the transition between two orders – such as the transition during birth or that during death. The experiences of these catastrophic changes cannot generally be told, because, in the first instance, there is no capacity yet for making the presence of birth present again; and, following death, nobody remains to talk about it. But there are forms of catastrophe in which we are completely changed, 'become a new person', that we can at least describe even though we are subject to conditions over which we have no longer or only very limited control. I had the opportunity to experience one such event during the 1970s, which I recount elsewhere in this way:

> On this afternoon, in the same way as on other afternoons during that period, I begin by smoking a joint while reading one of Carlos Castañeda's ethnographic reports on the culture of the Yaqui Indians and their shamanist practices – including *The Teachings of Don Juan, A Separate Reality*, and *Journey to Ixtlan*. As the drug takes effect, I *all of a sudden* have the sense that I am no longer breathing myself but something else outside of me is doing it for me. Or, rather, I am being breathed. Then a new sense emerges in an un-

> anticipated fashion, the sense of being taut like the drumhead of a steel drum. It bulges outward toward one side, being a little larger than the shell that fixes and defines the outer edges of the drumhead. I am the drumhead, pulsating slowly. Each movement brings me closer to the normal resting state. I sense that if the drumhead-I moves through the equilibrium state, it will be my end. Death. A second image emerges, suddenly, existing side by side with the drumhead image. It is that of going through a singularity – the biblical camel that goes through the eye of a needle. My whole body squeezed through a hole with zero extension. Death again. I can feel my whole living/lived bodily self resist. I do not want to die. But the vibrations toward the equilibrium state of the drumhead become stronger. I am moving/being moved closer to the singularity where, as I anticipate, I will vanish. I resist. I do not want to die. But each movement occasioned by the unknown, imperceptible but *felt* outside force brings me closer to the state that I anticipate to be death. Then, all of a sudden emerges a question: 'Why resist?' I sense that I am ready to die. I let go. I no longer remember what follows. I do not even remember loosing consciousness. I find myself again waking up. In finding myself waking up, I am finding my Self, my consciousness; but it is also a finding of something that exists against a ground that makes it possible in the first place. I am conscious against the unconscious state that preceded this instant. (Roth 2011: 211–212)

In this episode, we immediately notice the pathic dimension of the experience, which penetrates such fundamental experiences as breathing. Or, rather, the experience of breathing is already one that we are subject to. We can hold our breath, some time, in particular even for long periods of time, such as some yoga practitioners or divers. Unless we attempt to die by somehow forcefully stopping breath, we eventually gasp for air.[2] At birth, we do not automatically breath. It is a common practice to slap the newborn so that it begins to breath with its lungs, something that becomes necessary when the umbilical cord is cut. The very condition for being alive, breathing, is not, in the end, a function of my will. It is something given to me, enabling my existence. The recognition of the fundamentally pathic dimension of breathing is heightened to the extreme in this experience.

The next experience articulated in this narrative account of a catastrophe in the making, too, is also a pathic one. I am no longer an agent but subject to forces and conditions: like a drumhead, which is brought into motion by a drumstick and forced into a particular movement by the points of suspension. It is an image that repeats the pulsating nature of life itself, including the thought of death, which itself cannot be anticipated, lying beyond the threshold of what can be thought with the tools at hand. There is a sense that the point when the drumhead flips to the

[2] In obstructive sleep apnea, the tongue and throat muscles collapse, stopping all breathing. When there is not enough air available, the person 'goes for air', wakes up medically speaking (generally not being conscious of it), and then falls asleep again. As in the case of a dream, the apnea reaches into the present – when my heart rate is increased and when I find myself intensely breathing. But I am not generally aware of the apnea episodes: medical tests showed that I used to have 20 or more of them per hour and yet I have never been consciously aware of them and know about them only through the medical tests in a sleep clinic.

other side is a point of death, a point of singularity. A second image of singularity emerges: being pushed into and through a point, the eye of a needle with a diameter of zero. It, too, is accompanied by an association with death.

In the account, we observe vestiges of agency, such as when I attempt to resist for a while to being pushed 'over the edge', that is, to flipping through the resting position of the drumhead or moving through a point of zero extension. The movement toward the singularity becomes stronger, and much as I attempt to resist falling after tripping, there is still an attempt to resist the experience of death associated with the singularity. I do know what is on the other side, but there is a sense that the singularity means death. And then a final act of decision: abandoning to the conditions and to the inevitable. Just as I have let go overcome by this infinite fatigue, which allows me to slide to the floor, I let go in the present instance. When I return to consciousness – in fact, when consciousness returns to me – I am not merely finding a 'self' but a different self, as evidenced in the very different form and content of the poems that I am writing before and after that incident in my life. In fact, already at that time, more than thirty years ago, the poems before and after are separated by a leaf carrying the inscription 'Transcendence' and the preceding section is entitled 'Before the Great Divide'. This afternoon, when I lived through the crisis, became a syncopic instant, where my former self died and a subsequent self emerged both being one and the same at the point of passage.

Describing such events is not easy, as we do not tend to have an appropriate language for it (Bakhtin 1984). What we require instead is a language that allows us to produce 'the conception of the world as eternally unfinished: a world dying and being born at the same time, possessing as it were two bodies' (ibid: 166). Such a language creates dual images. A 'dual image combining praise and abuse', for example, 'seeks to grasp the very moment of this change, the transfer from the old to the new, from death to life. Such an image crowns and uncrowns at the same moment'. Our traditional language, representative of class culture, is problematic for 'there is no place for it in the culture of the ruling classes; here praise and abuse are clearly divided and static, for official culture is founded on the principle of an immovable and unchanging hierarchy in which the higher and lower never merge' (ibid: 166).

In the decisive instant of this episode, the irreducible relation of agency and passivity and the source of agency in passivity become apparent. I am subject to the experience, but still make the decision to let go; even if I had not decided to let go, I would have fallen into the singularity. The decision is to abandon myself to what remains, in fact, to return to the beginning, where only pathos remains. At this point, the experience of death (of the old subject) and sleep coincide, irremediably fused into a single and singular experience.

From the first-person perspective of the living subject, the experience of catastrophe and crisis allows us to understand that there is not just agency, the will and power to act. Rather, a slow reading of the events shows that there is a series of verbs that we have to think together to understand human experience. This series is captured in statements such as 'I intend to . . .', 'I want to . . .', 'I have to . . .', 'I can . . .', 'I may . . .', 'I am supposed to . . .', and 'I ought to . . .'. Thinking agency dialectically means acknowledging that each of these forms is only a manifestation of an irreducible whole that encompasses all of these forms simultaneously. There

is no 'I intend to . . .' without also an 'I have to . . .', even when the latter is not salient at the moment. If 'I', for example, '*intend to* hammer a nail into the wall for hanging a picture', then there are many constraints to which this intention is subject to. My arm, hand, and finger joints constrain movements in particular ways and only some things are useful as hammer when a 'real hammer' is unavailable. If I intend to hammer, I have to overcome the resistance of my body to movement, and I cannot but acknowledge this fact. Even the most accomplished carpenter, who has learned to hammer with minimal effort, still requires *some* effort to do the job. This effort is required to overcome the resistance of the body, the resistance of the hammer to being moved through the air, and that of the wall, which resists accepting the nail. The source of resistance is sometimes indistinguishable, coming from the outside or from our own bodies. On the bicycle, for example, three different contexts may give rise to the same feeling: riding uphill, riding against the wind, and riding on the flat but with legs tired from a long ride on the preceding day. And the movement is a good movement only when it is controlled, but this control, as we know from expert hammering, is not executed by the mind.[3]

Framing our condition through the dialectic of agency | passivity, where the verbal expressions in the preceding paragraph constitute its manifestations, allows us to understand the emergence of intentionality in passivity. This is so because to be able to say or imagine 'I intend to . . .' I already have to be in the position of 'I can . . .' or at least I have to be in the position to anticipate the possibility of an 'I can . . .'. I cannot intend something that I cannot already do, either practically or symbolically. But the 'I can . . .' is given to me. I find myself able to do something, but this ability precedes my finding or intending it.[4] I become conscious, but I cannot intend consciousness because intention requires consciousness; I cannot intend the learning object, because intending it requires knowing it, and to know it is precisely what I want to or am supposed to do during a teaching-learning event. That is, learning is a pathic experience rather than the agential experience that current learning theories make it out to be.

Coda

In this chapter, I use two forms of experience as a means of inquiring into the nature of learning and into the relation of the subject to the events at hand. Both

[3] 'We have absolutely no experience of a *cause*; psychologically speaking, we derive the entire conception from the subjective conviction that *we* are cause, that is, that the arm moves. . . But this is an error. We differentiate ourselves, the actors, from action, and we make use everywhere of this schema' (Nietzsche 1954: 767).

[4] Intentionally pointing to some object, for example, is the result of a societal relation (Vygotskij 2005). At first, the infant moves his arm and hand in a haphazard way resting in some position. The mother hands the infant an object that lies in a line extending the orientation of the hand or arm. After repeated experiences of this kind, the infant begins to intentionally point. Here, 'pointing' has emerged from random positions of the hand and arm, which are socially reified as pointing gestures because they come to be associated with things that have a particular orientation with respect to infant, hand, arm, and finger.

forms of experience allow us to understand pathos as an essential aspect of all experience, and, in fact, as the origin, source, and end of any having of experience. We literally do not know in any carnal sense what a form of experience is – pain, passion, crisis – unless we have had the experience rather than having merely heard the words that name them. Experiences such as the ones analyzed here have allowed me to understand the world and human existence in a different way, not only with respect to such experiences but, more broadly, with respect to the phenomena that I research as part of my professional life. It is through such experiences that I have come to understand the problematic and paradoxical nature of learning, which we cannot ever resolve unless we also make thematic its pathic dimensions.

In the instances of suffering, pain, and (personal) crises, first-person methods appear to be the only way in which we can validly say anything at all concerning the phenomenon of interest. We need to have experienced affection, have been in the state of being affected, of being subject to the condition without any remaining form of agency to truly understand what we are talking about. This may also be at the heart of the experience with doctors, who find themselves exceeded by what the patients intend to communicate. My family physician could not understand my experience and responded to my accounts by saying 'Anyone who lives as healthy as you do, and who exercises as much, *cannot have such an experience*'. Even more ironical, the rheumatologist that I have been sent to, after having looked at the x-ray images, suggests that there is nothing I have – even though I am sitting in his office with so much pain in the shoulder joints that I hardly can move my arms. In each case, I am sent home without any further action being taken, as if I had faked illness or told a lie. Neither doctor exhibited empathy or sympathy, and perhaps if they were able to feel such, they would prevent themselves from doing so.

From the methodical point of view, the sources of data in this chapter are single and singular events that are interrogated with the intent to uncover invariants of human experience. That is, the point here is precisely not to find out how 'I' felt being subject to an extreme fatigue, which turned out to be a chronic condition that lasted for a decade, or to find out how it is to have a death experience under the influence of a drug (and fatigue). The point of the investigation and the reason for the first-person method employed is to uncover and extract the general and invariant properties in the specific cases (Bourdieu 1992). This interrogation requires some systematicity. Among others, it requires attention to those dimensions of experience that tend to be hidden or disregarded as too mundane. Such generalization is not achieved by applying routinely existing conceptual constructions, often empty and merely formal, but by thinking the particular as particular, as particular instantiation of the possible.

As in other chapters, I also exemplify those aspects of the first-person approach that draw on, explicate, and elaborate on the etymology of words. These in fact are remnants from the time when humans first became conscious of a particular form of experience. They are part of the sediment that forms the memory of the past (Husserl 1939). Sometimes the words are or have experienced metaphorical extensions (e.g., 'sympathy'); and at other times, they have been constructed more recently based on the patterns in which other words are put together (e.g., 'empathy'). In this chapter, the analysis shows that without having had a particular form

of experience, we are not truly enabled to experience empathy and sympathy, because this means that we have been subject to the same *pathos*, the same *pathic* experience. But, as in any other field, there will be people who claim sympathy and empathy because of their symbolic mastery of the discursive domain. However, in the same way that knowing the formulas for the flight of a soccer ball does not mean a person can actually play soccer, the ability to talk *about* a pathic experience – i.e., showing mastery of the discourse – does not mean that we also feel the pathos associated with the term we use. Claiming otherwise means being in contradiction with an age-old wisdom, which says, as quoted in chapter 8, 'the Tao that can be told is not the eternal Tao. The name that can be named is not the eternal name'.

10

Thinking and Speaking

> One day Michael arrived at our office and started to share his insights from a paper he had written that morning. He talked excitedly with waving hands, and I tried to follow his thinking, which sounded novel and interesting to me. During our conversation, I mainly nodded my head and produced continuers such as interjections 'mm . . . yeah . . .' to show my interest and encourage him to share more. Suddenly, he said, 'Oh . . . do you have a pen and paper, I need to write something down!' After finding a piece of paper, Michael then jotted down some words on the paper and said, 'Just some ideas I suddenly have for my writing, and I need to write it down, otherwise I will forget!' Here, one might wonder: 'How could Michael share his previous insights and generate new insights at the same time?' One might say it is Pei-Ling who said something to stimulate Michael's new ideas. But as I have described, I did not say anything insightful. I only made interjection sounds and nodded my head. I don't even know what ideas Michael jotted down on that paper. Obviously, it is not Pei-Ling who gave ideas to Michael. Then, how do we explain this phenomenon? (Hsu 2010: 162)

The relation between thinking and speaking tends to be thought and theorized in causal terms: speakers *express* what they have thought or are thinking. That is, speech is theorized as a copy of thought even though thought itself may be theorized in terms of inner speech. The verb 'to express' – as a live or dead metaphor – indeed portrays this relation as one in which some content of a container is pressed out. The verb etymologically derives from the Latin *ex-*, out + *pressāre*, to press, to squeeze. The French equivalent verb, 'exprimer', generates the same image as it derives from Latin *ex-* + *primēre*, to press. Even the German equivalent verb, 'ausdrücken', which etymologically has a very different origin, signifies pressing (*drücken*) something out of (*aus-*) a container. The conception of speaking that pushes something out to make it available to the listener goes back to Aristotle, who defines the relation between the soul (mind), voice, and writing in this way: 'Those things therefore which are in the voice, are symbols of the passions of the soul, and when written, are symbols of the (passions) in the voice' (Aristotle 1889: 46–47).[1] There is a direct, unmediated relationship between Being and the soul,

[1] Aristotle uses the Greek word *psykhé*, which has been translated into Latin as 'anima'. This term is rendered in English as 'soul' or as 'mind'. *Psykhé* is more comprehensive than mind and perhaps more akin to the English concept 'psyche'.

which itself has been imprinted by nature (in the way wax is imprinted by and bears a copy of the seal). The things of the voice (*phoné*) are the outer symbols (signs) of something on the inside of the speaker. Verbal articulation therefore literally is expression, exteriorization; it shapes the medium that carries the sound in the same way that paper carries the symbols (signs) of the passions in/of the voice. That is, in the end, the voice does not even signify the soul but shows what has left its imprint (form) on the soul: nature. Because imprints have form, it is not nature itself that is recorded but its forms, ideas, in the same way that wax records the form of the seal rather than the seal itself. As a result, 'expression as sign that wants-to-say ['meaningful sign'] is thus a *double exit* outside of itself of sense in itself, in consciousness, in the with-itself or near-to-itself that Husserl begins to determine as the "solitary life of the soul"' (Derrida 1967a: 34–35). Much of the research in the social sciences is built on this model, whereby the content of research participants' talk is taken as an outer expression of their inner thoughts, interests, motivations, or feelings. Not only does such research neglect considering the mediational role that language plays in any verbal articulation – I can only say what others will find intelligible and what I, concretely realizing a possibility of language, find intelligible myself – but also in the indirect relation between any inside that we might want to conceive of in the traditional model and the outside.

Methodical Note Here, as elsewhere, the first-person approach focuses on an instant in life that generally is not notice: The fact that we speak even though we have not prepared our speech and even when we have never talked about. This suggests that the first-person approach requires a keen attention to events that generally tend to disappear, be (become) invisible, or are taken to be unproblematical. In the present instance, the keen attention is to the fact that we can find new ideas in our own speech. This has implication for the way in which we think about knowing or about the method of interviewing people about their intentions, interests, or feelings.

Finding Thought in Speech

The opening quotation points us to an interesting, in fact pervasive phenomenon that tends not to be recognized for what it is. The narrative is from a chapter that a postdoctoral fellow of mine, Pei-Ling Hsu, wrote following an experience at our common workplace. Upon my arrival at the office in the afternoon of that day, Pei-Ling, who has arrived ahead of me, asks me about what I have been writing (about) that morning. I launch into what is an impromptu account, uninterrupted, as Pei-Ling writes, because she only uses interjections and nods to acknowledge attending to what I am saying. As an impromptu account of what I have written (about), there has been no explicit plan to produce a certain narrative; at the time, I am not merely articulating a text that I have memorized beforehand. That is, the text that comes from my mouth forms itself in speaking. There is no mental image of *this*

text, because I have not had the time to think about what I will be saying. But because the text that comes out of my mouth is continuous, there is no time to reflect upon what I will be speaking next. There is no plan that prescribes or anticipates what is coming only seconds hence from any given instant in the talk. I just talk and it is as if the talk sustained itself, one word leading to the next until I am finished, or, rather, until I stop to record what I have just said. I do not anticipate the end until it has arrived, that is, I know the end of my talk when I see or experience it.

There is in fact nothing strange about this. All readers will know that this is *precisely* how we participate in everyday conversations or impromptu accounts concerning some issue if we are asked to provide such. We do not have to reflect in particular, plan a speech ahead of time. We simply launch into the talk and allow it to carry us with it. What is coming out of my, the speaker's mouth happens almost despite myself. And then: I find something new in my own talk.

Such experiences, therefore, constitute first indicators that my speaking does not simply exteriorize something already pre-existing in my mind (soul). I speak, sensibly and intelligibly contributing to the current, societally organized activity – e.g., a laboratory meeting with my postdoctoral fellow, a dinner conversation at my home, an impromptu conversation with the undergraduate student working behind the fish counter in my local supermarket – without having my contributions prepared beforehand, without having to reflect upon what I will say next, and without the need to look up something in my mind that might be suitable to be added to the conversation in my next turn. But at the same time, what I say is not a mere memory dump[2], not a reading out of my inner life, somehow squeezed in the way I squeeze toothpaste from a tube onto my brush. Rather, in each turn that I am given and take, some initially rather general and generic, somewhat hazy, nucleic, and unspecified idea develops into a mature contribution in the process of articulating itself, whereby what I have said so far is itself a context and resource for what I will say next and how I say it. The idea, my thought, develops into something concrete *in and through* my talking. Before, it articulates itself, it is just vague, not even formed, like the potential for something. But in the way an egg (seed) does not resemble the chicken (tree) that will grow from it, the seed of an idea does not resemble the thought I will have articulated in speaking. This developed idea is something that I can discover in my own talk, precisely when I talk about something that I have never or hardly ever talked about before. I am not just repeating myself, giving the same (kind of) talk over and over again, but I talk about something for a first time – such as to Pei-Ling about what I was writing (about), itself a new idea about the way in which we use language. From a first-person perspective, while I talk to Pei-Ling, I do not look up 'declarative knowledge' about the world to contribute to a conversation, I just speak; and what I say is not simply a dead building stone that I pull from a library – though uttering such may be part of a societal relation, such as when we say 'How are you?' or 'Fine weather today!?' –

[2] In computer science – the discipline on which much of information processing psychology is based – a 'memory dump' or 'core dump' is the name of a process, where the entire state of computer memory is recorded for subsequent examination, for example, to find out why the computer has crashed at a certain point in time.

but a creative response to the contingencies that arise in *this* particular contact with one or more persons beside myself. When I talk I do not look up grammar ('procedural knowledge'), to 'construct' sentences. I just speak – in this case oriented toward Pei-Ling and toward the developing thought and speech.

Some readers might object saying that I merely voice in the office what I remember from that morning. They might say that what I have done and written has left a trace in my memory or has been stored like a book on the shelves in my office; and now I am merely spilling the content of this memory – as if I were spilling a bag of beans. But there is something else in Pei-Ling's narrative that offers a response to such an objection. Pei-Ling reports me to be saying, 'Oh . . . do you have a pen and paper, I need to write something down'. She continues the account of the event by writing that I jotted something down and then explained, 'Just some ideas I suddenly have for my writing, and I need to write it down, otherwise I will forget!' In fact, at the time I am jotting down what I have just said. That is, I have found *in what I have said* some new idea or ideas. So that I do not forget it (these), I need to jot it (these) down. At that point, I just have recognized *in* what I have said and *after* I have said it, something new not known to me before, and, therefore, which could not have been the result of an *ex-pression*. I have said something of which I – qua conscious 'I' – am not the *intentional* author (*auctoritas*, Latin for authority). I become aware of the content of my speech, the 'idea(s)', only *after* having spoken; and I discover the idea *in* what 'I' have said.

From the aforesaid, we can therefore conclude: My speaking is a generative process: it produces *ideas rather than reproducing them.* In making this statement, I do not mean to suggest that *all* speaking is like this. But these other forms of speaking – those that do not constitute speaking in the mode of absorbed coping – are but derivative forms, where speakers also make (self-consciously) present to themselves the speaking situation and the content of the speech. Cultural-historically and ontogenetically, these other forms come *after* we have learned to speak in unprepared manner and in the mode of absorbed coping. Thus, for example, Plato already was critical of orators who prepared speech in writing before they actually gave their speech. He considered it to be inauthentic.

It is precisely this experience that the French poet, novelist, actor, and theatre director Antonin Artaud captures when he notes: 'When I write there is nothing other than what I write. Whatever else I have felt that I have not been able to say and that has escaped me are stolen ideas or a stolen word [*verbe*], which I will destroy to replace by another thing' (in Derrida 1967b: 253). Writing, here, is depicted as the same productive process that I describe as the experience of speaking – in the mode of everyday coping. Derrida comments: 'The generosity of inspiration, the positive irruption of a speech, which I do not know from whence it comes, of which I do not know, if I am Antonin Artaud, where it comes from and who speaks, this fecundity of the other breath [*souffle*] is unpower: not the absence but the radical impossibility of speech, irresponsibility as the power and origin of speech. I am in relation to myself in the ether of a speech that is always whispered [*soufflée*] to me, which takes away from me exactly that with which it puts me in relation. Consciousness of speech, that is to say, consciousness pure and simple, is not knowing who speaks at the moment and in the place where I proffer my speech. This consciousness, therefore, also is an unconsciousness ("In my uncon-

sciousness it is others whom I hear", 1946) against which it is necessary to constitute another consciousness, which, this time, will be cruelly present to itself and will hear itself speak' (ibid: 263). Inspiration, the taking in of air and therefore the impossibility to speak, also is the origin and source of speech. The unpower is a power, inspiration constitutes inspiration, where the two occurrences of 'inspiration' are the same and different. My speech is always as if whispered to me by an invisible prompter.[3] That which speech takes away from me also is what I am put into relation with, *my* ideas, *my* words, and *my* thoughts. That is, all of these 'things' that are attributed to me are not even mine, as they have come to me from others, because 'in my consciousness it is others whom I hear'. This same experience allows Arthur Rimbaud, another French poet, to write in a letter to his teacher Georges Izambard, 'JE est un autre' (I is another).

Passivity in Speech

There is another interesting aspect to speaking, and to understanding this process and event in the way that I am developing here through a first-person analytic approach. In the preceding paragraph, my analysis suggests that there is a passive element to speaking: I am not the intentional author and therefore not the complete authority over what I am saying. (Even though the very act of speaking, the utterance, and the locus of the utterance all are used to pin *this* utterance to me.) What I have said in the meeting with Pei-Ling has been *for her* (benefit). *She* has solicited my speech to hear me talk about what I have written that morning. When I speak without having prepared notes or memorized my talk, my words nevertheless are *addressed to her*. This are words *for her*, these are her words as well. Etymologically, the verb 'to address' can be traced to Old French, *dresser*, to arrange, itself having evolved, through phonetic drift from the Latin *dīrect-*, the participle stem of the verb *dīrigĕre*, to straighten, set straight, direct. That is, in speaking, I arrange the said *ad-*, to Pei-Ling. But not any speech will do; only speech that is intelligible to her will do the trick. That is, in speaking, intelligible speech takes into account the audience and, therefore, differs according to the nature of the addressee. We know this to be the case from mundane, everyday conversation: I would have talked differently about my writing if a colleague, unfamiliar with my research had asked me; I would talk differently again if my wife, a non-academic, had asked me; and, if my son had asked me when he was 8 or 10 years of age, what I would have said would again be different. But in speaking differently, the content is different: not in the least because it is not just my speaking but also the hearing that

[3] In French, *souffleur* is the word for the prompter in the theater. The verb *souffler* can be translated as 'to whisper', 'to prompt', or 'to blow'; its past participle, *soufflé(e)*, used as an adjective, may be used in the sense of something taken away by a blow of air. 'Breath' is the translation of *souffle*. The chapter that begins with the quotation of Artaud is entitled, in French as in English, 'La parole soufflée'. As the choice of the translator suggests, the title is untranslatable, because it can be read as 'the stolen speech' or as 'the whispered speech'.

we need to take into account when we consider intelligible and appropriate speech.[4]

Hearing someone else speak, in the same way as reading some text, is similarly contingent and emergent. While writing the word 'object' in a previous paragraph, I stopped writing and began to reflect about how readers might read the word if they did not have the remainder of the sentence available to them. That is, how do we read 'object' if only the first part of the sentence is available: 'Some readers might object . . .'. Would they read /'ɒbdʒɛkt/ or /ab'dʒɛk(t)/, that is, the noun or verb form of the word? When the word is uttered, of course, no such question arises because the location of the intonationally produced stress immediately allows us to hear the verb or noun form without even reflecting whether it is one or the other. We hear in a way that resembles what we come to see in a video or film, where the contents disclose themselves as the camera rolls.

Here, then, there is another reason for stating that I am not in complete control over the content of my speech. If Pei-Ling, after a while of listening, would have said 'You are insulting me', then whatever my intent might have been in saying what I said, I now need to deal with the insult; if she had said, 'I don't have a clue what you are talking about', I would have addressed (would have had to address) this in my response. If there had been a camera rolling and recording the event, it would then show an unfolding of the event based on the fact that the utterance was heard as an insult or as a commentary on the non-intelligibility of what was said. To understand the *con*versation, that is, the situation *as* relation, we therefore need to take into account speakers and listeners, writers and readers, signatories and counter-signatories of texts. We are all familiar with events that are out of the control of the individual speakers – such as when interlocutors in some situation get into an argument even though none might have intended to do so. Conversations have their own lives, which exceed the intentions of their individual participants. There is a dynamic of its own, and this lack of control over the situation as a whole – as much as over the content of the said – is an experience that we live on a daily basis. But this understanding does not generally enter scholarly considerations when instances of speech or writing are analyzed.

The Absolutely New is Actually Shared

New ideas do not belong to the individual. Any speech (writing) requires understanding such that assessments whether something is 'utter garbage' or a 'radically new idea' presupposes the intelligibility of the said (written). This assessment of a text is collective, which means, I am subject to a collective assessment of what I say rather than the individual judge. I am *subject to* what I am saying – qua subject of the utterance – in a fourth way: I only have this language, and it is not mine. In fact, while speaking to Pei-Ling or other people in everyday life, I do not think

[4] The point is not to contrive artificial thought experiments where some person possibly could say non-intelligible things. But then, as 'breaching experiments' show, this talk would itself become an issue in and of the relation (Garfinkel 1967).

about 'me' (see the preceding comments concerning Artaud and Rimbaud), the speaking I does not make itself present as the speaker of the sentences that spring forth from its mouth. At best, as in other situations of absorbed coping, there is but a process of *speaking*. 'I', as a subject of the utterance, become aware of 'myself' and 'my Self' only in particular circumstances, for example, if a high school student were 'to be rude'. *If* I take the student's talk as a symbolic act that questions my position as a speaker, then I might have to act and respond to the said, which then would be reified as rudeness. In such an instance, I might think of myself as the target of an act, which, if others were to take it as an example to follow, would undermine my institutional position as a teacher. But in most situations of my life – including the meeting with Pei-Ling in the workplace – there is but a more or less anonymous process of speaking, the content of which 'I do not know whence it comes'.[5] Anything I can say in *this* English language is but a concrete realization of its possibilities. These possibilities do not depend on me, on *this* individual, or on *any* individual for that matter. Even if I were to use some 'new' word in communication, upon reflection it makes sense only to use it if there is *already* – at this precise moment – the collective possibility of its intelligibility. That is, if this possibility exists, then 'my word', the one I have just created at this instant, is not mine at all because it exists as possibility and I but realize the latter.[6] Even the perhaps most difficult literary text that exists, *Finnegans Wake*, has been written to be read (though it is not every person's preference). That is, even when we read the following quotation, we are the counter-signatories of what it says; and we are so even if we put the text aside with the comment 'incomprehensible garbage', because making such an assessment means that we have read and understood that the text does not fall within the normal range of intelligibility. The initial negative reaction to the work, which was considered to be 'unreadable' and, therefore, untranslatable, eventually influenced culture more generally. To use but an example, consider this passage:

> Bump!
> Bothallchoractorschumminaroundgansumuminarumdrumstrumtrumina-
> humptadumpwaultopoofoolooderamaunsturnup!
> – Did do a dive, aped one.
> – Propellopalombarouter, based two.
> – Rutsch is for rutterman raming his roe, seed three. Where the muddies scrim ball. Bimbim bimbim. And the maidies scream all. Himhim himhim. (Joyce 1939/2000: 314)

Some readers may ask, 'What is this?' because the text is not intelligible. But it does indeed offer a lot once we read it aloud and listen to the sonorities in the way we listen to language, where there frequently is no pause between the words and

[5] This, of course, is similar to other 'flow-like' everyday experiences where we do not make our presence in the world present to consciousness. Thus, I personally engage in academic writing, meditation, gardening, cycling, and other pursuits without making present my being-in-the world (see chapter 8).

[6] This also explains why the same 'unword' or the same 'invention' can spring up in different places at the same time and unbeknownst to the participants in the different sites. In each situation, culturally existing, that is, general possibilities are realized.

yet we understandingly hear the other person. Thus, in hearing, listeners parse a sound stream, which is not required in reading, because the space between words *constitutes* the parsing. The space, which *expresses nothing*, in fact gives access to reading the words as separate units; this space, therefore, is constitutive sense even though it expresses nothing. Speech, unless it is relatively slow and makes clear articulations, often tends to run one sound into another making transcription difficult to impossible (see chapter 4). I can read Joyce, with the one word in the second and third lines of the quotation, as making this phenomenon a topic. Once we read and parse according to our sense of language, structure emerges that is not provided for on the page. Joyce allows us to become aware, in the contradiction between the letters on the page and our sounding them out, the fact that transcription does not render speech but adds to it a device that frequently is not present in speech. When it is present, it is a temporal pause rather than a spatial distance. We may read 'Both all chor actors chummin' around gans um um in arum drum strum trum in a humpt a dump waul top oo fool o oder a maun's turn up'.[7] There are now recognizable English words and sonorities, but also German ones like 'um in arum', which would translate into 'in and about'; we can here *oder*, 'or'.[8] In fact, many of Joyce's 'thunder words' are composed of words from different languages denoting the same general idea. There is also a sense in the content of choral actors chumming, with the drum strum trum, which we may associate with German bands playing at a beer garden. The relation between speaking and singing, which is made thematic in the combination of words and apparent sonorities from chant – e.g., 'bimbim bimbim', 'himhim himhim' – also appears in the critique of the phonocentric metaphysics underlying philosophy and psychology (Derrida 1967b). Moreover, the very writing reminds us of German compound nouns, which may extend seemingly endlessly. Searching the Internet, I found the following word, which apparently is recorded in the Guinness Book of Records as the longest German word: 'Donaudampfschifffahrtselektrizitätenhauptbetriebswerkbauunterbeamtengesellschaft' (the sub-organization of the society for steam boats on the Danube River in Vienna before World War I; its main section is responsible for electricity). It has 81 characters, and therefore is a bit shorter than Joyce's word with 100 characters. The absence of spaces between words actually constitutes the reversal of works in other contexts, such as when painters produced single-colored surfaces that bring to the fore the ground against which figures normally come to stand or when John Cage offers a 'piano composition' consisting of 4'33'' of silences. In written (sheet) music the silences are indicated by special signs – e.g.,  – just as the empty spaces in writing separate the words. In musical performances, the silences (pauses) do not normally come to stand out, just as we do not attend to the pauses in speaking – unless they exceed a certain length (e.g., 'embarrassing silences') or are below a certain threshold (e.g., overlapping speech).

In French, my speech will be at times like this, as this language has a rule whereby certain words need to be connected in speaking using a 'liaison'. For non-speakers or learners of French, it will be very difficult to hear what is said just as

[7] A Google search of the word also proposes this decomposition: 'Both all choractors chummin around gansumum ina rumdrumstrumtrum ina humptadump waul topoofoolooder amaunsturnup'.

[8] There are apparently text fragments from some 40 languages assembled in this work.

for novice speakers of German it is difficult to hear the combination of words out from under the long sounds of compound words. Thus, *vous avez* ('you have') will have to be pronounced as /vuzave/, that is, as one continuous sound. There are circumstances where a speaker might pause precisely at the boundary between the two words – a phenomenon I observe almost every night watching the French news in this and similar cases. In this case, the pronunciation is /vou zave/, which a novice could hear as the words *vous*, you, and *savait*, 's/he knew'.

In the Joyce text, there are other pointers to other languages: (a) the compound word 'Propellopalombarouter', which, as compound points to German but is based on the word propeller and Italian word *palombaro*, diver; or (b) the German word 'Rutsch', slip, slide. We can hear references to mathematics, in seriation 'aped one' (like 'to ape'), 'base[d] two' (as in exponents', and 'seed three' (as in randomization, where different seeds are used to generate true random sequences); but we can also hear/read is a reference to '[as easy as] ABC-123' ('aped one . . . base two . . . seed three'). There are rhythmicities and rhymes as well (Bimbim bimbim, Himhim himhim). In sum, therefore, we are able to make sense even of the most unfamiliar and initially incomprehensible communicative act. As a consequence, the particular text, in and with all its particularities, is not so singular after all: it constitutes but one realization of the possible.

Different readings are viable, just as different hearings are possible when a person speaks. Someone other than Pei-Ling may have heard me speak differently, complain about the 'gibberish' or about 'ivory tower discourse'. The point, however, is not to try getting at what a person, here I, 'really means to say', for, as this analysis shows, I myself do not know what I am saying until after I have said it, finding the thought that I have not had before. That is, it is useless to try getting 'behind' my words, trying to figure out what I wanted to say to Pei-Ling independent from the act of my saying. Moreover, it is not what *this* person wants to say that matters to understanding the shared situation but the total unity of the event, that is, the dynamic of articulation and response, which, simultaneously, is the last part of the unit we may term utterance. This utterance never belongs to the single person but, for all the reasons I articulate here, belongs to speakers and listeners simultaneously. Once I understand discourse in this way, as part of an irreducible whole, then I will actually hear and understand myself differently. No longer is it important to be a singular 'I' who gets something out of a situation or who puts something into a situation (like in a relation to/with a partner). Who 'I' am is a function of the relation as much as the content of the said. The relational perspective on speaking, then, constitutes a radical change in the understanding: of the world and myself. No longer do I think of myself as the unconstrained agent, who is reflecting about the existence of 'free will'. Any speech, any 'I', or any 'free will' is enabled in the inherently contradictory unity of agency and passivity. In speaking, I am free and unfree simultaneously. It is precisely this tension that enables my speech and from which it springs forth.

In any relation, there are agential and passive dimensions. Our English language already has the means to express this in a very neat way. As an integral part of a relation, I am a subject, actually one part of the *collective* subject. This expresses the agential part, which, in speaking, resides in the fact that the sound of an utter-

ance is a singular act[9] produced in a particular location at a particular point in time. Simultaneously, for the reasons worked out in the preceding analysis, I am *subject to* the relation in the sense that it places constraints on what I can or do say, for saying something intelligibly – rather than merely making noises – means *subjecting* myself *to* language and the social order. The folds that imbricate agency and passivity in an irreducible way increase, as I am not only subjecting myself, agentially, but also I am subjected, the patient of the collective situation of which I am never in control.

Conclusion

In this chapter, I show how the first-person approach leads us to a very different understanding not only of the relationship between thinking and speaking but also of the nature of the two processes. From a simple interaction and relation in my workplace, I have arrived, through careful analysis, to very broad statements about the relationship between thought and language. In this analysis, I have used, without previously announcing it, not only my own experience but also analogically drawn on particular forms of experience generally. That is, I have worked out particular structures of experience from a single episode and, by drawing on similar episodes in other contexts, shown the generality and ubiquity of the phenomenon thereby brought to the fore. I have pulled out from the episode – through slow, careful, and extended reading – its invariant properties. This analysis, rather than bringing out my personal feelings or something that pertains only to a singular me actually pertains to the role of language in our lives generally and the manner in which thought and speech are related. This analysis also shows that the first-person approach requires particular attention to events because the very phenomena that are immanently present may never show up if we too quickly cover them with mundane (scientific) explanation. For example, we may take as mundane our everyday contributions to conversations without realizing that we are communicating reasonable and intelligible ideas without having planned them before, even in situations when we have never talked about an idea before and when the idea is the *result* of speaking rather than precursor thereof. The talk *cannot* therefore be automatic, as there is nothing behind it that would allow a mechanical assembly of sentences. Speaking is a generative process, including the ideas that it articulates (for a first time). We may therefore also miss – if we read an event too quickly – that if speaking produces *new* ideas, then this undermines almost every epistemological theory that we currently have; and it misses that there are fundamental dimensions of passivity that currently are not theorized in agent-centered ideologies of learning and knowing. But, and this is a contradiction, the very users of such theories *are* in situations where they talk about things that they have not thought about before.

[9] For Bakhtin (1993) it is this singularity from which springs our answerability, because the irreversibility of an action also means that I am affecting this world as a whole even though, in the act (material, discursive), I am inherently unable to know what I am doing (saying). Here, also, we find the biblical theme of being guilty (responsible, answerable) from the beginning.

Authentic speaking is a generative process rather than the expression of something previously impressed on our minds (souls). We need to understand it not as a difference of a before and after, but as difference in and of itself, encompassing the before and after in one unit. Once conceived of as generative, then the new ideas that spring forth no longer are surprising. Thought of as *events*, speaking and thinking come with excess of intuition over intention; and this is precisely the result of the first-person approach to the act of speaking and writing *for oneself as much as for others*. Because speaking and its relation to thought have had such a long cultural history, understood in terms of a process of externalization, some philosophers have recently sought different metaphors for the development of thought. Most prevalent and influential of the new concepts is that of 'writing' (*écriture*) (Derrida 1967b), because, as conceived, it is a temporal process of spacing. This spacing is the locus of productive and transformative being, capturing the very *process* rather than the difference between states. As Artaud suggests, if there is anything else, he will destroy it through his different writing. In contrast to speaking, which we think of as extended in time, writing has both temporal and spatial dimensions that were already central in the thought of Immanuel Kant, who viewed these dimensions as a priori conditions of experience. *Writing* is a more suitable metaphor because it does not presuppose space and time but rather constitutes the experience that produces space and time while occurring in space and time. And, as events, speaking, thinking, or writing are saturated phenomena where intuition exceeds intention so that we might find new ideas in what we have been writing or saying.

III

EKSTATIC KNOWING & LEARNING

We are all familiar with those instances in our lives where we become so absorbed that we forget about time and, once we again become conscious of the moment, we tend to be surprised about the amount of time that we have not been aware of the present. The present did not *stand out* as such, which is equivalent to saying that we have not made this presence present again. Numerous philosophers make use of the old Greek prefix for 'out', *ek*-, as a special marker that emphasizes this state. The noun ecstasy and the adjective ecstatic are of Greek origin, derived from the prefix *ek*- and the verb the *ístánai*, to place. For example, existence, itself a late construction on the Latin *ex(s)istĕre*, to stand out, 'is enduring [Aus-stehen] and standing out [Hinaus-stehen] into the openness of the There: Ek-sistence' (Heidegger 1927/1977: 133fn3). The philosopher thereby emphasizes *standing out* as the special property that constitutes human forms of being; and this standing out occurs in an open space, a clearing, where it can become figure against ground of being. This standing out is achieved by means of beings (*Seiendes, étants*), that is, forms that allow us to make present that which is no longer present. Standing out, as we see in chapter 2, comes about, in visual perception, when the particularity of the eye movements makes something a figure that stands out against the ground. There is therefore a special relation between figure and ground, which, as I state, constitutes one phenomenon rather than two phenomena. This is so because 'the background, here, shows nothing: it testifies that it is from the background of the unshowable itself that the *ectypes* suddenly appear, miraculous survivors from the unseen' (Marion 1996: 71, emphasis added).[1] During our investigations in the course of the first part of this book, we note that the 'transcendental body that opens us to the world, which senses the sensed body by intentionally relating to itself in a manner that allows it to see, hear, touch it . . . – the senses generally identified with the intentional relation, in the ek-static sense as "sense of distance"' (Henry 2000: 196). Absorbed coping in and with the world – i.e., what is happen-

[1] Marion here uses 'ec-' rather than 'ek-' together with '-types' to mark that is the typicality that stands out.

ing when we do not make present (i.e., represent) our present – and times when we do make (parts of) the present explicitly stand out differ: 'Just as action absorbed in the world does not involve an experience of acting, a mental state self-referentially causing a bodily movement, so, perception does not involve a visual experience: I am simply fascinated by and drawn into the spectacle of the world' (Dreyfus 1991: 58). Our normal way of being in the world is descriptively denoted best by the term 'absorbed coping', because at this time we efficiently deal with the matters of the world *without* representing them (see chapter 8). However, shifts to more conscious awareness occur at times of breakdown, when the normal ways do not work any longer. There is then a change over to deliberate coping or explicit deliberation.

Most learning scientists, psychologists, and educators tend to be concerned only with one of the three modes of being: deliberation. Moreover, they tend to research situations that are reduced in complexity – such as the game Tower of Hanoi, simple geometrical proofs, or interpreting the simplest graph from economics theory – to derive their models of problem solving, work, or reading. Throughout this book, however, I am concerned with exemplifying a research approach that allow us to come to grips with those other modes of being, which, simply on cultural-historical and evolutionary grounds, are the conditions of ekstatic forms of knowing and learning.

In this part of the book we see that even at times of deliberation, there are dimensions of our behavior that cannot themselves be explained in terms of intentions – not in the least because intentions are not in turn intended and because, once we turn our attentive intention toward one thing, a problem, we also turn it away from another, our own problem solving process. Moreover, instances of insight, the having of solutions at points in time when we do not even think about the problem, and the emergence of embodied feelings that we do not intend are but some of the phenomena that traditional research is not equipped to deal with. This is so because this kind of research is concerned with representations and situations that are represented. That is, this kind of research is explicitly concerned with those dimensions of our life that *stand out*, which are *ek-static*, *ek-sist,* and constitute *ec-types*. In hermeneutic phenomenological inquiry, we can observe a similar attention to the ekstatic, the *accounts of* experience rather than attention to the prenoetic experience itself. Thus, when reading biographical or autobiographical materials about an author, the reader 'is merely creating an artistic and historical image of the author that may be, to a greater or lesser extent, truthful and profound – that is, this image is subject to all those criteria that usually apply in these types of images. And this image of the author cannot, of course, itself enter into the fabric of images that makes up the literary work' (Bakhtin 1981: 257). That is, even in the case of an autobiography, what authors tell and write about themselves *cannot enter* the fabric of the images of the literary work. If we want to understand the *work*, then we have to attempt to enter it directly, living rather than depicting it by one or the other mode of accounting.

In this, the third part of the book, the first-person approach is exhibited and exemplified in the context of events that are of interest to educators – problem solving, proving, or reading – but which tend to be investigated only in terms of the ekstatic forms of knowing that may be relevant. I show how we can understand

such events more completely when we attend to passivity and immanent forms of knowing that do not tend to enter received theories of learning. Moreover, chapter 12 in particular works out the distinction between the living-lived work by means of which we do something and the accounts of such work that people will produce when we ask them about what they *have done*. At this point, we may already anticipate that trying to get access to the process will be problematic, based on our analyses in chapter 6 on memory: any trace of original experience is immediately written over again by subsequent experience. In chapter 11, I exemplify the first-person approach in the context of mathematical puzzles and everyday coping with problematic situations. Chapter 13 focuses on what we can learn from first-person investigations of reading when this process is thought as a *cultural* practice, of which my own reading is a concrete realization. The structures of reading are exemplified in the context of reading science features designed for the general public in an online medium, the science section of the BBC online news.

11

Problem Solving

Problem solving is an interesting area, and there exists a lot of psychological research, most notably, for example, the studies that the Gestalt psychologist Wolfgang Köhler conducted with chimpanzees. Most psychologists treat the phenomenon as a 'mental process' of 'problem finding', 'problem shaping', and 'solution finding'. Every now and then we can find some 'insight' thrown into the mix of concepts to explain a feature of the phenomenon, which occurs precisely when psychologists cannot really explain what has happened with their representational models. However, for a long time I felt that the application of these theories is rather limited because it misses essential aspects of the process. For example, in 8 years of studying scientists at work in their laboratories and in field research, I never found the kind of processes of 'hypothesis formation' and 'reasoning' that any popular textbook on cognitive psychology will feature. Most notable, for me, is a brief conversation that I have had with Marlene Scardamalia, an applied cognitive scientist who has done a lot of research on writing. I once spend some time in her research lab and field sites when she admitted to me that despite having conducted research on the topic of writing for two decades, her model could not describe my own writing process. At the time, I thought that this was not boding well for her model. Perhaps these models on writing and problem solving are useful when gross reductions are made from the original living-lived experience of dealing with troublesome situations – which for cognitive psychologists are of the simplest kind, like the Tower of Hanoi. I know that these models do not work well, especially after having observed experienced expert scientists in troublesome situations. What I observed led me to write an article answering the question 'What do scientists do when they do not know what they are doing?' Rather than applying rational models of problem solving, these scientists were 'groping in the dark', doing this and that precisely because they could not know what a proper next move would be.

What gross simplification looks like can be seen from Jean Lave's research on the use of fractions in 'best-buy problems' in supermarkets, outside supermarkets with selected items, and in paper-and-pencil format. In the supermarket, participants use many different, legitimate, and appropriate strategies to find out whether an item is a best buy or not. In paper and pencil format – where the best buy is reduced to a question such as 'is a 400-gram pack of cereal for $1.58 a better buy

than a package (of the same or different brand) offered at $3.18 for a $750-gram package?' – some processing of numbers is inherently asked for. But in the supermarket while doing the weekly shopping, the type of brand, package size, shelf life, use-best-before dates, rate of consumption at home, the degree to which different family members like the brand, and many other considerations come into play, which mediate the ultimate cost. (Spoiled food means the item costs more in the long run.) The very contexts and constraints that make problem solving interesting, highly complex, but also suitable to innovative approaches are eliminated beforehand when researchers ask participants to do paper-and-pencil tasks. In fact, the gross reduction may go even further by limiting those doing paper-and-pencil tasks to paper and pencil, while disallowing the use of pocket calculators or other devices or methods that people use in their everyday settings.[1]

In schools and at universities, problem solving often is not asked for, because students are made to copy notes from the chalkboard and memorize it for examinations. This has effects on what and how people go about dealing with the problematic situations that they are asked to solve or have agreed to participate in. For example, in one of my studies, eighth-grade students had worked on a 10-week unit of ecology, where they framed questions that they wanted to answer about a 20–30-m^2 plot of wooded land on the school property. At the end of the study, we tested their competency to analyze data that another eighth grader had generated. Later we asked science teachers in training – all had a bachelors or Masters degree in science – to respond to the same task. It turns out that there were a statistically significant higher number of mathematically (statistically) more advanced approaches within the group of eighth-grade students than among the university students. We concluded that the eighth graders simply were more familiar with the open nature of the problematic task than the university students; we did not conclude that they were smarter or better at problem solving and data analysis.

There is a lot that we can learn about problem solving when we abandon the traditional (psychological) discourse and investigate what the experience is like and attempt to understand the invariants in problem solving. What I am interested in by working through the two situations in this chapter – both of which I had found problematic enough to engage with – are not the particulars, that is, that I used a mathematical software in one instance or a motorized screwdriver in the second instance. Rather, I am interested in working out the behavioral invariants that teach us something about problem solving *generally*. This means that we need to systematically interrogate these particular instances of problem solving presented here to extract the general, invariant properties. These, then, will assist us in describing other problem-solving situations that we might encounter elsewhere and, more importantly, that others encounter in the diverse situations of life. It is therefore unimportant whether the solution 'I' have come up with is the 'right' one, the only one, or the most economical one. What the first-person approach attempts to unearth and excavate are the invariants in the forms of phenomenalization that occur in the process.

[1] One method consists in asking other people: my wife will ask me whether the 750-gram yoghurt on sale is a better deal than the same yogurt in the 1.75-kilogram package. But asking another person is disallowed in the testing situation, though a perfectly legitimate approach in the supermarket.

In this chapter, I show the first-person method at work in two very different contexts. The first pertains to two mathematical puzzles that I was given. It became a problem because of my engagement with them. It is therefore of interest to our present purposes of describing invariants of problem solving; because there are two of these 'problems', we can actually ascertain the behavioral invariants across the two contexts. In presenting this, I actually revisit a problem that I have written about repeatedly but without truly working out the possibilities of a first-person approach. Moreover, in other instances where I describe this 'problem', I am concerned with other aspects of this episode, whereas in this chapter, the methodical aspect constitutes the important matter at hand. The other context pertains to an issue that I had with a pocket door in my home, which required what turned out to be a difficult form of repair.

Methodical Note In the instances presented here, I had kept ample notes and drawings or photographs to document what I 'file' under keywords such as 'phenomenology of learning', 'phenomenology of problem solving', or 'phenomenology of invention'. There tend to be two places where I keep such materials. The first is in my research notebooks, which contain dated pages and keywords above the heading line below which I keep my notes. The other place is on my computer hard drive, where I create folders the name of which index its contents. Like the notebooks, the folders are organized in a historical order, because I tend to remember when and where events have happened and when and where I write something. Historical organization, therefore, works for me. For example, when looking for the materials for the second case study, I remembered approximately when the event had occurred and that I had kept electronic images. Because I also have an approximate idea about when I purchased my different cameras, I quickly located the images in a folder labeled 'phenomenology' and, from the date the photos were saved, I could quickly identify the appropriate research notebook and find the entry under the same data as the photographs.

School Mathematics 'Problems'

Many puzzles constitute ill-defined problems – unless one is already familiar with the particular type of puzzle of which this new one is an instant. Interesting puzzles are those that do not come with *holds*, where I understand 'hold' from a first-person perspective, as a form of relation that I have with the situation at hand. I am thinking about a foothold or handhold that I would have while hiking in the mountains over difficult terrain. In this section, the experiences of two such instants are featured together with a first-person analysis. Such school 'problems' are designed to weed out those students who can versus those who cannot do them, that is, they have an evaluation scheme ready against which any individual achievement – and even how it has been done – will be judged. Just writing an answer tends to be illegitimate and students generally are asked 'to show the way how they got their answer'. However, some of these 'problems' may be taken up much in the same way

that crossword puzzles, Sudoku puzzles, and the like are taken up, that is, in an 'authentic' way, as something truly problematic. This 'being taken up' is an interesting phenomenon in its own right because there is some affection, some form of allure that makes us pick up a 'puzzle' even though we do not have any guarantee of success. This affection cannot be understood solely by looking at the individual, as there is a pull that an object of consciousness exercises on the person (Husserl 2001). In the following, I illustrate the first-person approach at work in the context of two mathematics-related puzzles. In this situation, it is not the engagement with the mathematics problem that is invariant and generalizes to others, but the initial allure and engagement, which becomes an extended engagement until some point where it comes to a halt because some form of satisfaction is achieved. Again, coming to a halt and the particular interactions with the emotional response and state is more likely to generalize than being un/successful or the particular feeling that the person has. Because their affective pull was so great that they really grabbed me, these puzzles became problematic in their own right, though the precise nature of the problematic would have to be established. What is it – from the perspective of the acting subject – that is problematic in a particular situation? Thus, it may not actually be what the designer of the 'problem' wanted it to be.

On Hospitals and Birth of Boys

I have had an opportunity to investigate puzzle solving some time ago, when a graduate student of mine gave me what turned out to be a mathematical puzzle. At the time I do not know how to do it or how to go about it in the way teachers know how the word puzzles they assign have to be solved. I do not even know initially how to start and what kind of mathematics, if any, would assist me in answering the question at the end of the text. That is, the way the puzzle is framed tells me something about the kind of situation in which one might be asked to respond to something like it and that there likely exists a standard or standardized 'solution' against which I would be judged, if the situation were accordingly (e.g., in school, in a psychological laboratory). We already note a first invariant: There is a sense about the kind of situation that we can appropriately locate and of which we can provide descriptions as likely contextual factors. In the present instance, the way in which the story about the two hospitals is told and the question that follows it – 'In which of the two hospitals were there more such days?' – allows a characterization of the 'problem' to be of a certain kind. This kind of 'problem' differs significantly from the problematic situations that we face in everyday situations, such as the one described in the next section, where the problem itself is at issue – i.e., we do not even know what the problem is let alone how to solve it – and where existing solutions may define the nature of the problem.

After beginning to think about the contents of the text, I become so intensely absorbed (as I realized afterward) that I understand only subsequently what has happened to me. This is the kind of absorption I describe in chapter 8 and articulate methodological issues concerning its investigation. When I eventually do reflect on the event, I immediately notice the physical metaphors that I have used to describe

Fig. 11.1 Distribution of births in two hospitals with different numbers of average births per day. The drawing constituted a first hold.

what has happened to me. Although the puzzle phenomenalizes itself to me first in the form of a text, and although it appears to require some form of mathematics, my sense at the time is that I am exploring a space, and in my doing – using a computer modeling software, making diagrams, writing formulas and watching their results – it is as if I am exploring a physical terrain, seeking and creating holds, thereby creating space for me within which to operate, and eventually coming up with a reasonable answer. In the following, I narrate the events in the manner of this metaphor, which may actually differ for different individuals. This is so because 'space' and movement through space is a particular way in which I have experienced complex situations, such as making sense of data in research situations. Here, too, the entire dataset pertaining to a project and the associated literature constitute for me something like a library in which I move about to pull what I need off the shelves and from drawers. But let us turn to the text that my graduate student has handed to me, and which goes something like this:

> In a certain town there are two hospitals, a small one in which there are, on the average, about 15 births a day and a big one in which there are, on average, about 45 births a day. The likelihood of giving birth to a boy is about 50%. (Nevertheless, there were days on which more than 50% of the babies born were boys, and there were days when fewer than 50% were boys.) In the small hospital a record has been kept during the year of the days in which the total number of boys born was greater than 9, which represents more than 60% of the total births in the small hospital. In the big hospital, they have kept a record during the year of the days in which there were more than 27 boys born, which represents more than 60% of the births. In which of the two hospitals were there more such days? (a) In the big hospital there were more days recorded where more than 60% boys were born. (b) In the small town there were more days recorded where more than 60% boys were born. Or (c), the number of days for which more than 60% boys were born was equal in the two hospitals.

After reading the text, the image of two distributions emerges into my mind, an image that I quickly sketch on a piece of paper (Fig. 11.1). It represents the number of births in each of the two hospitals, which average 15 and 45. I have no idea at the time whether this diagram is or will be of any help, but it is one of the things

that allow me to explore the implications of the text. When I check my watch, I realize that it is late and that I must get on my bicycle to ride home.

We already note in this beginning that there is a particular way in which the 'problem' is cast in my actions. The textual 'there are, on the average, about 15 births a day' is translated into graphical form with a particular form of curve – insiders know it as 'a Gaussian' – that is symmetrical around the 'average' of 15, clearly marked by a vertical line. The number of births in the other hospital is similarly represented. Now we can probably assume that the form of representation, the diagram, is not a universal response to the original text. This transformation is very likely a particular response, though a culturally possible and legitimate one; but in itself it will not be an invariant. Whereas we might observe some form of 'transformation' across the performances of other individuals, the one that has surged into my consciousness is not the one that we would find in every person's response. My background and training in physics, applied mathematics, and statistics may be good candidate reasons for explaining that this diagram rather than some other translation has occurred. Also noteworthy in this context – something that will repeatedly return – is the fact that I cannot give any reason why this diagram emerged into my consciousness rather than something else. The text in itself does not provide a foot- or handhold for this approach. It does not ask for a visual representation, diagram, or anything else. I do not know why the particular (Gaussian) curves forced themselves upon me, because other drawings that might have possibly emerged might have just included the vertical lines marked with the average number of births in each. In fact, when I checked Google using the beginning sentence of the text, I found the 'problem' with varying numbers posed in about the same way. The solutions, if they are offered, do not (tend to) include diagrams.

Traditional psychologists might want to suggest that there was an association made between the term 'on average' and the Gaussian curves. But then the question has to be who made this association? I know it was not I. I know that I did not make anything. An image imposed itself upon me. If psychologists want to create an appropriate theory to explain the experience I have had then they need to explain how it is that the images *gives itself* to me rather than I, the acting subject, constructing it or pulling it off the shelves of my long-term memory.

We note as an intermediate result: (a) there is a particular *manner in which the situation description is translated into a diagrammatic description, (b) there is a* translation process*, (c) the translation phenomenalizes itself through* givenness *rather than intentional selection from a shelf of strategies or possibilities, and (d) the translation does not appear* as *translation but as another form of the possible*.[2]

On my way home, while riding my bicycle, the puzzle returns. Away from the desk and without pen, another image comes to my mind, this time reducing the number of children I have to deal with: the number of families with three children and the distribution of boys and girls, which I envision in the form of zeros and ones (Fig. 11.2). I think: *So the possibilities of gender distribution in a family with*

[2] As a person who fluently communicates in three languages, I experience moments where I engage in translation, *consciously seeking* equivalents of something that I read in French but want to render in English. But when communicating in French or German, I do not *consciously look* for expressions, even though English is my dominant language. These are two different modes of being.

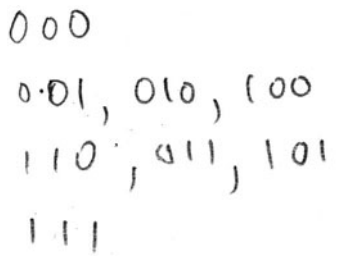


Fig. 11.2 Thinking about the puzzle while being away from my desk, another image comes to my mind, this one of suitable size to be envisioned in mind and operated upon it: The number of boys and girls in families with three children.

three children are three boys and zero girls, then two boys and one girl, one boy and two girls, and zero boys and three girls. In my mind's eye, I generate the image and count – literally, by envisioning the possibilities and counting them off – the number of triplets resulting from the previous operations. There are one, three, three, and one combination(s) in each of the four rows, respectively. That is, the possibility of having two boys and one girl or two girls and one boy is three times as high as having three boys or three girls. The distribution of triplets resembles my earlier paper-based drawing: it is 'like' 'a Gaussian' turned on the side.

Something noteworthy occurs in the preceding description: I write 'the distribution resembles my earlier paper-based drawing' even though I have been visualizing rather than actually drawing an image. I check off this 'mental' image as if I had a real image in front of me. This points to the fact that some aspect involved here is precisely the same as the one that has occurred in the situation with the actual drawing. Some aspect of the visual apparatus involved in looking at a diagram is the same as while generating the diagram virtually are the same. There is an immanent form of knowing that involves the organism – i.e., 'me' – in the same manner in both situations. In chapter 2, we already encounter what the eyes do when they count lines. Here we find in the description that in my mind's eye, I was seeing the distribution and counting. This tells us that visualizing is not something special but rather a form of doing what otherwise is done in the presence of the image. At this point I am reminded of something that I have read: 'the psychological nature of humans – the totality of societal relations, shifted to the inner sphere, having become functions of personality and forms of its structure' (Vygotskij 2005: 1223). That is, reading images has been a societal relation first before it becomes a form and function of individualized thinking. In fact, talking about the images, drawing them in the way they appeared (Fig. 11.2), and reproducing them as part of a description for how I have been going about it shows that there is something general, inherently intelligible and shareable about them that is not singular to me.

Still on my bicycle, I begin another example with the intent to make a comparison with the three-children example. This time, I try six children. As I try envisioning the sequences – {0,0,0,0,0,0,0}, {1,0,0,0,0,0}, {0,1,0,0,0,0} – I realize that the task of envisioning, enumerating, and counting the frequencies in each row is too complex to be held in mind and that I really need to wait until I have paper and

pencil available. Here, using a second situation that is similar to the first is a more active selection than that has occurred for the first image. I try six, but do not know why six rather than some other number. The six is given to me, and I cannot provide a reason for this: why not four or five? But I do try only to realize that the size of the resulting situation exceeds what I can deal with then and there on my bicycle. That is, whereas the approach might have worked with a sheet of paper, where I could have listed all possibilities in the manner that I have done for the small hospital, with six children my capacity to imagine all possibilities has been exceeded. I realize this: *If I had anything like a conception of a* 'problem space', *then I would have eliminated the possibility of using six children. The fact that I abandon this case only after working with it for a time tells us that whether a possible move will yield anything at all cannot be established beforehand, as the landscape of the problem becomes available only in an unfolding manner*.

Something else comes to my mind, likely a consequence of the earlier image with the three-children families (Fig. 11.2). That is, this first (fleeting, ephemeral) image has created a hold that now leads me to another thing the implication of which I begin to work out. I thereby create even more holds. The thing I imagine at this instant takes the form of two parentheses enclosing two numbers but, I clearly remember my high school teacher's advice – this is neither a fraction nor a vector, two other and distinct mathematical quantities:

$$\binom{1}{3} = \qquad (11.1)$$

Something has happened here, sharing, in the process of phenomenalization, similarities with what has happened before. The opening sentence of the preceding paragraph already sheds light on the nature of phenomenalization: it is a given. I have noted at the time that 'something else *comes to* my mind'. In this sentence, 'something else' is in the subject position. *It* is the agent that 'comes'. It comes to *me* in the manner someone else might come to visit me. I am the welcoming host in the former as I am in the latter case. The image of this strange notation (11.1) is not the result of my agential search and construction but the result of a process that I denote as *donation*.

After the image has appeared to me, I (consciously) remember having seen it before and also, vaguely, remember that it had to do with probabilities. Since my high school days, I have completely forgotten what this notation means or how to work with it.[3] It is an entity, perhaps a possible hold, but I cannot hold on to it right

[3] I was not doing particularly well in mathematics at the time. Though I became something like an applied mathematician later, I struggled in high school mathematics, frequently unable to visualize and concretize what the mathematics 'really' 'meant'. Some researchers may be interested in researching the kind of frustration I experienced in not being able to 'see', for example, how to figure out the distance between two straight lines in three-dimensional space. But here I am not interested in 'my' 'feelings' unless I can analyze them in a manner that gives rise to invariants that are suitable to describe the possibility of experiences of others as well. What is invariant is the existence of an emotional coloring, which may lie somewhere across the entire spectrum from negative to positive with intermediate states where the emotional nature disappears from consciousness.

then and there on the bicycle to use it for my purposes. I do not pursue thinking about it.

Later that day, having arrived at home, I also have a new resource for creating further holds: my computer and a mathematical modeling program – MathCAD – that I have used with students from the elementary grades to the high school level. The interesting aspect of this program, as probably of other modeling programs as well, is its capacity to 'play around', and getting a response upon acting. I know from experience – though I am not making this salient at the time to think about it but rather go to the computer and work with it – that these action/response cycles allow me to evolve holds, and eventually to the framing of a problem/solution pair that responds to the issue at hand. After I start up MathCAD, I look through its manual to see whether I can find something similar to the image depicted in (the unsolved) equation (11.1). I cannot find anything that resembles the vague image in my mind. However, another image then appears and takes hold in my mind's eye. I play a willing host to it:

$$\frac{1!}{1!(3-1)!} = \tag{11.2}$$

It is evident from the numbers in this strange equation that it is related to the image of the distribution of boys and girls in three-children families. That is, this image creates a hold, and based on this hold, further possible holds emerge, though some do not appear to be such – e.g., when I cannot find an equivalent to (11.1) in the MathCAD manual. Although I do not remember how this expression (11.2) was used in my high school mathematics class, I do remember all of a sudden that the exclamation mark is denoted by the term *factorial* and it mathematically meant that you had to multiply all integers up to it – for example, 3! = 1 x 2 x 3. I quickly type the fraction into MathCAD and, without even looking or thinking about the keys, simultaneously hold down [⌘][=], which I 'know' without reflecting upon it, recalculates all equations currently visible on the screen. The screen now shows

$$\frac{1!}{1!(3-1)!} = 0.5. \tag{11.3}$$

In this situation, my action has a result. Typing an expression and then asking the computer to calculate it produces a number, which, qua change, becomes a new possible hold that allows me to come to grips with the expression itself. At least, it is a beginning hold on the expression. Without making thematic what I am doing or the objects that I manipulate, I first change the numerator to 2, then to 3 and each time press the keys [⌘][=] which yield the following two results:

$$\frac{2!}{1!(3-1)!} = 1 \tag{11.4}$$

$$\frac{3!}{1!(3-1)!} = 3 \tag{11.5}$$

It then occurs to me – note the passive formulation! – that I have three children and perhaps the '3' in the numerator should stay and I need to change the '1' in the

denominator of (11.5). When I do that I obtain 1, 3, 3, and 1 when I use 0, 1, 2, and 3 in place of *n* in the equation

$$\frac{3!}{n!(3-n)!} = . \tag{11.6}$$

In this sequence of events, the new approach 'occurs to me'. I do not know *whence* it has come from. After the fact, it is always possible to generate what looks like a causal explanation. Someone might be tempted to say that the problem lies in (11.3), which is a number that does not appear in the image that originally appears to me (Fig. 11.1). Although the results '1' (11.4) and '3' (11.5) do appear in that image, the kind of symmetry that the figure displays is not obtained in the three equations. Zero – the possibilities to have a boy when a family has three children are 0, 1, 2, or 3 – could have been entered, too, but it would yield the same as 11.3, as 0! is 1. *At best, there is a vague sense that this approach* does not *work.*

I now test equation (11.6) by entering 0, 1, 2, and 3 for 'n', which gives me as results the answers 1, 3, 3, and 1, respectively. Here, then, a hold has appeared to me, allowing to be 'discovered', as much as I have created a hold. The ephemeral image of a fraction and numbers with exclamation marks, the sense of which has escapes me at that moment, and using the number '3' consistent with the three-children family, has yielded a series of results that are consistent with the image I have had while riding home from the university. It is a hold because two different images and processes have yielded the same result, which may be due to an underlying pattern. In a sequence of actions, the nature of which I have not been able to assess at the moment, new structures emerge, and these structures provide new holds.

We can retain this: When it becomes apparent that two different *approaches yield* the same *result, there is a sense of being on the 'right' track. That is, independent of the two different ways I come to use, the* invariant *is that after arriving at the same result, confidence is gained that the* general thinking *underlying the approaches is appropriate.*

I pursue the inquiry, and, encouraged by these latest results, return to the puzzle. I begin to type rapidly:

$$\begin{aligned} x &:= 0..15 & y &:= 0..45 \\ f(x) &= \frac{15!}{x!(15-x)!} & g(y) &:= \frac{45!}{y!(45-y)!} . \end{aligned} \tag{11.7}$$

I have been using MathCAD for such a long time that I know how to define a variable (x, y) and I know without having to reflect upon it that I can create a function of each of these variables. Functions can be plotted, and creating a plot, too, is something that I have been doing frequently. Creating variables, functions, and graphs are holds that I do not need to think about but that are to hand much like a crevice is to hand in rock climbing without requiring the person to think much about whether or not it is promising. Once I plot the two functions f and g with respect to their defining variables, I realize that the maxima are of different height and I decide to 'normalize' them, which means, divide the function by its highest value, which, in the present situation, is at 8 and 23, respectively. Once I divide the functions in equation (11.7) by the values of the functions at 8 and 23, that is, $f(8)$

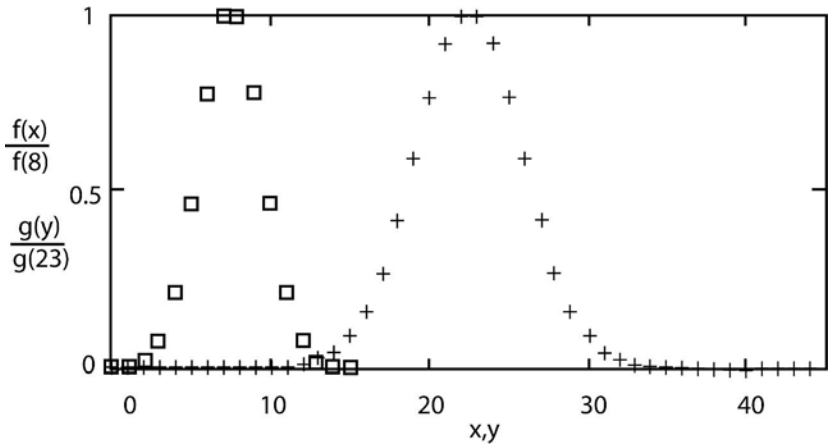


Fig. 11.3 The two graphs represent the boy/girl mixes in a hospital with 15 and 45 births, respectively.

and $g(23)$, I obtain two graphs (Fig. 11.3). The resulting figure is similar to the first ephemeral image but looks right – I am not looking for the distribution of children around the mean values but for the distribution of the boy/girl mix, which has its maximum at seven boys and eight girls and eight boys and seven girls in the case of the 15-children hospital.

Now, after having created and tested action possibilities – in typing equations and making the computer calculate them, creating functions and plots and making the computer graph the former – holds have come to exist for grabbing purposes. Possibilities for sense emerge. *Sense here means that a real situation I can understand and envision is modeled appropriately when I use mathematical representations that I may not entirely understand or know the behavior of. Whereas I have learned to navigate successfully the real world around me, I am often not so sure about mathematical objects, the mathscapes that they give rise to, and the kinds of footholds that they provide*. A sense of sense: my two distributions express precisely what the earlier envisioned and pencil-noted distribution of boys and girls in a three-children family expresses. The possibilities for having about equal numbers of boys and girls are most likely, and the possibilities of having 15 boys or 15 girls – and, equivalently in the other hospital, 45 boys or 45 girls – virtually are nil.

That makes sense! But I still have not answered the question. I continue my pursuit.

The puzzle is asking me about the number of days when there are nine or more boys in the small hospital and, equivalently, 25 or more boys in the larger hospital, each representing 60 percent of the total average births. I look at the plot (Fig. 11.3) and note that the widths of the two functions at their half-heights are different. Not only does the question now make sense but also, it has tuned my gaze to see something in the representation that I have not been immediately attuned to. One hold has created another hold, or rather, the two holds have emerged into my consciousness simultaneously (I merely play the unprejudiced host). The different widths make sense because of the question, and the question now makes sense

given the different distributions. At this time I can imagine that others might be led off track by the fact that 9 relates to 15 as 27 relates to 45 to state that the probabilities are the same in the two hospitals.

I know that the distributions tell me the probability to have a certain number of boys in the mix, each probability also representing a day. So I need to know how much area under each distribution is contained from the 60 percent mark to the upper end of the distribution. This means I have to add up all the values $f(9) + f(10) + \ldots f(15)$ and divide the sum by the total number of cases, that is, $f(0), f(1) + \ldots f(15)$. The associated vague sense is that of finding the area underneath each graph from 9 and 27, respectively, and to divide it by the total area. Vague sense here also means that I do not exactly now what I am doing but rather trying out different ways to see whether these are productive. Because I am dealing with integers, I am thinking of summing the values rather than integrating the functions, which I would have to do if I were dealing with continuous functions. So I type the division of the two sums into MathCAD

$$\frac{\sum_{9} f(x)}{\sum_{x} f(x)} = . \tag{11.8}$$

I am thinking that I need to sum *from 9*, which I type into the empty box of the sum, i.e., my hold; I type *x* in the empty box of the lower sum, because I have defined *x* to run from 0 to 15 (equation 11.7). I hit press the [⌘][=] key combination. But, *Oh my!*, I get a message 'must be range' tagged to the upper sum. I stare at the screen. There is a moment of no-thought.[4] It is as if the hold I have found gave in, was a no-hold, an outcrop that caved in as soon as I hung my weight from it. *Must be range!* I ponder what the sense of it is, and then think, *9* is not a range, it is a number. Create *a new range that runs from 9 through 15*, I barely have the time to think when my hands create a new variable *z* similar to *x* and *y* (equation 11.7) but running from 9 to 15. I then enter the new variable – which does have a range – into the slot of the sum in the denominator. I hit the [⌘][=] key combination again. Low and behold, I get a result that I can ponder:

$$z := 9..15$$
$$\frac{\sum_{z} f(z)}{\sum_{x} f(x)} = 0.304 . \tag{11.9}$$

The result is 0.304, which means that in about 30 percent of the days in the small hospital, staff sees nine or more boys being born. I check the distribution, and the result looks about right, about 30 percent of the total area under the first curve lies in the tail from 9 to the end (i.e., 15). I try the same for the other hospital, generating a new variable *w* that runs from 27 to 45. The result of the calcula-

[4] Those psychologists who use think-aloud protocol as a method would encourage the participant in this situation to 'say out loud what you think', when in fact I am not thinking anything. There is just a big black emptiness.

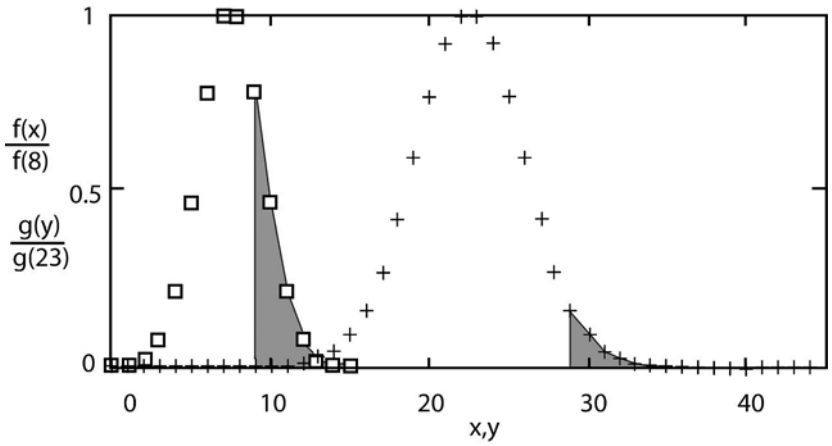


Fig. 11.4 The black tails represent the fraction of days in which there are 9 and 27 boys or more, respectively, born in the small and large hospital.

tion equivalent to (11.9) is 0.116, which means that on close to 12 percent of all days, staff in the larger hospital sees 27 or more boys out of the 45 total births. This brings me back to the image of the town with its two hospitals and a sense emerges in me that I have solved the puzzle. Into my mind emerges the image of a black-colored tail of the left curve that has a relative area of 0.304, which is larger than that of the right curve with its relative area of 0.116. I go back to the plot of the curve, print it out, and color the two areas. *Yea, I got it!* (An emotional response, an invariant, the particular of which depends on this situation, one of [possible] success.) The second grey area, the one corresponding to the larger hospital, is less than half the size of the larger grey area, corresponding to the smaller hospital (Fig. 11.4).

When I now look back at the entire episode, I know that it happened to me as much as that I was responsible for it. There may have been 'dispositions' that I am not consciously aware of. Much of the process involved passivity, from a first-person perspective, which is reflected in the associated language that makes use of the passive voice, which differs from the language normally used in psychology, education, and the learning sciences, where *transitive action verbs* tend to be the norm. As soon as there are intransitive verbs and passive formulations, the dominance of agential repertoires comes to be questioned (deconstructed). Slow readings of first-person accounts of problem solving allow us to throw much of the existing research into relief, seriously undermining the learning theories and concepts. In the present situation, the varying images, moves, and representations *came* to me: I *did not* intend or intentionally construct them. It is as if the entire episode occurred to me *despite* myself, taking me as a host to realize its occurrence. But this description also means that there is something more general in what I experienced, as something exceeding me: culture concretizing itself in the particulars of this case. It happened and I was as much a willing host as I was the agential subject who engaged with the task. Now our task as researchers is to get

back to culture, to interrogate *this case* for the cultural invariants that it harbors apart from the contextual particulars.

There is always the possibility that psychologists or learning scientists might say that I am a novice problem solver, even though they might have a hard time making the case based on other information from my life. Deficit perspectives appear more easily appropriate once the discourse already has established the lower-level performance of the participant. But even if I were only a novice problem solver, there are invariants in the behavior. It is precisely those invariants that the first-person approach is intended to identify rather than the particulars of my fitting the labels that psychologists and learning scientists have for categorizing the world. Besides, all we have to do to throw psychologists' frameworks into relief is put them into situation where the untenability of their own theories becomes apparent. For Marlene Scardamalia, it showed up has her inability to account for my writing, which means, her theoretical model is not invariant across *all* possible writers. All we have to do is look at the clumsiness with which many professors – including those of psychology, learning science, and education – go about particular aspects of their lives to show that (a) problem solving 'skills' do not transfer and (b) dealing with a real-world problematic is something other than running a rat in a maze that can be seen in its totality from a god's eye-perspective.

At that point, I have a sense of being done. I have climbed this rock – readers certainly take note of the similarity in the description with the sound experience I describe in chapter 4 on hearing – and it is no longer of interest. I do not know what a mathematician or mathematics teacher would say about what I have been doing. What I have done looks awfully complicated – like shooting flies with canons. I have the strong sense that a *real* mathematician would probably have a more elegant way of dealing with it, and wonder about how anyone could expect an ordinary teacher or student to solve this puzzle. Without further questioning myself, I remember having had a strong impression that this is too complicated for school mathematics and that what I have done is certainly unacceptable in school mathematics.

Postscript. While working on this chapter, I am doing a Google advanced search with the phrase 'In a certain town there are two hospitals'. Thirteen websites are listed, the first of which has the header 'Mr Danault – Word Problems, Age – 8 Questions, Multiple Choice'. The second and third result point to 'interactive quizzes' that appear on a site with 'teacherlink' in their URLs. I begin to wonder whether there is something in the problem as I have done and analyzed it for the present purposes. Surely I feel that there is a difference between what an eight-year-old child or even a high school student will do in an *understanding way* that I have failed to see. But I find one paper in which the author presents exactly the approach that has arisen for me in the end from my engagement with the task. I also find a paper that discusses research findings, according to which this task was given to students in grades 5, 7, 9, and 11 and to teachers in training. The studies show that with age, the proportion of individuals who respond 'inappropriately' increases. This is so because older individuals use ratios and proportions to say that the number of days is equal in the two hospitals because of the same ratios involved (9:15 = 27:45). That is, increasing (specialized) expertise in using ratios

and proportions also become a constraint, and, in fact, decrease the level of (general) expertise.[5] Expertise is not only enabling but disabling as well.

Mathematics is a Sweet Fruit . . .

In 2000, I happened to come across an article in a German journal dedicated to *Kritische Psychologie* (critical psychology) and the first-person perspectives that its practitioners have developed based on the theories of the Russian psychologist Alexei Leont'ev, the 'father' of cultural-historical activity theory. The article is entitled 'Mathematik ist eine süße Frucht . . .' ('Mathematics is a sweet fruit . . .') (Busse 1999). The intent of the article is to show how certain practices allow students to frame and choose themes and hypotheses, to arrive at statements and conclusions, and to prove these outcomes. The author contrasts his findings with the ordinary way in which word problems are framed. Although 'word problems' are designed to provide a connection with the everyday reality of students, the manner in which these are constructed foster particular solution paths that hamper making connections with the reality described in the stem. This is similar to what the comparison between the activities of grocery shoppers had shown when they bought their groceries versus when they did word problems. Word problems, though these may be framed in terms of making a best-buy in the supermarket, lead the subject to engage in practices that disconnects them from rather than connects them to their everyday realities – i.e., school mathematics.

The danger for any social scientist is common sense, which is a form of ideology. Just because I think in a particular way, or because my culture presents particular forms of thought, this does not mean that what makes sense is scientifically tenable. The concepts we use to think with are themselves the outcomes of previous thought activity. Just because some concept is also used in the sciences – such as the concept of 'motivation' that psychologists have borrowed from everyday language without checking out its epistemological implications (e.g., Holzkamp 1983) – does not mean it is scientific. In fact, it may just be a preconstruction that has been naturalized. The point in slow reading ('deconstruction') then is to break not only with ordinary common sense but also with the way in which we tend to make sense. That is, '*we must also break with the instruments of rupture which negate the very experience against which they have been constructed'* (Bourdieu 1992: 251). The purpose of the method is to build models of understanding that also encompass our primary naiveté.[6] The following account ought to be taken as what it is: the quick notes that have been jotted down following a particular experience, in which the author has not reflected critically on the account itself but

[5] In psychological research, one can find numerous phenomena where development is in the form of a 'U', which means, as individuals get older their performance decreases before increasing again.

[6] The author has a stark warning for those who feel superior when they uncover flaws in the primary naiveté: 'I cannot refrain from saying here that the thrill of feeling smart, demystifying and demystified, of playing the role of the disenchanted disenchanter, is a crucial ingredient in a good number of sociological vocations . . . And the sacrifice that the rigorous method demands is all the more costly for that' (Bourdieu 1992: 251).

merely provides a quick description in commonsense terms – even though there is at least one paragraph that is explicitly denoted as 'comment'. This, then, is precisely what we need to interrogate to get at a better understanding of what such 'problem solving' involves rather than taking the account literally, in the way that is commonly done when scientists talk about what they have done subsequent to having made a scientific discovery. Here, the purpose of the analysis is to go beyond the literal account that assumes an account has to be true just because the person involved has told the story. That is, to extract anything of use from the following account we need to analyze it critically to extract invariants rather than taking it literally.

> For several years now, I have kept painstakingly recorded personal 'discovery activities' and critically analyzed them subsequently. My intent has been to come to a better understanding of learning than what traditional psychological theories tend to provide us with. Furthermore, most personal accounts of discovery work by scientists fall into 'Whig history' rather than being critical accounts of discovery as ongoing process. In the latter reports, what is missing is a rigorous inquiry into lived experience.
>
> > Ich möchte euch ein Spiel mit 3 Ziffern zeigen, bei dem man Addition und Subtraktion braucht. Denkt euch drei verschiedene Ziffern zwischen 1 und 9. (Beispiel: 2, 3, 5) Bildet daraus eine dreistellige Zahl (Bsp. 325). Vertauscht die Reihenfolge der Ziffern, so dass eine neue Zahl entsteht (Bsp. 523). Zieht die kleinere Zahl von der größeren ab (Bsp. 523 – 325 = 198. Vertauscht im Ergebnis noch einmal die Reihenfolge der drei Ziffern (Bsp. 891) und addiert die letzten beiden Zahlen (Bsp. 198 + 891 = 1089).[7]
>
> Although I had not been mathematically inclined in school and, more importantly, have had considerable difficulties in making it unscathed through school (I repeated grade 5), I immediately found something interesting in this activity.
>
> As I read the problem, I mentally calculate the example provided in the text. (I intuitively know that the paper would not have been published had there been a problem with it.) Suddenly, I feel like writing a generalized solution to the task. I am not aware why this is happening, but immediately proceed to note on my scratchpad, and ultimately end up with the notes in Fig. 11.5.
>
> I first write a number, by converting the decimal positions into their full equivalent. That is, the digit in the hundreds position really stands for $x \cdot 100$, the digit in the tens position, y, encodes $y \cdot 10$, and so on if there were more than three digits.

[7] I want to show you a game with 3 numbers, which requires addition and subtraction. Think about 3 different numbers between 1 and 9. (Example, 2, 3, 5) Make a three-digit number with them (e.g., 325). Interchange the sequence of the digits to yield a new number (e.g., 523). Subtract the smaller number from the larger (e.g., 523 – 325 = 198). In the result, interchange again the sequence of the three digits (e.g., 891) and add the last two numbers (e.g., 198 + 891 = 1089).

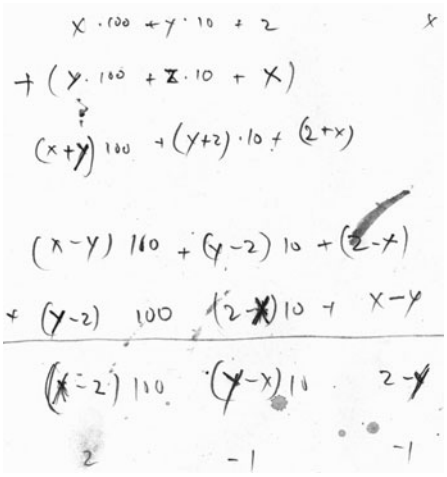


Fig. 11.5 The results of the first attempt to provide a general solution to the game with 3 numbers.

I permutate the generalized digits and subtract the two numbers, assuming that x > y. I note that the resulting differences (x – z), (y – x), and (z - y) are the differences of the permutations. I have the sense that there can't be a generalized solution because, depending on the permutation, different differences would be in the different positions. But this was not in any way articulated.

COMMENT: Even the choice of x, y, and z rather than any other letter is mediated by past experience. Actually, the set {a, b, c} would also have been a reasonable candidate. Setting up the digital representation in the form of an addition is something mediated by past experiences, though this was not salient to me at the moment when I did the problem and not even during my first attempts in analyzing what I had done.

With this sense that the permutated differences could appear anywhere, and filled with some unease, I begin to scribble down a few concrete cases (e.g., Fig. 11.6). Again, I change the order of the digits. My results are not at all 1089 as the text predicted it should be. There are two vague feelings present at this time. The first is about the article and that there might have been a case that the problem is not generalizable at all but that the author had given special instructions to the kids and these had done examples following the same pattern as the initial example. The other feeling was related to the failure to comprehend mathematical problems, the texts presenting them, while I was still in school.

I leave the problem and tend to my work. I am thinking about my failures in school mathematics, particularly the year that I could not calculate the amount of wallpaper needed to renovate a room given the dimensions of room, windows, and door. I also have the image of two lines in space whose distance I could not calculate as required in grade 11. I remember the frustra-

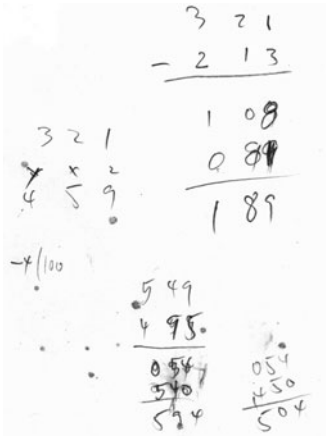


Fig. 11.6 After the initial attempt on a generalized solution does not yield a suitable result, I return to doing several practical examples.

tions I experienced in mathematics, and always being behind in my understanding.

Upon seeing the notes on my scratchpad on the following day, I do a few more examples, changing the position of the three digits (Fig. 11.7). I see from the example that there are different outcomes if different permutations are made. Thus, the 'correct' result only comes about when a particular permutation is implemented. I feel that the author must have asked the students to switch the first and last digit. I do not dwell on the question about the case of four and more digits that the author asks his students to do as an extension of the first task.

I do not get any further and leave for long day of work. On the way, as I am pushing myself hard on the bicycle, the problem returns to me. I wonder if in a four-digit number the outer digits are exchanged with each other and the inner ones. This could also be done for a five-digit number, with the middle digit remaining in its original position. Then all of a sudden I realize that this simply means that the number is written in 'reverse'. It then comes to me that 'vertauschen' may not mean, in this context, to permutate the digits, as this might have been meant in other mathematical settings, but 'to reverse'. Why did the author not use 'umkehren'?, I ask myself. I decide to check the word in a German-English dictionary.

When I return home that night, I immediately take to my scratchpad and begin to scribble my new attempt in the generalized solution (Fig. 11.8).

I begin this – as it later turns out – final session by noting a three-digit number in its generalized form ($x \cdot 100 + y \cdot 10 + z$). I reverse the order of the number, use '>' to note that '$x > z$'. I write down the result and note below it its reverse. As I look at my notes, I realize that addition would cancel my hundreds and my ones. I stare at the notes for a while, when it strikes me that $z - x$ will be a negative number. Even without thinking about the fact that negative numbers do not make sense in a digital representation, I begin to

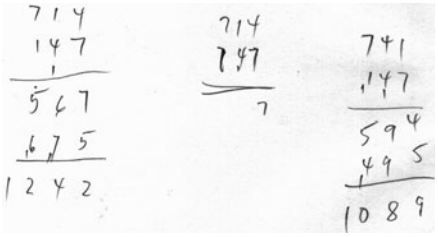


Fig. 11.7 A concrete worked out example of the game with 3 numbers, which yields the indicated result.

'take away' one hundred and divide it up into nine tens and 10 ones (in the last position). At first, I do not copy the 9 tens into the second line and end up with (10 – 1)·100 in the result (Fig. 11.8). I write 10 8 9 at the bottom, note that the addition gives me the correct result in the ones position. Then I think that adding two nines will give me the required 8, and note the forgotten 9·10 in the second line of the subtraction. As I add and carry over a one (in front of the first parenthesis, Fig. 11.8) I realize that this takes care of the –1 and that I have the required {10, 8, 9} sequence.

It is only at that point that it is clear to me that my first result could not have been appropriate, for if the result is always 1089, the generalized solution had to be independent of x, y, and z. It has not been evident to me throughout this process but only now that I have arrived at the final result.

Somehow the fact that I have the generalized result satisfies me more than knowing that any example that I can generate gives me the same 1089. The first question for mathematics education has to be, of course, 'Why this is so?', followed by the second question, 'What does mathematical curriculum have to look like to encourage such an attitude?' (Granted that such an attitude is what mathematics educators want to generate.)

Here at the end, I have a clear sense of satisfaction. I am pleased with the solution, even though it has only shown what I ought to have known all along. But I am filled with a sense of discovery, having found an answer, however trivial a mathematician might think that the problem is. I am able to close the problem and not to return to it. I know that I could now find the solution for any number of digits that the children had explored.

I do check the signification of 'vertauschen' in a German-English dictionary. It reads:

> **Vertauschen** v/t. exchange (*gegen, für, mit, um* for), (Handicraft, engineering) *usw*. A. interchange; (*Plätze*) change; (mathematics) substitute; (Rolle) reverse; → a. *verwechseln*.

I realize that among other things, I have discovered the signification of 'die Reihenfolge vertauschen' and therefore that of the activity for the children.

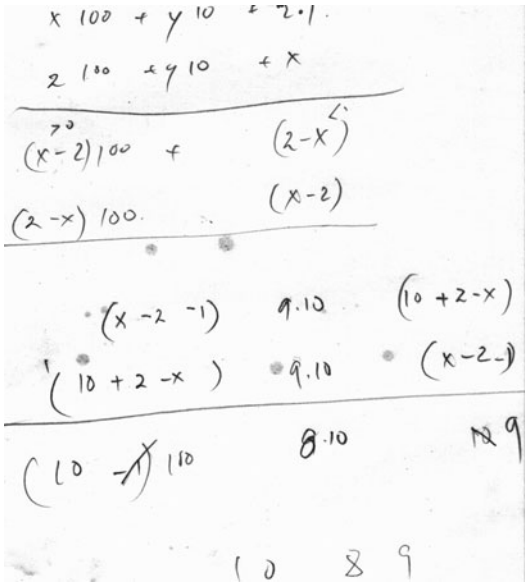


Fig. 11.8 The generalized solution proving that any 3 digits will yield the same result.

As we begin analyzing this *account*[8], we keep in mind that the event as a whole and in its part is a particular realization of the possible. It contains both aspects that are contingent and therefore particular to *this* case as well as aspects that constitute invariants.

The first point we may note pertains to the title of the article that got it all started. It says, 'mathematics is a sweet fruit', which we might find confirmed in the present instance. But surely, mathematics is not sweet for every person. Even avid athletes will pursue a range of sports but never become affected by some others. If the preceding account were taken as a reification of the message and title of the article, little would have been gained and we would have fallen back to the general assumption of those already affected with and by mathematics – mathematicians, mathematics teachers, mathematics buffs – that what tastes sweet to them has to taste sweet to everybody else as well. But we may interrogate this account as an instance of becoming affected. What has it been about this riddle that has made me engage with it even though I tend to leave many other (mathematical) riddles untouched? The question therefore is this: 'are there laws of propagation of intentional awakening? The most privileged case here is where affection results in attentiveness, grasping, the acquisition of knowledge, explication. Then this lawful regularity would of itself pass over into the law of awakening or again would lead the attentiveness further, or which is to say, would lead thematic interest further' (Husserl 2001: 198–199). What is it that makes *this* riddle an object that affects me at the time (it may not have done so at another time), become prominent enough at

[8] In chapter 12, I work out the difference between living-lived work and experience, on the one hand, and accounts thereof, on the other hand.

the time to lead to the deep and sustained engagement that is evident from the written account that remained after I have stopped?

In the account we note that there is an immediate turning toward a generalized approach. That is, the account shows that the initial attempt is doing precisely *not* what the stem asks students to do: to work through concrete cases. Rather, the very first attempt is to develop a generalized approach that works for any three numbers that are used as digits of a three-digit number. It is also immediately evident that most people in the general population would not attempt doing this task using the letters x, y, and z. This approach, therefore, is not something that generalizes as an invariant across people. Nevertheless, the fact that it was chosen lets us know that acting in this manner likely is a possibility in a culture characterized by the disposition of presenting results in a generalized manner – scientists, mathematicians, and perhaps others. What we observe, however, is that a rather simple, elementary-level task of forming, adding, and subtracting three-digit numbers is taken to a different level where, for the subject involved, it *becomes* a challenge and which is sustained as a challenge over a couple of days. All I have to do is look out of the window to know that there are other instances where someone creates a challenge and then pursues it to the point of mastering it: the children on my street build their own equipment for developing new moves and skills for riding their skateboards. They may begin by copying something they have seen and then add on special features that make engaging with the equipment a challenge for them. In both types of instances, the mathematical riddle and the skateboard challenges, there is no real 'need' for doing what is being done. What is it then that gives rise to sustained engagement even when the practical outcomes are rather inconsequential to the everyday lives of the persons? It is not just engagement, for I might not have abandoned the activity but tried to model the four, five, and higher digit numbers as well. We see here the absence of the affection that characterizes the beginning.

In this account, affects appear in overt – explicitly described or referred to – and covert ways – such as when an initial unnamed affection leads to salience, interest, and engagement. The interest is not simply there. It is in and through reading the text that affection occurs. We subsequently see evidence of negative tonality, such as when the experiences of having failed fifth grade or the experience of not being able to figure out the nearest distance between two lines in space are articulated. Affection occurs because 'every sense-field forms for itself a unique, self-contained realm of affective tendencies, capable of forming organizing unities by means of association' (Husserl 2001: 199). That is, engagement with the chosen task engenders a change in the emotional tone. Yet despite the thoughts about failure in school mathematics classes, I return to the riddle on the next day, doing more of the things I had done when I left it. In the end, following what feels like a successful solution, there is a positive emotional tone reflected in the account: 'Somehow the fact that I have the generalized result satisfies me more than knowing that any specific example that I can generate gives me the same 1089'. Again, the change in emotional tone is brought about by the activity itself, despite the negative tones that have accompanied it throughout. We therefore see that the negative and positive emotional tones are produced in and through the activity, as a measure of the distance between the current state and the unspecified end. Solving problems may require patiently waiting for a solution in deliberately turning away

from the problem. In this way, problem solving has a component of epoché, where the third stage means 'no attention'.

We also note the passive linguistic constructions, which I have used at a time to describe the events even though the role of passivity has not yet been clear or a focus of my research. The first such formulation actually constitutes the beginning: 'Suddenly, I feel like writing a generalized solution to the task. I am not aware why, but immediately proceed to scribble on my scratchpad and ultimately end up with the notes in Fig. 11.5'. The adverb 'suddenly' suggests that there has been no warning, preparation, or anticipation. The event arrives and I 'feel like writing a generalized solution' but 'I am not aware why'. That is, the intention to write the generalized solution has come to me; and I, a willing host, accept this offering and donation. Here, the intention toward an object is awakened by nothing other than the object itself. This, in classical thought, is a chicken-and-egg situation when conceived as the opposition of intention and intentional object. But it does not lead us to a contradiction if the fundamental category is that of change, which then allows us to understand the birth and death of intention and object at the same time. In the other example, on the bicycle, there is an episode in which a realization suddenly strikes me. I do not work on the puzzle or intend dealing with the problematic issues that have been arising for me, but I am 'suddenly' struck. Finally, there is a realization at the end that could not have been anticipated but required the entire process as antecedent: 'if the result is always 1089, the generalized solution had to be independent of x, y, and z. It has not been evident to me throughout this process but only now that I have arrived at the final result'.

Everyday Settings

In everyday life, we often encounter situations that need some response, some kind of action to get the mundane order of things back on track. We tend to find solutions, sometimes on our own, sometimes after consulting with a neighbor or with other individuals (e.g., in a hardware store). In other instances, we may call an individual craftsperson or a company to fix what is broken and thereby get us back on track. Such situations are ideal for finding out about 'problem solving' in naturalistic settings that tend to be so complex that the simplistic models developed on the topic are insufficient to account for and explain what happens. As with inventions or discoveries, however, it is dangerous and misleading to take the agents' own accounts literally, as if these depicted the events as a whole and in their development. Rather, after-the-fact accounts tend to be colored by the discovery process itself and by the ultimate outcome (Husserl 1980). Thus, we never have direct access to past events from the present now point. Rather, some present experience 'sinks' into the past such that – from subsequent now points – it is viewed through the events that have occurred since. We do not, however, reconstruct the original events by projecting backwards through the different ways in which it has appeared. Rather, the event is visible to me transparently through the ways in which it has appeared (Merleau-Ponty 1945). That is, I see the object as if it were unmediated by my intervening experience as if I were to see it through a set of

Fig. 11.9 A pocket door is only about 35 mm thick and slides in a pocket of 45 mm width.

(colored) spectacles without being aware that what I see is colored and is given shape by the glasses. This leads at least some social science researchers to suggest that practitioners, by principle, have no better access to their practice – events that they have lived through – than others (Bourdieu 1980). The other important dimension is that practitioners themselves make use of common language that stresses rules and regularities of behavior to explain what inherently follows very different principles.

In the following, I exemplify the first-person approach by drawing on a situation and event that occurred in my home: it required fixing, possibly with major structural work, and therefore has had a truly problematic nature. My kitchen is separated from the hallway by means of a door that slides into a pocket in the wall (Fig. 11.9). The door itself is 35 mm thick and slides into the pocket of 45-mm thickness. One day, we could no longer close it: Upon investigating the matter it appears to jam as it is pushed into the pocket. I unhang the door and it becomes apparent that the track has come loose inside the pockets. Two screws have come out completely and are about to fall to the ground; another one further to the door jam also is loose. Unsuspectingly, I go to get my power drill to fasten the screws again. But I cannot get the drill into the pocket. The pocket is so narrow that I cannot turn the screwdriver to fasten the first screw let alone reach the place where the other two screws. In fact, I get stuck pushing my arm too hard into the pocket. When I finally get myself out of the jam, I go to ask my neighbor, who has always been a handyperson and who has installed the electrical wiring in the garden level floor of his house. He comes with an electrical hand drill (seen as part of the contraption in Fig. 11.10) and we succeed in getting the first of the three screws fastened. But the others are out of reach. After pondering for a while, he suggests that this means having to take off the plasterboard next to the door. He tells me about a tool that requires only damaging part of the wall. The thought of having to remove the wall and then plaster and repaint the entire hallway flashes through my mind's eye. My neighbor returns home leaving me to myself. The idea of having to re-do this entire part of the house just because I need to fasten two screws frightens me sufficiently to be staring at the door.

All of a sudden, an image emerges: I am extending my arm with a skinnier extension no wider than my flat hand and that reaches the battery-driven screwdriver far enough back to set the screws comes to me. I go to the basement riffling through the wood, then to the outside where there are all sorts of scrap wood underneath the deck. I have no clear idea what I need or what it is that I am looking for. I wonder about holding the screwdriver in place and, the image of its rotating out of position as soon as I begin to screw appears in my mind. I do not have a 'clear' idea about what an 'appropriate' piece of wood might look like. But, after

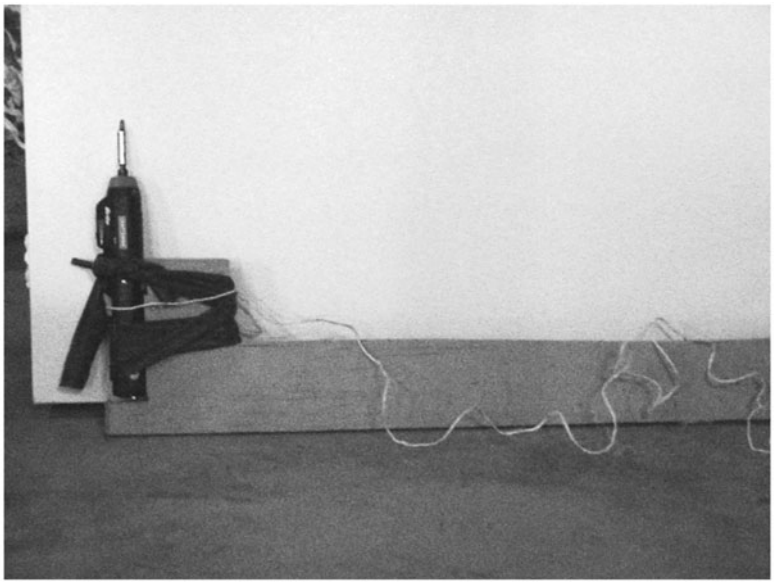


Fig. 11.10 This tool is an ad hoc creation for going into a narrow cavity to place and tighten a screw that would otherwise have required the removal of a wall.

finding nothing in the basement or underneath the deck, I know that I have something appropriate while seeing a piece of stock cut from the old deck that I had to replace because it had rotted. 'Appropriate' meant that I would not use 'good wood', at least not during the time of trying to come up with a suitable solution. I immediately take note that 'appropriateness' *emerges* at the very moment that I see the piece of board – like in the old saying, 'I know one when I see one'. I build a first contraption, but the screwdriver comes off almost immediately and there is insufficient space for holding it to the wood. Using an old piece of plywood, I cut it such that I can use an old inner tube to hold the screwdriver at a sufficient amount of length along the tool. When the string with which I pull the trigger does not stay in place, the idea comes to me that a screw might hold it. I end with a strange-looking contraption (Fig. 11.10).

When I am actually ready to try the tool, a worry creeps up within me about how to provide sufficient force from underneath the screwdriver to be able to hold it in place on the screw. The first thought that arises within me is that of using a household ladder as a fulcrum, but the one I have is not of the right height. An image surges: using my left hand as a fulcrum and the right hand and arm as the force. The contraption allows me to fix both screws firmly. I end this episode with a sense of relief – about not having to take the wall apart – and a sense of elation about having allowed the episode to come to a successful ending. I have a sense of discovery – which is captured in the keyword of the associated notebook entry that I produce after the fact: 'phenomenology of problem solving / discovery'.

Nothing in this experience and nothing in the account that I subsequently jot down rapidly and stenographically in my research notebook justifies a description

of the kind that we may find about problem solving in standard textbooks of cognitive psychology or learning science. Even when this literature categorizes an approach as 'trial and error', the source of the trialed solution remains unexplained. There probably are many different ways to get the two screws back into place and appropriately tightened, but not all of these ways are equally palatable and some, like taking out part of the wall, would have been mere brute force and not a reflection of efficiency.

At the time, the notebook entry begins with what the essence of the event has been for me, and possibly a reason for the notes to be jotted down in the first place: 'emergence of idea, without my will; dialectic will | no will'. That is, although I also subsequently note the word 'système D' – a French expression that is used synonymously with the verbs *se demerder* ('get oneself out of shit') and *se débrouiller* ('get oneself out of the fog') – thereby making reference to agency, it is the passive aspects of receiving ideas as if from nowhere that dominate this experience and its account.[9] I also jot down the initial impression that the ideas that I hosted were not 'clear', did not constitute 'knowledge', but were rather vague. That is, even if I make use of the term 'image', it is, at the time, more something one might apperceive through a haze, a 'foggy idea' that requires concretization and working out. Sometimes there is no idea about what is needed, which leads to situations perhaps best characterized by 'taking a look' to see what there possibly might be. Or perhaps I am looking for an idea without knowing what it might look like but with the implicit hope or anticipation that I might recognize an idea once I see it or once it has come to me.

The episode might be material for describing how people 'make do' and how they act when they do not know what they are doing. In fact, this characterization does not do justice to the event. At the time, I know what I am looking for: a solution to my problem of getting the screws into place and fixing the track of the sliding door without necessarily having to take the wall apart. But there are no 'states in problem space' that I might investigate; and there is no 'searching of the problem space. Sometimes psychologists talk about 'means-end' analysis, where people are said to use the difference between the current state and the end state to break the bigger problem into smaller problems that eliminate part of the difference. The present account and initial reaction shows that there are no 'states' that are constructed in mind but rather a lot of passive acceptance of images and ideas that have come to me from elsewhere.

'Making do' also places in relief the old diction of 'thinking outside the box'. Thinking in terms of the concepts and images available to us precisely constitute a box; but these concepts and images are all that we have to think with. 'Thinking outside the box', if it is an appropriate descriptor of the events accounted for here, means precisely not thinking, or not thinking in the way we tend to theorize it. It is a form of intensely engaging with a problem and then taking a 'no attention' attitude so that possible candidate solutions may emerge that I can subsequently

[9] While working on this section of the chapter, I realize that I have used these French expressions almost an entire decade prior to writing an article in which I recommend thinking about learning along the life span in terms of these expressions even though I was not aware of this fact the second time around (Roth and van Eijck 2010).

evaluate for their usefulness to the issue at my hand. This situation, as the cases of the mathematical puzzles, has to be thought in terms of the category *event*, in which, because of its nature of saturated phenomenon, intuition is in excess of intention. This also means that there is an important place for the unforeseen – and, therefore, the uncontrolled – typical of phenomena that we also characterize by the adjective 'emergent'.

Conclusion

Researchers in psychology and education, as well as teachers, ask their participants (students) to engage in tasks that the former already have an answer to. Those 'owners' of the problem then evaluate others whether they have come to the same end state. If the 'subjects' do not arrive at these pre-determined end states, then negative assessments are made with respect to the ideal solutions (end states) that someone else has defined as the norm. It is an exercise in metaphysics, where real world constraints, interests, and needs are completely left to the side. The present investigation, a concrete instantiation of the first-person approach, shows that there is much more to problem solving than pushing pawns on a rather well-known chess board or moving rings from one peg to another in the Tower of Hanoi game. Most importantly, we notice that whereas there are images and other representations, these come to the agent as if from nowhere. These are not intended but given to the problem solver, who can accept or reject them as useful. In any event, problem solvers might want to investigate those images that come to them and which they accept to host as willing hosts in order to find out what there is to them and what they yield.[10]

[10] The French language would allow me to use an active passive construction, *Voire ce que cela donne* ('Looking what it gives [yields]'), where we can look at that which has given itself.

12

Work, Primary Experiences, and Accounts

In my work as a researcher who reads research and as research methodologist who advises others on issues of research method, I can identify a frequent confusion between accounts of experiences and the experiences themselves.[1] What we can say is always less than what we have lived. For example, in chapter 2, I deal with methods of investigating perceptual experiences. It should be evident that there is a big difference between saying 'I see a cube' and the work of the living-lived body (the pathic flesh) that produces for me what I report to be a cube. There are worlds apart between feeling pain and the thought (report) that one is in pain. The former is something present (i.e., being, verb) whereas the latter is a representation (being, noun). The two are the same only from and within a metaphysical perspective. One experience that I repeatedly have had with doctors is telling them about my fatigue. They cannot say when or why I am in pain or fatigued and yet I experience, but have a hard time communicating, the telltale 'signs' of pain and fatigue when they announce themselves (see chapter 9). There is a difference between the plenitude of our sensing and feeling (presence) and the communicative potential of a language that makes present again something that itself is absent. My family physician ambiguously says that I 'might' have 'chronic fatigue slash fibromyalgia'. My rheumatologist tells me to the face 'You have nothing!' even though I am sitting before him with great pain in my arm and hip joints. It is apparent that he lacks what it takes to be sympathetic and empathetic. He has not had this experience where a pain is inaccessible to another person. He might even think that the problem is not pain after all but a psychosomatic imagination of pain. In chapter 8, we already are confronted with the gap between what the English language awkwardly renders as Being (*Sein, être*) and as beings (*Seiendes, êtant*). The living work underlying our structured world is part of the former, whereas the content of the language belongs to the latter (though the language itself also exists, and therefore in the form of being [verb]).[2] Investigations of *accounts* of experience lead us to the

[1] As noted in chapter 9 (footnote 9, p. 35), there is a difference between *method*, a descriptive term for what has done to realize a research project, and *methodology*, the science of method.

[2] Using language, however, such as in speaking, again is a process of the kind that interest us here.

structure of beings, for example, language (its metaphors, genres, concepts) whereas the living and lived work takes us to the structures underlying perceptual experience.

Confusing Experiences and Accounts Thereof

The confusion between living-lived work and accounts thereof leads to problematic situations in those cases where researchers attempt to understand what an experience is like without ever reflecting about the difference between what we can say an experience to be like and what it feels – any making present again inherently and unavoidable constitutes an *abstraction*. The recipe *is not the actual work of cooking*. When I refer to first-person methods, then I mean conducting research in which we produce experiences in our own bodies so that we have more available than the description alone. We want to have the pathic of the pathic experience so that we may become truly *em*pathic and *sym*pathetic. We want to access that which is pre-noetic, that is, that which comes and is experienced *before* thought sets in. Let me begin by describing the road that I would not want to go, one that I do not classify among lived experiences but under descriptions (accounts) of experiences. To anticipate my hypothesis: analyses of descriptions can only reveal us properties of language. I draw, in exemplary fashion, on the description of methodology and method of one recent study (Henriksson 2008). As the subtitle of the book suggests, the author is interested in 'school failure as *lived* experience' (emphasis added). Early on in the methods chapter, she provides the anecdote of one of her research participants, who, as a young child, did not understand why her mother would have said 'the temperature as fallen' when the temperature had gone from –7 °C to –10 °C. The anecdote describes the child to have asked the teacher, who, together with her classmates, laughed at him. Only a few years prior to the telling the anecdote, the narrator asked a person whom he trusted to answer his childhood question: 'And when *he* explained about temperature and the thermometer I understood! For fifty years I have felt so stupid, a complete failure. They put me in a class for children with special needs' (ibid: 41–42).

After raising a few questions about what the anecdote may be about, the author suggests: 'Whatever feelings the anecdote might evoke, this is still the personal experience of this particular pupil. One needs to take a closer look at the text to transcend the unique and enter into the universal. What themes does a detailed analysis unveil?' (ibid: 42). The author then provides a list of ten themes with concrete quotes from the narrative that she was analyzing, of which I reproduce the first four:

1. *Placing the reason for failure inside him* ('I always found it difficult to understand when my teacher was explaining something. Everything seemed so self-evident and easy for my peers'.)
2. *Individual understanding* ('I did not understand. Ten is more than seven. Why was it that the temperature had fallen?')

3. *Feeling of being ridiculed* ('When I asked the teacher, she made fun of me and the other pupils laughed'.)
4. *Feeling of shame* ('I was so embarrassed'.) (Ibid: 42)

The author concludes: 'It is obvious that some of the themes are more phenomenological, whereas the others are more hermeneutic; it is so difficult to communicate an experience without giving it some kind of interpretation' (ibid: 42). She continues:

> From individual subjective experience it is possible to find universal experiences. From several individual lived-experience descriptions it is possible to distinguish the essential themes from incidental themes: What do lived-experience descriptions have in common? What might be the essential experiences of school failure? How can a couple of subjective experiences be of any importance to people in general? (Ibid: 42–43)

From my perspective, these few quotations provide evidence of some fundamental (logical) contradictions that underlie this approach to investigating lived experience; and they also reveal the path we need to take to understand just what is happening in the author's method and what its practitioners will find.

The author clearly focuses on the text of the anecdote and provides us with themes that denote its structural features. These are therefore themes of the *account* rather than themes of the *incarnate* experience and work that is being accounted for. For example, the author notes as the first theme that the narrative places the reason for failure inside him. But this is nothing universal of *experience* but rather of the language used. In this case, the participant talks about understanding and that he had difficulties with it. Inherently, the English language provides us with two options for the responsibility in understanding when the subjects involve student and teacher. The student has difficulties understanding, making him the subject of the sentence, or the teacher does not explain very well, making the teacher the subject.[3] In a language focusing on teaching – a language in which teaching is conceived of in terms of something like a Nuremberg Funnel – the teacher is *always* at fault. It is not the experience that is analyzed. Rather, the properties of language are revealed. If the language where knowing solely is described in terms of practice, a narrator would never talk about not understanding but about not being able to do something. The language that we have available, therefore, also constitutes the epistemology – it is an ideology through and through (Bakhtine [Volochinov] 1977). I have shown repeatedly that interviews concerning motivation, interest, identity, or conceptions only bring to the fore *collective* ways of talking about these phenomena, the possibilities of which are concretely realized in the interview situation (e.g., Roth 2008; Roth and Hsu 2008). There are very general patterns and narrative forms that are reproduced. Thus, for example, autobiography and biography constitute the same genre, with the same linguistic means. Moreover, it has

[3] In chapter 8, I make reference to a conception of the event, which questions the very nature of the relation between causes and effects, two concepts that are ill-suited to model *emergent* events that are saturated phenomena. The analysis of different forms of events – historical events, births, fatherhood – allow us to deconstruct the cause–effect relation typical of the metaphysical approach (e.g., Marion 2010; Nietzsche 1954).

been recognized that there is a difference between the author and the protagonist in the autobiographical account, where the latter, to be authentic, has to act according to the needs of the plot – otherwise the narrative does not make sense (Bakhtin 1981). That is, what the author of *Living Away from Blessings: School Failure as Lived Experience* reveals are properties and possibilities of the English language to talk about school failure in a reasonable and intelligible manner.

Very early on in my career as a professor of qualitative and quantitative methods, I became aware of the role of language in telling experience and the difference between lived experience and accounts thereof. While I was teaching a course that introduced Masters-level students to research methods, I invited students to talk about phenomena of their interest so that we could develop possible methods for researching them. One student talked about being an adult child of alcoholics. Her peers were very interested; but none provided any indication during the discussion that s/he, too, was an adult child of alcoholics. However, when we met again, about one quarter of the students in the class provided biographies in which they were adult children of alcoholics. That is, even though they had not known this concept before and the language that surrounded it, these individuals began to account for their lives – providing reasons for why they had acted in this or that way – in terms of this newfound biographical genre, even though they could not have had their original experiences under this aspect given that the discourse was not available. If a researcher had done an investigation prior to the beginning of my class on the biographies of these participants, she would have analyzed very different narratives than she would have done following the class. In the latter, themes to the lives of grown-up children of alcoholics would have constituted a dominant part – just as feeling of shame, feeling of being ridiculed, or a focus on individual understanding was dominant in the accounts of school failure. This is not to say that school failure could not be researched from a first-person perspective. Quite the contrary is true. It might be a very important research topic to be investigated by means of a first-person research method. However, few of those who get into teaching, education, and university themselves have actually experienced school failure. There are few colleagues – I cannot think of any one right now – who has repeated a grade, as I have had to do following my first year in fifth grade, because they failed to meet the expectations for the grade.[4] If I am interested in the pathic aspects of school failure, then, to speak from and through my experience, I have to have lived this failure rather than only heard accounts of it.

[4] In part, this failure may have been provoked by the fact that I could not hear but did not know because lip reading had compensated for the loss of my auditory capacities (see chapter 4). I did not know that people addressed me while standing behind me. My teachers thought I was dumb (i.e., stupid) and therefore did not respond (i.e., was dumb). It was not until my mother visited me in the boarding home that she noticed I could not hear. By then, I was down the failing track from which I could not recuperate.

Investigating the Living-Lived Work of Geometrical Proving

In this section, I provide a practical demonstration of how to investigate the relationship between living-lived work of doing something, on the one hand, and the account of this work, on the other hand. Whereas the accounts are available to anyone, the work as living-lived experience is available only to those who actually do what the account describes. Most readers will have had relevant experiences but might not have thought about them as such. For example, think about reading a recipe for cooking some gorgeous food. This recipe is the account of the work required to make the food. You can read it; you can even memorize it for a high school cooking class examination. Does this mean you know how to cook (like a chef)? Of course not! Many a person has tried following a recipe only to notice at the end that what s/he has cooked does not at all resemble what can be seen in the photograph that goes with the recipe. Although you have apparently followed what the recipe says, the food may be burned, tough, coarse, indigestible, disgusting, or unsightly. What has gone wrong?

But when you eat at your friend's place, the same dish turns out to be delectable. Or, with a few years of experience, you may produce a delicious meal based on the same recipe. In this case, one will say that the cook has followed the instruction. In fact, my own research suggests that we ought to see the relationship between recipe and final dish the other way around. Thus, I found that even in the most advanced science laboratories, where a research professor had done fish eye dissections for 30 years, he sometimes realized in the evening that the dissection he had done in the morning was not according to the plan. At the time, he had thought having done one thing, but in the evening, after having worked with the materials from the dissection all day, he revised his account. The recipe describes what we has done only after the fact, when our actions have yielded what we had intended to produce; or, rather, in this professor's case, the recipe did not account for what he has done. In the first instance, when you did not succeed in making what you wanted to make, the recipe does not constitute an account of your work. But it does constitute an account when you have succeeded. Thus, the question whether you follow or do not follow the recipe can be answered only once you know the outcome rather than while cooking.[5]

Throughout this book, I emphasize the experimental (observational) nature of first-person methods. My intent is to provide for experiences right here in the pages of this book that allow readers to re-live the phenomena described to the extent possible. To bring out the difference between living-lived work (experience) and the account thereof, I invite readers to go through a perhaps surprisingly simple geometrical proof that brings home the message. The proof is that of the sum of the interior angles of a triangle, which, on the Euclidean plane, always add up to

[5] This, therefore, is but another situation in which the normal (metaphysical) order of things comes to be upset: we do not first intend (plan = cause) an action and, thereby, bring about some result (effect). Rather, whether the plan is an appropriate description of the action can be established only after the fact. The effect has to be known prior to being able to attribute a cause. On this point see Nietzsche, 1954.

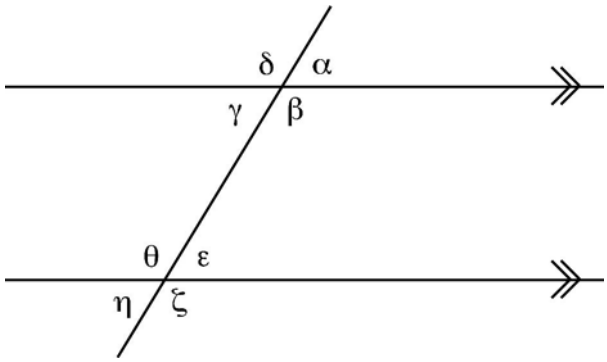


Fig. 12.1 The angles produced when a line crosses two parallel (») lines.

180°.[6] I begin by providing the proof account and then investigate, exhibiting the first-person method at work, the work of seeing things mathematically, for example, straight lines, intersections, and angles.

The Proof Account

The proof that the internal angle sum of a triangle is 180° involves a drawing (Fig. 12.1) and the following. In a first step, we note the relationships between angles that are produced when a line crosses two parallel lines (marked by the sign "»"). These angles are labeled, in the tradition of geometry, by means of Greek letters beginning with α and in clockwise direction for each of the two intersections.

a. The pairs (α,ε), (β,ζ), (η,γ), and (θ,δ) are known as corresponding angles; corresponding angles are equal (i.e., $\alpha = \varepsilon$, etc.) because the two horizontal lines are parallel.
b. The pairs (α,γ), (β,δ), (ε,η), and (ζ,θ) are known as vertically opposite angles; vertically opposite angles are equal (i.e., $\alpha = \gamma$, $\beta = \delta$, etc.).
c. The pairs (ε,γ) and (θ,β) are alternate angles. Alternate angles are equal (i.e., $\varepsilon = \gamma$). This is so because of (a) $\varepsilon = \alpha$ and (b) $\alpha = \gamma$, we can re-write this as $\varepsilon = \alpha = \gamma$ or, for short, $\varepsilon = \gamma$. In a shortened version of this third statement, we might have simply stated $\varepsilon = \gamma$ and referred to the first two statements: because of (a) and (b)

Readers unfamiliar with geometry might find already that seeing these relations itself requires a particular form of perception. Or they might ask themselves, 'Why should opposite angles be equal?' I return to the living/lived work of mathematical seeing below. For the moment, we return to the proof account.

[6] The development of this account was provided as part of a chapter on mathematical cognition (Roth 2012).

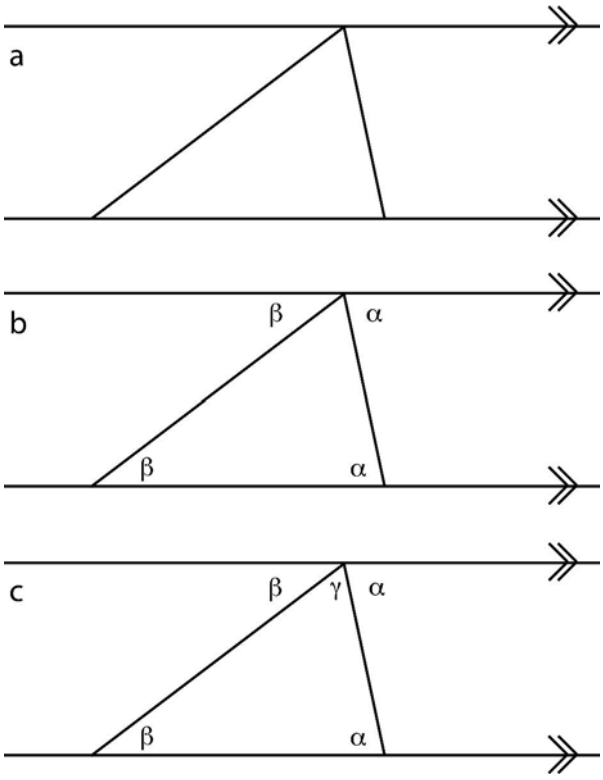


Fig. 12.2 Steps in and part of the account for the proof that the interior angle sum of a triangle is 180°.

With the identities listed in (a) through (c) in place, we now prove that in the Euclidean plane, the angle sum in a triangle is 180° – if the total angle around a point is defined as 360°. This proof includes the following steps together with three diagrams (Fig. 12.2a–c).

a. Any triangle can be drawn such that the base lies on one of two parallel lines and the opposing vertex on the other (Fig. 12.2a). (If you started with a triangle, extend its base on either side and then construct a parallel line through the opposing vertex.)
b. We know that alternate angles are equal, as marked in the second diagram (Fig. 12.2b). (Each of the two sides of the triangle can be viewed as a line of the type seen in Fig. 12.1)
c. Hence, because of the configuration of lines at the upper parallel, α, β, and γ add up to 180°, that is, $\alpha + \beta + \gamma = 180°$. (Think of a line cutting the plane in half, which means, each have covers 180° so that the total angle on both side of the line add up to 360°.) Therefore three angles in a triangle add up to 180°.

The preceding steps and figures do not constitute the entirety of the proof; rather, they constitute what we know to be the *proof account*. If you follow what I

describe as having done myself, you will *see* that 'α, β, and γ add up to 180°, that is, $\alpha + \beta + \gamma = 180°$'. You can literally see it as these angles are aligned on the upper parallel; and, because these three angles are those within the triangle, you can see – or perhaps better: understand – that the angle sum is 180°. Now these are the parts that one might find in a textbook on geometry, on a website, or, in the case of new mathematical discoveries, in relevant journals. But this does not mean that 'you', the reader, have *actually* seen, with your own eyes, and simultaneously *comprehended* the proof. You may have seen the proof account but never actually lived it through so that every step becomes intelligible. Again, a comparison with the recipe may help (it functions as our analogical case here). Reading a recipe does not imply that you know the recipe, that is, that you know what it means to act such that after the fact the recipe *is* an account of what you have done. This latter part comes from the work of actually living the proof. The former part is a description, a recipe for doing the proof. It allows us to re-do the proof over and over again, which certainly has been done so since some time in antiquity, when the proof was done for a first time (Husserl 1939). For example, the reviewers of an article submitted to a mathematics journal take the proof it contains as instructions for doing the proof *again*, checking whether there are 'no holes' in the proof procedure. This *cannot* be seen by gazing at the proof account. Whether there is a hole in the proof procedure actually needs to be discovered in the actions of doing the proof. When the reviewers get the same result after *working through it*, their own living-lived (subjective) work has reproduced the *same* objective account. The proof becomes a fact. In written form, this account suffices to guarantee that the proof procedure can be handed down – initially, to share it with others in the prover's community. In other words, the proof is objective because different subjectivities yield the same results.

Ordinarily, newcomers to a discipline learn these practices in face-to-face work with others who monitor and give feedback to correct actions; but the written accounts are such that they allow others to re-discover the proof in their own *praxis*. That is, we find the relevance of an instruction in our own doing as soon as this doing has yielded the correct result. I use the term praxis to denote the real situation where the living/lived work occurs; it generally is not characterized by thematization and 'metacognition'. *Practice*, on the other hand, refers to the patterned action and therefore denotes something apparent to a theoretical gaze rather than to the regard of the practitioner. That is, as initially arbitrary and tentative actions are marked as subject to correction, the student tries again. Once such actions receive approval, then the immanent generating mechanism, the self-affected movement, can now or after some trials reproduce the action intentionally. Such 'approval' could come, for example, from our own satisfaction with the results of our preceding actions; or it could come from some external source, a mentor, who guides us, or a teacher. But in each case, what I do truly and in all senses of the word constitutes a rediscovery of the proof in and through my actions. This possibility for the rediscovery of the proof in fact constitutes the objective and tradable nature of geometry as objective science. Thus, 'the important function of *writing* is to enable the *continual objectivity* of ideal sense entities in the curious form of virtuality'

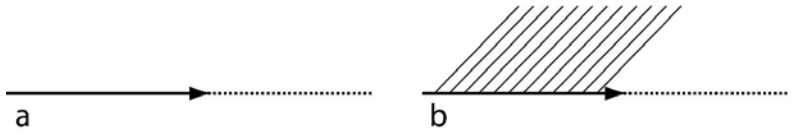


Fig. 12.3 In the dynamic of drawing a line, the plane becomes bisected, here denoted by a hatched and an unhatched part.

(Husserl 1939: 212).[7] The ideal (subjective) objects exist *virtually* in the world in written, objective form, and they therefore can be *actually* produced at any time. The lived praxis (labor) within this written account *counts* as the proof. However, it is not actually contained in the written account. *It is precisely this lived work that we are interested in here and in ways of capturing it*. We already see some of what is involved in the inquiry concerning the question of what makes a cube a cube (chapter 2). To bring this proof to life we actually need to do it in and as of living/lived labor for which the written record has to provide sufficient resources.

The Living-Lived Work of Mathematical Seeing in Proving

Here we are interested in a method for producing the actual experience of the living/lived work within which the corresponding accounts constitute the resources that allow us to count what is happening as a proof. In the first part of this chapter, I critique the approach chosen in hermeneutic phenomenology, at least as interpreted by many educational researchers. I suggest that it focuses on *accounts* of experience rather than on the experience itself. It extracts structures from these accounts. The equivalent in the present situation would be to take what a person says or writes as equivalent to the experience of proving. That is, if we analyze what I provide as an account of the proof of the sum of the internal angles, then it will be immediately evident that we obtain as themes or patterns precisely what *culture* makes possible – in and through language and other communicative means – rather than what is individually and singularly lived. The same is true for investigations of the 'feelings' I might have during the proof process. If I provide an account of my feelings – the difficulties, frustrations, and elation that comes with successful completion – after having completed the proof, I am still analyzing the account. That is, the themes I can come up with concern the ways in which we can talk about the proof procedure or the feelings that we have had in the process. The first-person method directly accesses the experience when the researchers do what they are interested in studying. So what is the living-lived work of proving?

Part of the kind of work involved is articulated in chapter 2, that is, the lived work of seeing something. In the present instance, for example, this living/lived work includes the re/cognition that pairs of corresponding, opposite, or alternate angles are equal. That these pairs of angles are equal presupposes the seeing of

[7] We also know this from scientific research. Something is a new discovery rather than an artifact when others, using the same method (i.e., recipe) get the same results.

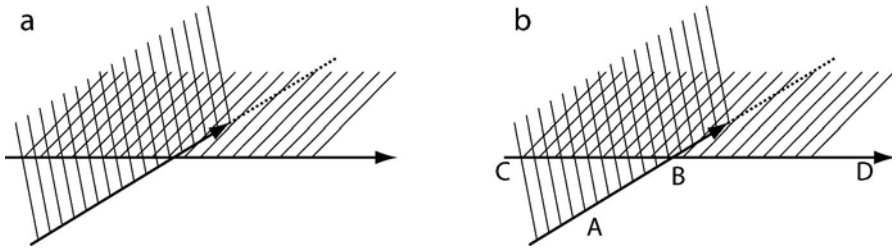


Fig. 12.4 Two intersecting lines produce four sectors.

each angle – where the work of *seeing* is described above. Such *seeing* is related to the living/lived work of drawing multiple lines, each of which bisects the plane (Figure 12.3). This work involves particular movements, integral kinesthetic structures that unfold on their own and in their entirety once triggered. These movements are inscribed in the living-lived body (the flesh) where it constitutes an immanent form of knowing. I do not only draw the line after placing the pencil, I also feel (chapter 3), even if ever so vaguely, the hand moving from left to right. There is a resistance. I change the pen, and notice that the resistance is changing. It differs according to the pen I use – rougher in the case where I see that there is less ink flowing – also requiring me to push harder and put some more pressure onto the pen and paper, which in turn increases the resistance of the pen on the paper. I can sense the ballpoint moving across the paper, in a manner more flowing with one and more jerky in another case. Drawing a line involves more. I see the line as it unfolds under my hand and splits the formerly immaculate plane in two. Drawing, splitting the plane, and seeing the plane splitting as I draw all are confounded into one and the same act. In fact, already before I begin, there is an ever so vague sense of what will be happening when I place the pen and move from left to right – the anticipation that is associated with intentional movement, itself due to the self-knowledge of the muscles and nerves that will bring the movement about.

From the perspective of the living-lived work, the writing gesture produces the divisions of our pre-geometrical perceptual experience of left/right, up/down, and so on. Even if the movements initially are arbitrary and random, they constitute traces that mark differences in space, and thereby shape the perceptual experiences that follow. In addition, the work of seeing something even as simple the first line against the white ground involves work: the eyes have to produce the saccadic movements that take them away (see chapter 2) to find the line again upon returning and, thereby, constitute the reality of the line.

When, after the completion of the first line (involving a complete bisection of the plane), a second line is added, it, too, bisects the plane. Already after my hand begins to move the pen, an ephemeral shadow falls across part of the paper, sensing an angle to emerge. In fact, once the movement is completed, four angles and sectors have thereby been produced, which appear in three different hatchings: not-hatched, once-hatched, and twice-hatched areas (Fig. 12.4a). It is the latter that previously has appeared as the ephemeral grey.

I could have also drawn the second line in the reverse and produced the same account: beginning somewhere from the top and right and moving to my lower left.

For this reason, the angles enclosing the single-hatched areas are the same. What is in the first drawing the angle forming first to the left and then to the right will be, upon beginning the diagram from the other side, again first to the left and then to the right. In this very act of drawing, we also produce an order that goes with the naming of locations (Fig. 12.4b). In this way, the unfolding from the drawing the AB line with respect to CD forms angles ABC and ABD, which we may also name, following the tradition, by the Greek letters α and β (as well as the equivalent angles γ and δ) (Fig. 12.5). Here, the order in the actual making constitutes a conceptual order: 'The temporally placed label of an angle or its apparently disengaged placement in a finished figure exhibits this seen relationship as a proof-specific relevance' (Livingston 1987: 96). The conceptual order is *in* and *arises from* the movement rather than from the constructive mind, if there indeed should exist something of that kind. Mind and sensorimotor schema are *post-kinetic*, as are all accounts of mathematical experience.

The relationships between the lines, angles, bisectors, and sectors have to be seen. That is, in a very strong sense that must be emphasized, seeing involves work (see chapter 2). To be able to do any proving at all, we have to *see* that $\alpha = \gamma$ and that $\beta = \delta$. This seeing, as experienced and described in chapter 2, is based on the movements of the eyes, movements that we are not in conscious control of. But these movements reproduce themselves to allow us to see the cube over and over again, or, in the present instance, to see the equivalence of alternate angles once we have seen it for a first, second, or third time. Not surprisingly, phenomenological philosophers have recognized the fundamental passivity that is associated with a *first* cognition that such seeing involves. Any first formation of sense has two passive moments: the first existing in the first cognition and the second in the fact of the retention of this first cognition (Husserl 1939). Thus, 'the passivity of the initially darkly awakened (insight) and the eventually increasing clarity of that which appears is accompanied by the possibility of a change in the activity of a *remembrance*, in which the past experience is lived again actively and quasi anew' (ibid: 211). The memory is awakened passively but can be transformed back into corresponding activity when I live the experience over again. The relationship is cognized again: it is re-cognized or *re*cognized. It may therefore be maintained throughout the proof procedure, which leaves behind, as its end result, the sequence of the diagrams involved (Fig. 12.1, 12.2). In making the drawings (Fig. 12.2), I do not specify a particular angle to be produced. I could do the same using a differently slanted line that crosses the two parallels. Any work that produces two non-parallel lines suffices to get us to this point. This fact produces the generality of the proof procedure. Because *any* work of this type gets us to the same results, the same relations between the labeled angle exists making the proof procedure valid for *any* triangle that we may draw on the Euclidean plane. That is, the generalizability derives from the nature of this work itself.

All of this may have appeared to be self-evident. Yet if we do not understand why the self-evident is self-evident – because to the animal that we once were it is not – and how what is self-evident has become such, we do not understand a thing. I can decide to draw a line because my hands, arm, and finger know what to do to produce one. There could not be any intention of drawing a line (see chapter 6) unless my flesh did not already know what it is to draw a line. Much as my hand

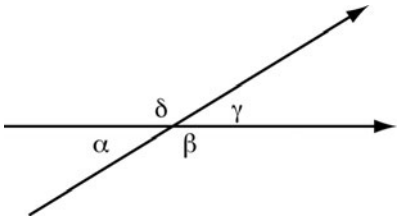


Fig. 12.5 The placement of the labels α, β, γ, and δ is apparently disengaged from the temporal practice of drawing the figure.

remembers a phone number that my conscious mind has already forgotten (chapter 6), my hands and fingers know to draw a line when such is required.

This immemorial, subjective memory is important in the constitution of geometry as an *objective* science in and through the subjective, living-lived, sensuous work of the geometer. A sense-forming act that came about spontaneously can be actively/passively remembered, and therefore reproduced not only by the original individual but by any other individual as well. It is in the reproduction of the living-lived *work* that the evidence of the identity between original and subsequent act arises: 'That which now is originally reconstituted is the same as what was evident before' (Husserl 1939: 211). That is, together with the original sense formation comes the possibility of an arbitrary number of repetitions that are identical in the chain of repetitions. As a consequence, the very subjective, living-lived work of doing and seeing geometry that allows me to recognize relationships again also make for the societal nature of geometry and its historicity as objective science.

Interestingly, the very generality of the proof derives from the way in which the sensuous work generally and the sensuous work of seeing specifically unfolds. For example, in the drawing of a line that crosses two parallel lines and labeling alternate angles using the same letter, the proof makes available that any such line could have been drawn, which in fact occurs when the second line between the two parallels is drawn such as to form a triangle. The very possibility to have one line between parallel lines with alternate angles enables all other lines. The relations between the angles in configurations of parallel lines crossed by a third thereby imply the angle sum of the triangle to be 180°. The way in which living-lived work draws parallel lines and sees the equivalent angles that follow from (the idea of) parallelism simultaneously constitute the angle sum to be 180°. That this is so can be discovered over and over again because (necessarily written) proof-accounts describe, like a recipe, their own work. That is, it is precisely 'in this particularistic way, the generality of our proof-account's description was evidenced in and as the lived, seen, material details of the proof' (Livingston 1987: 108). The very nature of geometry as objectivity science arises from the demonstrability and visibility of its procedures in the living-lived (subjective) work of proving, including the living-lived work of mathematical seeing. Anyone may reproduce the sensuous work anywhere. In sum, therefore, we realize that the 'generality of our proof both is in and not in the proof-account; it is in that proof-account through the pairing of that account with its lived-work' (ibid: 108).

In this first description of some of the work involved in a geometrical proof, we can see an outline of how the living-lived work of producing, seeing, and labeling the angles is actually accomplished. (Recall, it is not in my words that this work is accomplished, it is in the drawing and seeing of lines and angles that the work unfolds and is felt.) This drawing, seeing, and labeling is available to those present; this drawing, seeing, and labeling makes the work objectively available to those present. But this sensuous work does not (and cannot) appear in the proof account proper, where the lines and labels appear disengaged from the actual movements of drawing, seeing, and labeling. The *work* as something that lives is invisible in the same way as life as a whole is invisible, even when someone else does watch me while doing the proof. The purpose of the written or verbal account is to make the work independent of my body, yours, in fact, independent of the body of any potential individual reproducing geometry. The account is an *abstraction*. Returning to the critique that opens this chapter: the stories that the author of *Living Away from Blessings* collected to understand school failures are *abstractions*, they do not represent the actual experience of failure but only generalized and culturally intelligible depictions of school failure. As a result, the themes the author identifies are characteristic of the language rather than of the sensuous (living-lived) experiences people have.

All movements involved in drawing, seeing, or labeling involve our living/lived, sensuous body in the manner described in the first section above for the eyes' work that makes a cube from a set of lines. Seeing an angle involves fewer lines, but nevertheless requires the movement of the eye that makes the lines figure against ground, puts into relation the two unfolding lines, the half planes, and the seeing of the intersecting planes against the background (generally white). Even imagining an angle or a line in our minds or recognizing someone else drawing an angle or a line *requires* the activation of the same immanent movements in us that operate when we actually see or draw a line. This fact has been recognized over 200 years ago through phenomenological analysis (Maine de Biran 1841)[8] and has recently been substantiated by neuroscientific studies on the function of mirror neurons. The account, as we might find in textbooks, is disengaged from this sensuous work, but it may serve as a resource on the part of the learner, as an instruction for reliving the sensuous work of proving in and through his/her own living praxis of drawing, seeing, and labeling. The relation between accounts and the lived work can be articulated in this way: In textbooks the actual production of the primal geometrical idealities is surreptitiously substituted by means of drawn figures that render concepts visual-sensibly intuitable. It is up to the students to find in their own subjective sensuous work the practical relevance of the instruction, which in the present example would be the proof-specific relevance of the lines, markings, naming, and so forth.

[8] 'To imagine or remember, the organ of thought has to take again a form, a modification similar to that it had during the perception itself' (Maine de Biran 1841: 58).

Of Perceptual Work and Accounts of Perception

In a text on the formal structures of practical action, Garfinkel and Sacks (1986) propose a way of theorizing the relation between accounts of structured practical actions and the generally invisible work that brings these structures about (Fig. 12.6). Thus, the expression 'doing [proving the sum of the internal angles of a triangle is 180°]' consists of two parts. The text between brackets '[]' topicalizes a particular practice that social scientists and educational researchers might be interested in; the text is a gloss of what a researcher or lay participant might say that is happening. In other words, the text can be understood as that which people tell you what they are doing, whereas the doing itself, the work, is that which needs to be accounted for in, but is different from, words and other forms of accounts. For example, observing a student, a teacher might explain to the researcher visiting the classroom that the former is 'proving the sum of the internal angles of a triangle is 180°'. This text is the verbal account for what is currently happening. Similarly, if asked by the researcher what she has been doing, the student might gloss, 'I was proving that the sum of the internal angles of a triangle is 180°'. When the teacher asks a student on an exam to prove that the sum of the interior angles is 180°, then we might find something on her sheet that resembles the proof account in the preceding section.

Almost all research in the social sciences and education is of this kind. Ethnomethodology distinguishes itself from that research, to which it refers as *formal analysis*. Research methods are provided in articles to articulate how the researchers arrived at identifying the structures that appear between the gloss marks (i.e., between '[' and ']'). But formal analysis does not capture the first part of the expression: it misses the 'doing', that is, the sensuous work that actually produces something that is described by the account or the account itself. This moment of the expression allows us to ask the research question, paraphrasing Garfinkel and Sacks: 'What is the work for which "proving the sum of the internal angles of a triangle is 180°" is that work's accountable text?' or 'What is the work for which "proving the sum of the internal angles of a triangle is 180°" is that work's proper gloss?' (Fig. 12.6b). Similarly, we may ask, 'What is the work for which "seeing an angle" is that work's accountable text (proper gloss)'?

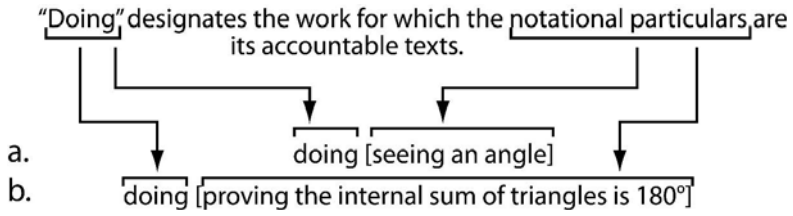


Fig. 12.6 There is a difference between an account of experience and the actual work that produces the experience described. a. In chapter 2, the methods of investigating the work that produces simple perceptual experiences are described: the eye movements differ from the angle or cube that I see. b. More complex phenomena, too, require work to be produced. The description of this work and the lived work producing it differ.

In contrast to constructive formal analysis, we are interested here in specifying the sensuous work by means of which the structures are produced that are accounted for and glossed by the bracketed texts. This work is accessible to us only in and through our bodies. We cannot account for the sensuous work unless we actually access it, which, inherently, means that we have to live it. In other words, the question our first-person method pursues is that in the living-lived and therefore sensuous work, for example, of proving that the internal sum of a triangle (on the Euclidean plane) is 180°.

There are some decided advantages that come with investigating the sensuous work and to produce evidence for its organization. Once we know this organization, we will be able to predict the kinds of results people produce in the same manner as we can predict what kind of entities people will see when looking at the diagram known as the Maltese cross or the Necker cube. In a very strong sense, therefore, once people have seen the Maltese cross or Necker cube, then these drawings are *accounts* of the *work* their eyes have done! However, from knowing the accounts, we cannot infer the nature of the lived work. We do not know what the eyes do when we look at the cross or cube. But once we know the work of seeing, we know what the eyes will do when confronted with drawings such as the cross or cube. From a statement that a person sees a cube while gazing at the Necker cube, we do not know anything about this work that actually produces the perception. From seeing the written work of a student who has produced a proof for the sum of the internal angles of a triangle, we cannot infer anything about the sensuous work that has gone into producing the written work. But the reverse is absolutely the case. Once we know the structures of the sensuous work, we also know what it is that it has produced. For this reason, phenomenological and ethnomethodological accounts of mathematics are related to formal analyses – whether quantitative or qualitative (e.g., phenomenography) – in *asymmetrically alternate ways* (Garfinkel 1996). This is not to say that ethnomethodology disputes the accounts provided by formal analysis; those achievements can be demonstrated and are demonstrated in and as of the *outcomes* of the sensuous work of doing mathematics (or anything else). This asymmetry is radical and incommensurable, but nevertheless obtains to related aspects of mathematics. Our first-person methods – as ethnomethodology or classical phenomenology – are not in the business of 'interpreting' signs that people produce. Rather, we might say that the fundamental phenomenon of a first-person method and 'its standing technical preoccupation in its studies is to find, collect, specify, and make instructably observable the endogenous production and natural accountability of immoral familiar society's most ordinary organizational things in the world, *and to provide for them both and simultaneously as objects and procedurally, as alternate methodologies*' (Garfinkel 1996: 6). The two examples I use here constitute such materials that allow readers, in and through producing the work specified, to experience the sensuous, living/lived, and worksite-specific (inherent lived) praxis of *doing* and *seeing* mathematically.

Coda

Plato uses a story about people sitting in a cave and seeing their shadows on the wall. The shadows are something like evidence that there is a sun, which only one of them is allowed to discover on a trip to the entrance of the cave. While writing the preceding sections, I have been thinking about this story again as a metaphor for the relation between the first-person approach, as I articulate it here, and the other methods in the tradition of hermeneutic phenomenology. The stories that researchers collect, for example, about school failure, are like the shadows on the cave walls in Plato's analogy. Investigating them may be an interesting pursuit in their own right, to find out about the structure of the shadows, but they give access neither to the bodies that cast the shadows nor to the sun that is the cause of the shadows. That is, when we ask people about some experience, we do not have access to the sensuous experience itself. There is some of it, because the descriptions used are based on and related to experiences. But, in the way the shadows provide evidence for the sun and the manner it shines onto the bodies, the stories people tell are indicative of the language they have and are part of the ways in which we tell such stories. Moreover, there are explicit constraints what such stories have to look like, so it is not up to the narrator to make up any text. Rather, narrators make up texts that are inherently intelligible because they have to express possibilities present in and enabled by the culture. In a strange way, researchers working with such other methods do not see the animal (sensuous experience) because of all the foliage (language). When they actually do get to anything resembling an index to the things we feel, then it is because they draw on their own related sensuous experiences.

I am equally suspicious of sports journalists who talk about tennis without ever having played tennis as I am about a celibate priest talking about making love or about a professor talking about teaching secondary mathematics courses without ever having taught secondary mathematics. What all of them may master is a discourse. It is a mastery of symbols, literally therefore symbolic mastery, rather than a real mastery. There is nothing wrong without the former, as we need, for example, physicists who can calculate the trajectory of a football (rocket) in the earth's atmosphere. But in the context of football, this symbolic knowledge is of very little use, and the practical mastery is to be preferred. In the same way, we may be interested in the structures underlying the way in which we tell stories, in accounts of work practice, rather than in the practice itself. This is especially so because practitioners may be as little able to provide a good account of what they do than a good onlooker studying the practice from a third-person perspective (Bourdieu 1980). But the first-person approach combines the two orientations: a rigorous description of the organization of sensuous work such that it can be shared with others because they can live this work in and with their own bodies because these are of the same kind as our own.

Throughout the description of the first-person approach in this chapter, we see variation involved. For example, I note that we can change the angle of the line crossing the two parallel lines (Fig. 12.1). We get the same result: the same relations between corresponding, vertically opposite, and alternate angles. That is,

these three relations are truly independent of the way in which the third line is drawn – unless it were to be drawn parallel to the other two lines, in which case it would not cross or only cross at an infinitely distant point. Similarly, we can do the proof of the internal angle with *any* triangle, and arrive at the same result. This means that the different sensuous experiences all lead to the same result even though parts of the account differ (e.g., the drawings) and even though the sensuous work involved in drawing the first is different from the drawing some second triangle. I also point out that there is sensuous work involved even with the simplest aspects, like drawing a line or seeing a line (which, following chapter 2, involves the saccadic movement along the line that makes it stand out against a ground) and the manner in which it bisects the plane. Seeing half of the plane is the other part of seeing the line (i.e., the figure), even though it may not have been salient as such. Seeing a half plane and seeing the line are alternate ways of describing the same phenomenon. They are two different manifestations of the same phenomenon, where the half plane now is stabilized against the line. The constitute one dehiscent and diastatic phenomenon.

13

Reading

The kind of first-person methods I advocate and stand for do not attempt to identify and isolate that which is particular but aims at isolating the generalizable in the individual practices. Thus, when I read online science materials, these appeal to the process of reading in general rather than to my individual reading and interpretation. In this chapter, I provide a demonstration of the method used for bringing out the *culturally invariant* aspects of reading, that is, those aspects that are shared among those who read the same kinds of texts. We note, as a sort of advance organizer: *the relation between text and reading is the same as between a proof account and the work producing it.* Reading (science) textbooks and other media is pervasive in praxis but it is not a major item in the thinking of (science) teachers or a major research focus on the part of (science) educators. When it is a focus of research, then of interest often are vocabulary, 'meanings' of texts and images independent of the *lived work* of reading, or science and reading as separate entities that need to be brought together or integrated. A second major dimension common to much of published research on reading in science is the focus on what students *cannot* do – e.g., the misconceptions that they have while reading, the absence of reading comprehension and metacognitive skills, or an over-confidence readers have in their own understanding – which generally occurs against an unstated background of the normative performances and questions of why the population under study *ought to know* science in the way laboratory scientists do. The fact is – as my own research has shown – that even experienced PhD scientists themselves often do not provide readings of graphs from introductory college textbooks in their own discipline that the instructors of introductory courses would accept as correct from their students (Roth 2003).

First-Person Approach to the Work of Reading

Against the background of such deficit views of students in science specifically and of the public understanding of science more generally, my research agenda has been concerned with the tremendous skills exhibited in everyday praxis that allow individuals to become scientists, doctors, engineers, and so on although, at some point in their life, they did 'have' 'misconceptions' and viewed the world much in the way those deficit-oriented studies depict. Concerning scientists and technicians, this has led me to begin anthropological studies concerned with graphs and the way in which these are used – read, produced, and made sense of – in the course of practical, everyday, ongoing work in scientific laboratories, scientific field research, and a variety of workplaces. That is, I am not interested in the different interpretations that readers might generate of and for the signs that online science and science related articles make available but in the *work* itself that allows reading to self-organize such that it in fact *can* read a text *as* a science-related text rather than a piece of fiction. Reading constitutes largely invisible work, and bringing this work into the visibility of our scholarly discourse is an important part of my present endeavor. It is an anonymous cultural process that becomes a specific reading in and through the work that my body performs. Anthropology is an appropriate science for studying this invisible lived work because it has the habit of coming to understand by making the familiar strange.

Concerning lay science reading in the general public, I note that already when I was a high school teacher I experienced time and again how students may become interested in science after picking up and discussing such works as *A Brief History of Time* despite the fact that such works often do not constitute easy reads. As shown in chapter 4, however, we need to rethink our approaches to learning such that participation even and precisely under adverse conditions – lack of 'knowledge', negative emotions – changes itself into a successful endeavor. We know from the literature that everyday people generally may pick up science-related books and become interested in the subject more generally.[1] The following questions of interest to those working in the field of the public understanding of science and scientific literacy then pose themselves: What is it that allows just plain folks never interested in science before – and, in fact, turned away from science in and through their negative school experiences – to pick up a book on nanotechnology, read it, and become interested in science and develop into regular consumers of texts on the topic? What is it that allows just plain folks to pick up a book or open a webpage and read science and science-related texts although they do not have what science educators would consider the requisite 'prior knowledge'? Proper answers to these and similar questions have to begin with competencies that people *actually* bring to such first encounters, because only knowledge of what just plain folks actually do and think allows us to understand why some, upon encountering a

[1] I am thinking here of one student in particular. My colleagues told me, when I arrived at the school, that he was a 'looser'. He did not do so well. But he 'read' *A Brief History of Time;* and he became so interested in physics specifically and science more generally that eventually – after some more failures at the university – he became a professor of neurobiology.

science-related hyperlink, read the science-related text that they are led to and then become deeper entrained into the relevant scientific field.

The purpose of this chapter is to provide first answers to these and similar questions by engaging in a first–person-based anthropology of reading that focuses, consistent with theories in cultural sociology, on the *agency* | *structure* dialectic that exists in the reading | text pair.[2] Here, text (sign assemblage) constitutes a *semiotic resource*, one form of (semiotic) structure, whereas the cultural *schemas* a person may be said to bring to a situation constitute another form of structure. In ongoing praxis, structure cannot be understood independent of the forms of *agency* that mobilizes it, here *reading*; or, in other words, it is only within agency that we know what the relevant and currently mobilized semiotic structures are. On the other hand, without structure we do not know why agency takes the particular forms it exhibits in ongoing praxis. The present investigation uses a first-person approach to show that science texts, as texts generally, provide reading with semiotic resources so that it *organizes itself* and accomplishes a coherence with the reader's existing practical understanding of the world. Here words and sentences *do not have 'meaning'* but that words and new texts *accrue to* always and already existing significations that constitutes our everyday lifeworlds. Language and everything else in our life are inextricably interwoven constituting something like a cloth.

How Reading Bootstraps Itself

Reading is not a fixed skill but a process that bootstraps itself into the relevant practice of reading much like the gaze organizes itself when confronted with a painting. It is the text that brings reading to life, grants to reading the ability to organize itself from the unheard of to the news. Thus, with the first semiotic resources, reading departs and, in organizing itself, becomes the 'reading of a poem', the 'reading of a piece of fiction', or the 'reading of science-related text'. To enter the problematic of the work of reading science online texts, I enact in this article an anthropology of reading, which begins with a consideration of reading *practices* available in and through my own reading of online science texts.

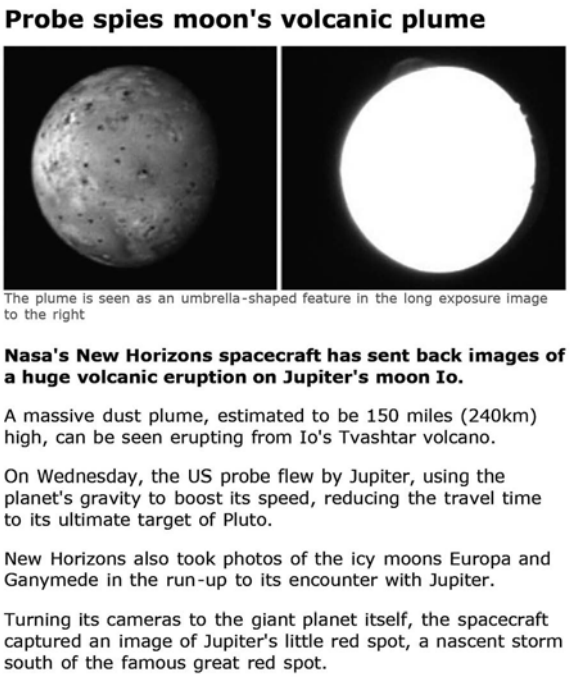
It is March 1 2007, very early in the morning. I begin my workday with a quick look at the BBC news website, scan the 'headlines', and follow some but not other links. Among those that I follow ranks 'Probe spies moon's volcanic plume' not just because it appears to promise something I am interested in, but also because I am in the middle of a study of reading online science materials that had begun two weeks earlier and was to continue for another month as part of which I save copies of (links to) every science-related article that BBC publishes during this period. One of the very first questions that emerges into my consciousness concerns the

[2] The Sheffer stroke 'l', a form of denoting the logical NAND (not-and) operation, combines two mutually exclusive concepts to form a new concept that is always true unless both original concepts were true – which they cannot be because they are mutually exclusive. Each part of this new term is understood as a one-sided expression of the whole.

reason why we, readers of online materials, follow some links but not others. What is it in the text 'Probe spies moon's volcanic plume' (Fig. 13.1) that incites a reader to follow the hyperlink and read the related article? What does such a hyperlink – which turns out to be the headline of the article as well – make available that promises and reveals a newsworthy item, which readers then look for in greater detail by reading the article at hand? An anthropology of reading online science materials begins with an investigation of the hyperlink (headline), for an understanding of scientific literacy must begin with trying to understand what makes just plain folks – heretofore and all too often disinterested in science – take up reading science after seeing a link, headline, or book title that constitutes a starting point for a story that a person subsequently might comment upon with the well-worn 'and the rest is history'. Reading the hyperlink provides me with a context to introduce several concepts central to an anthropology of the work of reading. The concepts are discussed and further elaborated in the subsequent section before I turn to an exemplary study concerned with understanding the praxis of reading online science materials generally. That is, I am not interested in my or any one else's reading as product (e.g., my interpretation), but in the structures that support the (anonymous) reading processes from which issue this, that, or another reading (product).

Methodological Comment Here, I am not interested in individual and singular senses or 'meanings' that I – or any other reader for that matter – might evolve in the process of reading. Rather, I am interested in the more general patterns that allow reading – qua social practice that is learned in transmitted in social situations – to organize itself, given the cultural resources provided in popularizing science and science-related texts that are published, among others, by the British Broadcasting Cooperation (BBC). In the course of one such reading selected from more than 6 weeks worth of materials analyzed, I exemplify what an anthropological study of the work of reading might look like and articulate some of the specific resources and skills that characterize the reading | text pair. I begin with an account of the first time that I encountered this online science text.

I began the work reported in this chapter because, as part of my research agenda on scientific literacy in everyday practice, I wanted to find out more about what it takes to read online science texts even in the absence of specific preparation in the science covered. It turns out, as shown here, that much of what it takes to read online science materials are more general cultural practices. It has to be that way, as there are a substantial number of individuals who come to science through materials posted on the web; more so, individuals who had been turned off from science while attending school, largely at the secondary level, come to find science very interesting and engaging. They are therefore not interested in science itself, it is in and through their reading that they find enjoyment in reading science. One aspect that is particular to online texts is the hyperlink that leads potential readers to another page on which the text appears in its entirety, at least on the BBC site. (On other sites, such as the German *Die Zeit*, articles spread over multiple pages so that the reader has to navigate additional hyperlinks.) I therefore spent a considerable



Probe spies moon's volcanic plume

The plume is seen as an umbrella-shaped feature in the long exposure image to the right

Nasa's New Horizons spacecraft has sent back images of a huge volcanic eruption on Jupiter's moon Io.

A massive dust plume, estimated to be 150 miles (240km) high, can be seen erupting from Io's Tvashtar volcano.

On Wednesday, the US probe flew by Jupiter, using the planet's gravity to boost its speed, reducing the travel time to its ultimate target of Pluto.

New Horizons also took photos of the icy moons Europa and Ganymede in the run-up to its encounter with Jupiter.

Turning its cameras to the giant planet itself, the spacecraft captured an image of Jupiter's little red spot, a nascent storm south of the famous great red spot.

Fig. 13.1 The opening one-third of a BBC article that appeared in the science news.

part of this analysis on reading hyperlinks for the newsworthy item: How come some hyperlinks promise us an interesting newsworthy item whereas others do not? How do I come to see *what* is newsworthy when reading a hyperlink? Further aspects that are particular to online science materials are the frequency of images, which, more like in high school science texts, constitute a particular pedagogy in their interaction with the various forms of text present (caption, main text, title). But the online science texts also differ considerably from high school science texts in that they are not intended to 'teach' a particular content and the concept words associated with it); in school textbooks, these words frequently are highlighted in boldface type, asking reading to configure itself in a particular way to extract what it is expected to learn. There are other differences with textbooks as well: generally no turning of pages, the possibility to highlight web text with the cursor, the possibility to change the text size and frequently also the images. These, however, are not the focus of the present inquiry, concerned as it is with the issue of how we make sense of text and images.

Reading Hyperlinks for a Newsworthy Story

On this day, the main hyperlink under the *category* 'Science' reads, 'Probe spies moon's volcanic plume'. In fact, 'Science' is not just a category but a *category*

collection, for there are very different articles on very different topics and from very different disciplines that I have assembled over the six weeks of the data collection under this category name. (It turns out that the statement making the hyperlink also will function as the title of the text; or conversely, the title also doubles as the hyperlink on a different web page.) 'Probe spies moon's volcanic plume'. This, as my further investigation below shows, also is the headline of the article itself (Fig. 13.1). For a reader to become interested and to follow the link, it has to have something in it that promises and foreshadows a newsworthy item – after all, the link is provided on the main website of a media outlet featuring 'news'. What is it that is newsworthy, and what of this newsworthy event or fact is revealed in the hyperlink (headline), the purpose of which is to invite readers to follow and read the associated article? Finding the news is much like seeing the unseen in an innovative painting, which 'transmits to our gaze its own movement as the imprescriptible condition to be able, precisely, to follow with one's own eyes the ascent of the unseen in it to the visible' (Marion 1996: 79). In the case of reading, this ascent concerns the crossing of the unheard of into the known as newsworthy item. Let us begin with the work of reading.

'Probe spies moon's volcanic plume'. Probe. The term 'probe' is used literally to denote an act of examining or probing something and figuratively to denote a penetrating investigation. Figuratively, it is also used to refer to an entity that penetrates some domain 'as if to explore or investigate; a thing used to obtain information about something or someone' (OED 2011). It denotes covert police operations, whereby an undercover officer infiltrates an organization to find out about its activities and intentions, the agents/perpetrators of which might not otherwise be known. In the current situation, 'probe' is in what commonly is the subject position of the sentence, though the revelation of the precise nature of the word may have to await further reading. That is, probe belongs to a category of agents or recipients of agency when it is acted upon.

'Spies'. The next word is an action verb in the third-person singular. In fact, reading 'spies' as a verb rather than as a plural noun allows us to learn something about how reading organizes itself taking it as a verb rather than as the second part of the compound noun 'probe spies'. But as the next word is another noun, or rather, a noun phrase 'moon's volcanic plume', culturally competent reading takes 'spies' as a verb. Having read 'probe' as the subject now becomes plausible, because subjects generally are agents of action. The verb 'to spy' exists both in transitive and intransitive form. In the latter form, it is used in the sense of making (stealthy, covert) observations. A probe, as 'a drone', acts in place of human beings, when it is impossible or too dangerous for human beings to go to the place of interest. (For example, the *Washington Post* featured a headline 'U.S. Uses *Drones* to *Probe* Iran for Arms'.) 'Spies' not only is a verb but also the first part of what is known to grammarians as *predicate*, here 'spies moon's volcanic plume'. The word appears in the third-person singular form of the verb 'to spy'. It is generally used to denote watching and making observations in a stealthily manner, though, more uncommonly, it also denotes looking at, examining, observing closely, catching sight of, discovering, or noticing. As a transitive verb, 'spies' demands an object to be spied on or upon or the something that has been spied (seen, discovered). Here, such a reading is confirmed or enabled *after the fact* as soon as reading ar-

rives at the second part of the predicate, 'moon's volcanic plume'. A moon, whether it is the one accompanying the planet Earth or the moon of any other planet, is not easily accessible. Few people have been to the one accompanying the Earth, and no human being has been there as of late. It now becomes possible to understand why it is a probe that is doing the spying rather than a human being. It has also become possible for the spying to be read as observing, discovering: there is little that requires stealth when one or more moons are concerned.

'Moon's volcanic plume'. The second part of the predicate consists of a noun in its genitive form, an adjective, and a regular noun. Plume. The primary sense of 'plume' is feather or feathers taken collectively (as in plumage). In metaphoric extension, it also has the sense of adornment, ostentatious display, or mark of honor. In extended usage, the term 'plume' refers to anything resembling a feather or feathers; the extension carries both form and lightness of the primary phenomenon. Even prior to arriving at the word, this reading has appropriated the adjective 'volcanic', which organizes reading to find something pertaining to a volcano. These do not generally have plumes in their primary sense, but the clouds of smoke and materials associated with eruptions. As such, plume takes one of its other senses, a trail of cloud, smoke, or vapor that emerges from some localized source and spreads out. There therefore is not even an issue of interpretation, because reading configures itself to discover and disclose phenomena related to volcanoes while crossing the adjective 'volcanic'. The newsworthy item thereby becomes the discovery of a volcanic plume that – because of the observation as a discovery – has not been observed before at all or not to the extent to be described.

'Probe spies moon's volcanic plume'. In engaging with this text that constitutes the hyperlink, therefore, reading has organized itself to find the newsworthy item: the discovery of a volcanic plume on some moon. Reading does so both forwardly, coming to expect particular resources as materials for further reading, and retrospectively, in reading what has been read differently or specifically (when and where alternative readings are possible). As it begins to follow the unfolding text from left to right, both the subject 'probe' and verb 'spies' open up the cultural (and therefore general) possibility that the hyperlink takes readers to a spy story. But the second part of the predicate makes such a reading unlikely, though not impossible. This is so because activities and action-words are often bound to specific categories, and using a *category-bound activity* implies the category associated with it. Spying is bound to spies and other secretive agents, and probes are consistent with the category collection of secretive agents. Reading thereby retroactively structures itself to alter or make definitive its prior reading achievements; and in this structuring and restructuring, reading finds the newsworthy item: The discovery of a volcanic plume, sign of an eruption, that has not been seen before.

Cultural Resources of/for Reading

Everyday reading draws on semiotic resources for the production of probable readings, such as finding in the link (title) the newsworthy item that its author has intended to be found. These resources are cultural, available to anyone engaged in

culturally competent reading; as semiotic resources, which constitute cultural (collective) possibilities for acting, these can be studied anthropologically. Among the resources are, as seen in the previous section, member categories, category collections (devices), and category-bound activities; but there are also maxims (heuristics) and rules. Together they constitute a set of resources for speaking/writing and hearing/reading in culturally specific ways (Sacks 1974); as cultural resources, they are available to every member. In fact, not using these resources or using other resources would be regarded as foreign, strange, and abnormal, and therefore would ask for an explanation, as was shown in the infamous breaching experiments (Garfinkel 1967). Thus, it would be curious indeed if, after telling someone that I have been reading an online article about Jupiter's moons, the person were to ask me, 'What do you mean by 'reading'?' We would expect the person to provide an explanation for why he or she asked the obvious, because the person has breached what is taken to be plain, ordinary, and everyday sense of the words and phrases we use. Here, I elaborate each of these semiotic resources that (culturally competent) members of society draw upon in reading and that subsequently figure and are highlighted in the exemplary reading of the selected science online text.

A *category* collects entities that are recognized to be of the same kind: Io, Ganymede, and Europa, which appear in the different parts of the text (see Figs. 13.1, 13.4, and 13.5), all are members of the category 'moon'; Jupiter and Pluto used to be members of the same category, planet, before the latter was demoted less than a year earlier to be a member of the dwarf planet category. Some planets have moons associated with them, including the three named in this article that belong to Jupiter and the three noted but unnamed ones that accompany Pluto (paragraph 5, Fig. 13.5). Together, planets and their associated moons form *standardized relational category pairs*: The pair planet–moon is of the same kind as the husband–wife, teacher–student, or brother–sister pairs. Employing one member of a pair constitutes an opportunity to introduce the other member without additional preparatory work. Thus, the statement 'Jupiter's moon Io' affords reading 'Jupiter' as the name of a planet even without having to state explicitly that 'Jupiter' in fact *is* a planet. This is an important way for extending what a person already knows, that is, allowing reading to extend existing categories by adding further members. This might be evident for planets, assuming every culturally competent person knows all the planets of the solar system and their names. But in less everyday topics that regularly feature on science-related websites such as BBC online, this becomes an important resource for a novice on the topic.

Categories are combined to form *category collections* – they also can be situationally combined in the case of not 'naturally' or previously existing collections. 'Solar system' (first paragraph, Fig. 13.5) is one such device, collecting planets, moons, sun(s), and other categories not mentioned in this article (e.g., dwarf planets, comets, asteroids, meteoroids, interplanetary dust, clouds, planetary discs). A category collection taken together with a given or open set of rules of application constitutes a *categorization device*. Rules of application articulate how and why specific members belong to a category. As the recent history of the member planets in our solar system shows, rules may change thereby refining categories to allow inclusions and exclusions not existing before – Pluto, which used to be a planet no longer falls into this category. Thus, Pluto is a member of the dwarf planet cate-

gory because of the rule ‘has not cleared the neighborhood around its orbit, and is not a satellite’.

Adequate reference (sometimes *economy*) and *consistency* name two rules that mediate categorization. The first rule allows the use of a single category reference to characterize an entity. Thus, the specification of Io as a moon of Jupiter (Figure 13.1, first paragraph) is a sufficient resource for reading to find it as a member of the solar system collection. Because of the noted standardized nature of category pairings, therefore, establishing Io as a moon also establishes Jupiter as a planet because of the adequate reference (economy) rule. The second rule states that if some population is categorized and if some category from a collection is used to characterize a member of the population, then that same collection may also be used to categorize further members of the population. Thus, upon encountering the category ‘moon’ in the title, and given that the moon is a celestial body of the solar system, other categories from the solar system collection may be employed for categorization purposes, including ‘dwarf planet’ or named members thereof (i.e., Pluto) and, not applicable in the present article, ‘small solar system bodies’.

Two *maxims* or heuristics constitute further resources for the lived work of reading to accomplish the intended reading of a given text. The first heuristic specifies that if two entities are collected into two different categories that can be heard/seen as part of the same collection, then they should be seen as such. Io is a member of the category moon; Jupiter is a member of the category planet. Both *can be* read (heard, seen) as categories of the solar system collection and therefore, thus goes the heuristics, *should be* read (heard, seen) that way. The second heuristic allows reading to recognize categories when it comes across action terms that tend to be bound to categories. The actions of seeing and spying are bound to the category of images, so that even without further specification, the category of images (photos, drawings, mental images) not only *is* implied but also *should be* implied.

Geography and Cartography of Online Texts

A generally unnoticed aspect of reading is the fact that reading bootstraps and organizes itself so that whatever the text, we come to read a science text *as* science text, a poem *as* poem, a commentary *as* commentary rather than as news item, and so on. That is, reading can engage with *any* text even without knowing beforehand what type of text it is; and then, as reading unfolds, it organizes and configures itself to become a form of reading appropriate for a science text, poem, commentary, news item, and so on. Reading, therefore, is a self-organizing process that contingently configures itself to be appropriate to the task. It does and can do so because of the semiotic resources of the text itself. Reading not only produces ‘a reading’, that is, an outcome, but, in configuring itself, produces itself as a process – much like a university committee that not only makes decisions but also configures itself to evolve a process by means of which the decisions are to be made. More so, when reading encounters ‘Probe spies’, it is yet unclear whether there is a spy story to come or some element of spying or a text that makes tongue-in-cheek

reference to spying, and so on. It is the text itself that makes available specifications of how it is to be read. It is the text that makes available to our reading its own movement as the imprescriptible condition to find the newsworthy in the text. Reading encounters these specifications as resources and uses them to configure itself. In part, the text itself is organized physically, that is, it provides physical resources for reading to organize itself and read a poem, science text, opinion editorial for what they are. The layout of the text is one semiotic resource, which generally works well to distinguish poems from other forms of text, though there is prose poetry, which looks more like a literary text than a poem. There are other more detailed structural resources as well, as I show below.

If it appears strange why I focus on the physical features, then consider cryptanalysis or the decipherment of ancient inscriptions in forgotten languages and ciphers. To decipher what the text says, the analyst has to identify recurrent structures and physical organizations that provide clues to 'words', 'sentences', 'paragraphs', 'beginnings', 'endings', and so on and therefore provide clues to the (spoken) languages that they represent. Consider the compound words that the German language has and which need to be read such that we can or hear their constituents to know what the letter or sound stream 'means' (chapter 10). Or consider transcribing tapes recorded in noisy environments, where we often hear someone speaking but not *what* s/he is saying (see chapter 4); or consider prosody, which allows us to hear an utterance as a statement rather than as a question and so on. That is, the physical context and its structure provide resources for the reading/hearing of the texts themselves. For example, 'hieroglyphic' script', one of three different forms of writing found during excavations at Knossos (Crete), is found only on seal stones, thereby providing special clues to its decipherment. Another form of writing, denoted by the term 'linear B', includes short lines taken to be dividers of words, and 'pictograms', which were thought to denote whole words. That is, the decipherment of a text requires reading to use physical clues to organize itself and find what the text is intended to communicate. I use the term 'geography', for the physical display provides a heterogeneous terrain of physical resources (structures) that allows the lived work of reading to take its course all the while it is shaping itself.

Topology and Features

On first opening the webpage after following the hyperlink 'Probe spies moon's volcanic plume', it becomes immediately apparent that there is not a homogenous but a textured surface that is receiving (on which falls) the reader's gaze. It is not just that the gaze is falling on this surface, but the textured surface of the page has awaited the reader, as anyone following the link, to receive the gaze that is falling upon it. In fact, its author has designed the page such as to invite reading, which therefore configures the author and the reader as a 'standardized relational pair of categories' (Hester and Eglin 1997: 36). In this situation, the texture constitutes a particular topology, a surface with different regions, consisting of different physical features; and this topology provides reading with the semiotic resources for

constituting the topic. (Both topic and topology derive from Gr. *τόπος* [topos], place.) These together make for an entity that can be studied by a science concerned with the way in which physical surfaces that surround us in our everyday world present themselves to us.

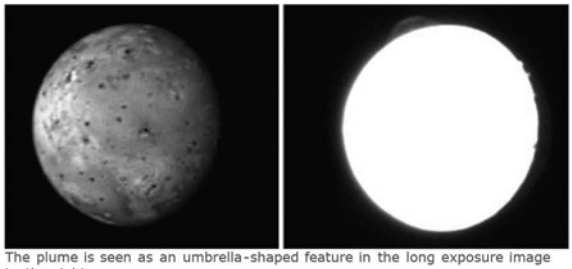
From afar, literally, where the details of the webpage remain unclear, a first structure emerges in the relation of different fields, of which we find three in the case of this article (Fig. 13.2). The figure clearly shows the physical similarities that are constitutive of the existence of the three parts of the article. Upon approaching, it can be noted that each field consists of short dark text ('title and subtitles') and lighter printing ('text') and images, the latter associated with even lighter, grey text ('caption'). In the present instance, there are what reading comes to recognize as five 'paragraphs' following the 'title' and one image associated with a subtext.

The first identifiable part of the display repeats the hyperlink, 'Probe spies moon's volcanic plume'. It is identifiable as something separate because of its larger size and boldface printing. Here, we do not see the text as a hyperlink but as a title, because reading draws on the structure of the context (background) to establish 'Probe spies moon's volcanic plume' as a different kind of figure. That is, the same piece of text, differently located and structured – no longer is there an underline and color feature that marks it as a link to another page – changes the nature of reading from a reading | hyperlink to reading | title pair; and this change itself is the result of the process of reading.

Etymologically, *title* derives from the Latin word *titulus*, superscription. A title is a form of text inscribed before or above some other text, announcing the latter, announcing its content. What is the work that allows us to (a) see the title as title and (b) find in the text what the title announces? In the Western tradition, reading progresses from left to right and from top to bottom. It is in this that the praxis of (Western) reading comes to realize itself, finding the 'superscript', and finding in it something announced, the discovery of a volcanic plume on a moon, which it then finds elaborated in the text that follows. Among the features we immediately note in the display (Fig. 13.2) are the different types of 'text': There are 'letters' of different size in the proportion of 13 (title) : 10 (subtitle) : 9 (text) : 8 (caption), different color (grey, black), and different print intensities. There are empty spaces that separate texts both vertically and horizontally. There are 'capital letters'. All of this micro-texture provides resources that allow reading to concretize and specify itself in the way it concretely does during this reading, without an awareness that these resources are constitutive elements in its work. The work involved in reading disappears and becomes unremarkable precisely because it has become invisible: identifying periods, capitalization, paragraphs, titles, and subtitles for what they are is so much common sense that we no longer are aware that their identification requires and does work. This work becomes visible when there is some form of breakdown, such as when archeologists encounter tablets with unknown scripts or when children learn to read.

Texts do not just appear at random on the page but are organized in very structured ways (Fig. 13.2). The text is not the same throughout but physically differs in different regions of the display. Grey text only appears beneath images but never exceeds the column width that the image occupies. When the image spreads across

Probe spies moon's volcanic plume



The plume is seen as an umbrella-shaped feature in the long exposure image to the right

Nasa's New Horizons spacecraft has sent back images of a huge volcanic eruption on Jupiter's moon Io.

A massive dust plume, estimated to be 150 miles (240km) high, can be seen erupting from Io's Tvashtar volcano.

On Wednesday, the US probe flew by Jupiter, using the planet's gravity to boost its speed, reducing the travel time to its ultimate target of Pluto.

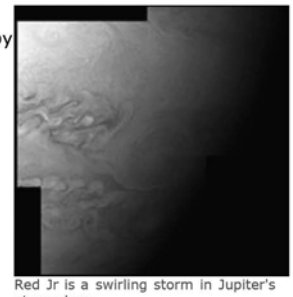
New Horizons also took photos of the icy moons Europa and Ganymede in the run-up to its encounter with Jupiter.

Turning its cameras to the giant planet itself, the spacecraft captured an image of Jupiter's little red spot, a nascent storm south of the famous great red spot.

Volcanic fallout

New Horizons made its closest approach to Jupiter at 0543 GMT (1243 EST) on Wednesday, passing within 2.3 million km (1.4 million miles) of the planet.

The gravity "kick" will accelerate the probe's speed by 14,000kmph (9,000mph).



Red Jr is a swirling storm in Jupiter's atmosphere

The probe will carry out more than 700 observations of the Jupiter system by June, in a dry run for its planned rendezvous with Pluto and its moons in 2015.

The pictures of Io provide the best glimpse yet of Tvashtar, one of the most active volcanoes on Io. The volcano can be seen in the "11 o'clock" position in the images. It is surrounded by a dark patch the size of Texas consisting of the fallout from the eruption.

The probe's observations of icy moons like Europa and Ganymede will allow scientists to map their surface features and composition.

Fig. 13.2 continued . . .

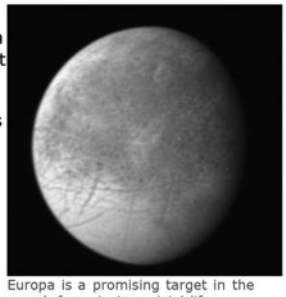
Subsurface ocean

Europa is an attractive target; planetary scientists consider it one of the best places in the Solar System to find extraterrestrial life forms.

Beneath its outer shell of ice, the moon is thought to host an ocean of water warmed by heat from the interior.

The little red spot, or Red Jr, is a swirling storm that formed from three smaller features between 1998 and 2000.

Its larger counterpart, the great red spot, is Jupiter's most famous feature. It has been in existence for at least 130 years.



Europa is a promising target in the search for extraterrestrial life

After an eight year cruise across, New Horizons will conduct a five-month study of Pluto and its three moons in 2015, characterising their geology, structure and composition.

Fig. 13.2 The analyzed BBC article in its entirety.

two columns then the grey text spans the same two columns (Fig. 13.1), whereas when the figure spans one column, the grey text only spans this one column (Figs. 13.4, 13.5). Such differences constitute resources that allow reading to separate out and relate different parts of text. Generally the main text (majority of the display) is black, but below the image the text is grey.

Letter sizes also differ, being largest in the first line (which we recognize as title both in its position – English, as other European languages is written from top left toward bottom right, left column before right column). A second type of text is smaller (‘Nasa’s New Horizons spacecraft . . ‘.), that is, slightly larger than the majority of text (10:9 ratio), but differs from the latter in that it is printed in boldface type similar to the text (title) immediately preceding it. This text therefore constitutes something like a transition, sharing physical characteristics with the text preceding and the text succeeding it. This ‘first’ paragraph is not really a paragraph, because it also has the characteristics of a subtitle – being printed in boldface type and appearing before the text in regular Roman printing. It is placed after the title of the article as a whole, and, in the same way, is printed in boldface type; but it also has the same size and length as a ‘regular’ paragraph. As such, therefore, it allows a specific type of reading work to occur. Such text is read as a subtitle, as *pretext,* in two distinctly different senses of the word, for the text that follows. Other parts of the texts use the same font, size, and boldface type, but distinguish themselves in their brevity, generally consisting of a noun phrase, a noun modified by an adjective or other noun, and lacking a predicate. Here, these other texts include ‘Volcanic fallout’ and ‘Subsurface ocean’.

Grey text and smaller font size distinguishes another form of text associated with images, which competent members (of Anglo-Saxon culture) recognize as *caption*. That we see captions and the remainder of the text as different may be unremarkable and overstating some point. Yet we may gain a new appreciation of

this relation in light of the fact that copy functions in computing environments – e.g., in (scanned) PDF materials – where the different columns remain unrecognized by optical character recognition software. Again, the attribution of the grey text to the image – that is, the relation between the two – is a result of the lived work of the reading | text pair, which configures reading such that it reads the grey text as caption of the image rather than as main text.

There are smaller regions of text separated from other regions of texts of about the same size – culturally competent readers recognize these as 'paragraphs'. These are separated from other regions by an area of white larger than the area of white between two lines. There are additional markers of recurrent features. At the 'bottom right end' of each paragraph there is a '.', a textual feature that members recognize as the grammatical feature 'period'. It is recurrent, and because of its recurrence it is remarkable and therefore remarked in the actual praxis of reading. Periods have a function, or rather, we may ask, 'What is the function of periods?' Another recurrent feature is the specific location where we find 'capital letters'. There always is one following (if the top left-bottom right of Western culture is assumed) a period, clearly marking end and beginning of structures that we recognize as sentences and paragraphs. There is only one exception: texts that do not include a period at their end are in boldface type, generally not exceeding the width of the text that follows. This, therefore, constitutes an additional resource for reading some text as (sub-) title, and allowing reading to approach the first full paragraph more like a regular text than as a subtitle, the physical characteristics of which it has (font size, boldface type).

These physical signs other than letters, though rarely if ever addressed and studied in the research literature on science reading, allow reading to organize itself, to read the text as intended and as read by competent members. This little-attended-to fact in the reading literature generally and in the literature on reading in science more specifically has been problematized and highlighted by James Joyce in chapter 18 of his *Ulysses*, where reading finds no commas, periods, quotation marks, apostrophes, or other punctuation marks as resources to structure itself: 'I wonder is he too young hes about wait 88 I was married 88 Milly is 15 yesterday 89 what age was he then at Dillons 5 or 6 about 88 I suppose hes 20 or more Im not too old for him if hes 23 or 24 I hope hes not that stuck up university student sort no otherwise he wouldnt go sitting down in the old kitchen with him taking Eppss cocoa and talking of course he pretended to understand it all' (Joyce 1986: 637). Here, in the absence of punctuation, reading has to find resources other than punctuation to structure and organize itself. Reading such texts, therefore, constitutes a breach of ordinary reading and allows the normally hidden (aspects of the) work of reading to exhibit itself (themselves). For example, the unfamiliarity of the word 'hes' may provide reading with a resource for turning upon itself and venture a possible alternative, 'he's', which does include a structuring device that the word (text) normally uses. The verb 'wait' can be used to 'wait', read what follows as belonging to some other topic. 88. In and by itself the number appears to fall out of context until reading encounters 'I was married 88', which allows reading to understand the previous as an announcement of a year (1888). As it proceeds reading may arrive at the conclusion (reading as product) that Milly was born in 1889 and on the previous day turned 15, making 1904 the year of the present event. (*Ulysses*

recounts the hour-by-hour events of one day in Dublin, June 16 1904, also known as 'Bloomsday.) The protagonist remembers the wedding date, making it plausible that Milly might be her daughter because this would realize the category collection of *family*. Reading can then specify the protagonist's age, as probably somewhat older than 30, making her older than but not yet too old for the male person ('he') she is considering ('he'). In fact, in the interest shown for 'him', the probable sex of the 'I' is female. Readers note that Joyce has retained other physical features that allow reading to organize itself, including the capitalization of what culturally competent members recognize as names ('Milly', 'Dillon['']s['']', and the English personal pronoun 'I'. This capitalization provides, among others, clues about how to read 'Im', not as another name but as 'I'm', the short form of 'I am'. But let us return to the online science-related text.

There are other physical structures as well, which provide additional resources for reading to structure itself. Among these, there are what is known as commas, periods, inverted commas (title), quotation marks (third paragraph from the bottom, and inverted commas. Reading makes these operate together with the text, such as when what we see as an apostrophe modifies the structure of 'moons' – as we might have found it in the quoted chapter from *Ulysses* – so that we read it as a genitive form of a single 'moon' rather than the plural form 'moons' or the plural genitive 'moons''. In constituting 'moon's' as a singular genitive form, reading organizes itself and now anticipates some entity that belongs to the moon in question, which here is a 'volcanic plume'. Furthermore, the letters are of different types: what we recognize as 'capital' letters in contradistinction to small letters. Etymologically, capital means 'standing at the head', and letters at the beginning of a paragraph or chapter in certain literary books are not only of capital type but also decorated, many times the size of the remaining print. Capital letters stand at the head of words (names) and sentences in much the same way that subtitles and titles stand at the head of text sections and entire texts. In constituting a letter as a capital letter, reading organizes itself to read words that are not at the beginning of sentences as names, such as 'Jupiter' or 'New Horizons'. Thus, the very fact that the two words in 'New Horizons' (or 'Solar System') are capitalized allows reading to constitute these as names rather than as concept words. The capital 'S' constitutes a resource for reading to find *our* solar system rather than some other solar system within or outside of our galaxy. Even though reading may encounter the words 'Io' and 'Tvashtar' for a first time, capitalization allows reading to recognize thise as the names of a moon ('Jupiter's moon Io') and a volcano ('Io's Tvashtar volcano'), respectively, rather than as regular but unknown nouns.

Recurrences and Linkages

Up to this point, I note features as if it were possible to identify something *as a* feature upon seeing a singular instance of it during a first encounter. In fact, it is recurrence that allows us to see *features* as what they are, subtitles, regular text, titles, captions, and so forth. Recurrent features also provide reading with resources for structuring itself and get at the informational content of the text. Links and

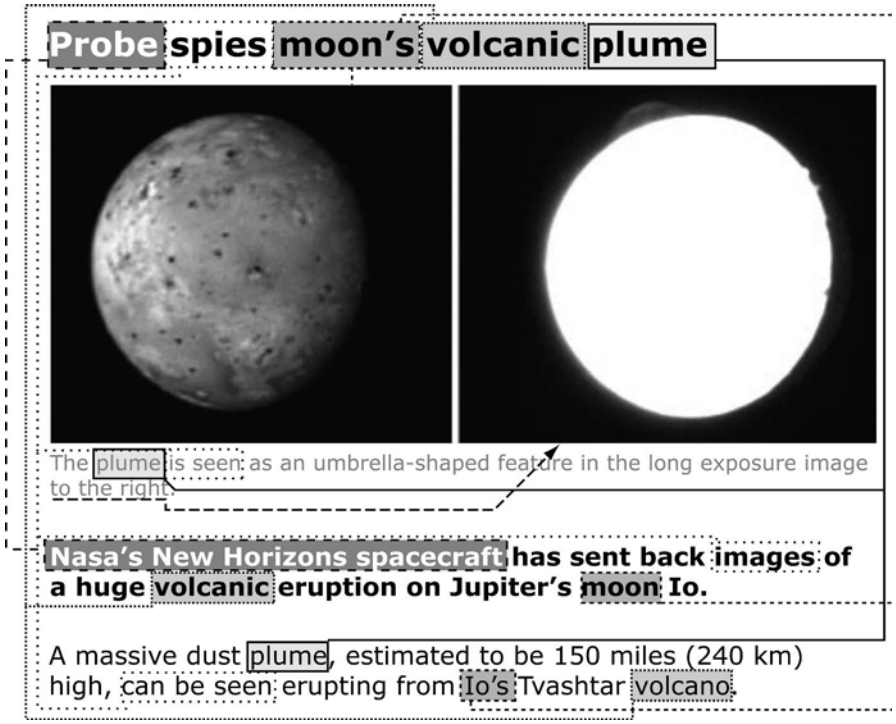


Fig. 13.3 Recurrences and linkages that reading can find just within the first few lines and the first image.

linkages do not appear physically in the text: they are the *product* of the work of reading. The different characteristics therefore mark out physical terrain; but they also mark out conceptual terrain. In the course of its unfolding history, reading organizes itself to establish ephemeral and situated relations between the different parts of the text(ure) so that from the organized whole emerges the sense of *one* narrative. The most basic technique for establishing a relation between multiple pieces of the same type (within main text, titles, captions) and different type of text (across title, caption, main text) is the preservation of a word, a category, or a category device across the spatial and temporal gap in the reading | text pair (Fig. 13.3). The definite article 'the', personal pronouns ('it'), and possessive pronouns ('its'), are other means that preserve the presence of a previously introduced entity.

Examples of the way in which recurrence is used to provide resources for linking different parts of the text abound in this article, which a closer inspection of the first few lines and images of the article shows (Fig. 13.3). The term 'plume' first appears in the title and then is repeated in the caption; the adjective 'volcanic' is repeated from title to first paragraph, and so is the category term 'moon'. The 'probe' in the title and the 'spacecraft' are not the same terms but they can be read to belong to the same category, and, following the above-noted cultural heuristics, should be read that way. The category-bound nature of the verbs spying and seeing allows us to read the images to be the result of this spying. The definite article

'the', which appears twice in the caption, provides a resource for reading to seek the first appearance of the two items thus identified. Some linkages become possible when a term is associated with another term (or a name), so that the second term (name) in fact constitutes a resource for repeating the first. Thus, the moon category appears in the title, then is repeated in the first (boldface typed) paragraph where it appears together with the name 'Io'. In the second paragraph, Tvashtar is identified as 'Io's' volcano rather than as some unspecified moon's volcano, the way in which it appears in the title. But because of the association deriving from collocation in the first full paragraph, reading knows Io to be the moon it first encountered in the title.

The relation between text and image, because there is a translation between domains involved, is more complex. However, even the replacement of a word by a synonym constitutes a translation, which, as all translation, relates two things that are non-identical and therefore not replicas of one another. To produce a sense of oneness, the reading | text pair has to provide resources (text) and possibilities for linkages (reading) that relate different parts of the multimodal display (Fig. 13.3). These links, as stated above, are not themselves present in the display: they would not have to be *made* otherwise. But they are not in the making (reading) alone, because then the reason for making them could be found in the reading practice itself and it would not require a text or the text. It is in the dialectic of the reading | text pair that the links come to emerge as the contingent, ephemeral products of *this reading* of *this text*.

Until this point in my analyses (which assumes the reading to be following the most common, linear trajectory through this text), I have treated recurrence and repetition as an unproblematic phenomenon, though there is evidence available in the figure discussed that requires us to take a closer look. When reading encounters the term 'moon' again, it no longer is the same moon that it was in the title. Initially, especially while reading 'Probe spies moon's volcanic plume', the moon was an unspecified moon, in an unspecified solar system and accompanying an unspecified planet. Now it is one of Jupiter's moons, named Io, which has been photographed by what we later come to know as cameras (Fig. 13.1, paragraph 5) of NASA's spacecraft New Horizons. Recurrence is a curious phenomenon, which is easily seen in the apparently paradoxical phenomenon of festivals: 'they repeat an "unrepeatable". They do not add a second and a third time to the first but carry the first time to the "nth" power' (Deleuze 1968/1994: 1). Thus, the word 'probe' is both the same (structurally composed of structurally same letters) and not the same (physically different paper, ink, conceptually richer meaning) as we read from title downward through the paragraphs until we get to the (literal and metaphorical) bottom of the text. Each recurrence transforms the term, taking it to the second, third . . . and nth power: whereas the signification (dictionary sense) is repeatable, the *theme* changes even if all the repetitions were to occur one after the other.

To sum up: There is real lived work that the repetition allows us to do, such as linking ideas between paragraphs and finding continuation when the topics in different paragraphs are different. Such links and continuations are not *there*, it is the lived work of reading that makes them in the process of reading. Reading recognizes the recurrence of 'New Horizons' [spacecraft], and in the reading | text pair,

there are particular outcomes that result. In reading, 'links' between different parts of the text are the result of work, in which we observe a coming together of agency (reading) and structure (text). The links are the ('invisible') results of this reading | text dialectic, contingent outcomes of an emergent and self-organizing process of reading.

Reading Online Science News: A Practical Demonstration

There is insufficient space in a single chapter to produce a description of all the resources and forms of agency (reading) that are mobilized and enacted in the reading of an online text, even though these are generally rather short compared to, for example, articles that appear in magazines, scientific journal articles, or books and book chapters. I provide but an outline of a reading, and, with it, provide only a partial account of reading online science materials.

Subtitles

In the BBC online (science) texts, two forms of titles below the main title can be found. Textually appearing second, the 'true' subtitles – recognizable in their separation and distinction from the remainder of the text – appear in boldface type, are short and grammatically incomplete statements (i.e., there are only subjects without predicates), and figure on a line of their own. Textually appearing before these is another form of subtitle (recognizable by its font size and boldface type) that also functions as the first paragraph (recognizable by the period that completes it). This paragraph literally is both *sub*title, appearing below (Lat. *sub-*) the title, constituting the title as title, and elaborating the main title preceding it. It is also *sub*-text: literally, appearing below the text of the title, and metaphorically, elaborating the theme that is sketchily announced in the title. Let us begin a reading of this first, strange subtitle 'Nasa's New Horizons spacecraft has sent back images of a huge volcanic eruption on Jupiter's moon Io'.

As reading begins, it discovers first a genitive form ('Nasa's'), followed by a capitalized compound noun ('New Horizons'), succeeded by a regular noun before finding the auxiliary verb 'has' that announces the beginning of the predicate. Here, the term 'spacecraft' is part of a category collection of entities that are launched from Earth into space and may be manned or unmanned. When unmanned, a spacecraft may be a probe to explore either the planet Earth itself or the space beyond. 'Probe' and 'spacecraft' here are part of the same category collection, following the earlier stated *economy* and *consistency* rules, respectively, (a) that a single category suffices to categorize an entity and (b) that once a first category from a category devices has been used (here 'probe'), other categories from the same collection may be used to classify category members (here 'spacecraft').

The first part of the predicate reads 'has sent back images'. The spacecraft, operating as a probe in space where human beings cannot (at the moment) venture

themselves, communicates with human beings by 'sending back' information, which, in the present case, is specified to take the form of images. In the title, the probe is said to be 'spying', which has as one of its senses the mode of making observations. Observations belong to the same category collection as images, which are the results of making observations. The specific content of the images is identified as being (a) 'huge volcanic eruptions' that (b) take place on 'Jupiter's moon Io'. Reading therefore reveals the same structure in the subtitle as it has discovered in the title: A probe observes volcano-related entities or processes on some moon. The extended subtitle elaborates the title preceding it in that it further specifies individual categories that first appear and are announced in unelaborated form. This specification arises from, depends on, and is constitutive of a parallel structure in title and subtitle/subtext. The 'probe' turns out to be a spacecraft named 'New Horizons' and is owned by NASA (rather than by some other organization or nation). The moon is specified as a moon of the planet Jupiter and as bearing the name 'Io'. The plume is associated with a volcanic eruption (rather than being volcanic smoke or steam).

In this single sentence, we find two different grammatical forms in which an entity is characterized as both category and as specific entity. In the construction of the subject, the proper noun 'New Horizons' *precedes* the category 'spacecraft', whereas in the predicate, the proper noun 'Io' *follows* its categorical status as a moon. Here, the capitalization constitutes an essential resource for reading to organize itself and achieve the proper grammatical form to disclose the sense to be communicated in the two different grammatical forms.

The titles in the text – titles below the title and therefore appropriately *sub*titles – are physically smaller than the main title, but are recognizable as titles in that their boldfaced type and brevity makes them stand out from and against the remaining text and background of the page (Fig. 13.2). At a coarse level they constitute part of the recurrent features that contribute to the overall structure that becomes apparent when the reader stands sufficiently far back so that the recognition of individual words becomes impossible. How do we know that it is a title, text in advance of a text – a 'pretext' – that is standing before other text rather than belonging to the paragraphs that precede it? In contrast to the first subtitle/paragraph that immediately follows the main title, subsequent titles consist of noun sentences, category words associated with a modifying adjective, which in the present article include 'Volcanic fallout' (Fig. 13.4) and 'subsurface ocean' (Fig. 13.5).

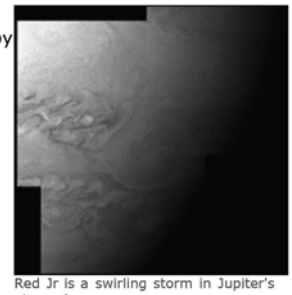
'Volcanic fallout'. Volcanic is an adjective modifying, in English, the noun that follows. This is a cultural historical and contingent fact; it therefore could be otherwise. In French, for example, adjectives generally follow the noun. However, some adjectives may precede the noun modified, but, in the different position, produce a different reading – 'un homme grand' is a tall man but 'un grand homme' is a great man, where Napoleon falls into the latter but not the former category. 'Fallout'. The primary sense of the term volcanic is 'radioactive refuse of a nuclear bomb explosion'. Figuratively, the term can be read as referring to the side effects and aftermath of some event; and, as a combination of the adverb 'out' and the verb 'fall', it may be read both as leaving a formation or quarrel and as falling out of something. 'Volcanic fallout'. Is it refuse of a volcanic eruption, in an extension of the primary sense of fallout? Is it the process of something 'falling out' of the

Volcanic fallout

New Horizons made its closest approach to Jupiter at 0543 GMT (1243 EST) on Wednesday, passing within 2.3 million km (1.4 million miles) of the planet.

The gravity "kick" will accelerate the probe's speed by 14,000kmph (9,000mph).

The probe will carry out more than 700 observations of the Jupiter system by June, in a dry run for its planned rendezvous with Pluto and its moons in 2015.



Red Jr is a swirling storm in Jupiter's atmosphere

The pictures of Io provide the best glimpse yet of Tvashtar, one of the most active volcanoes on Io. The volcano can be seen in the "11 o'clock" position in the images. It is surrounded by a dark patch the size of Texas consisting of the fallout from the eruption.

The probe's observations of icy moons like Europa and Ganymede will allow scientists to map their surface features and composition.

Fig. 13.4 Section 2 of the BBC science news on a volcanic eruption on the moon of Jupiter.

volcano, an extension of the category collection to which also belongs ‘plume’? Or does fallout denote some possible side effect associated with the volcanic eruption? Without a predicate, the eventual outcome of reading remains indeterminate, several senses co-existing until something that encourages one of these possible reading (outcomes) to become more plausible than others. This something is to come: The title announces something to come. In naming and announcing what is to come, the title as pre-text also names the subtext, the underlying theme in a piece of writing, here a paragraph.

Continuing on below the title to find the subtext, reading searches the text for something motivating the title, and the title motivates reading to find what it announces. If this is not apparent, consider the reflexive and mutually constitutive relation between a pointing finger and the thing pointed to: for various reasons, the relevance of the possible targets of the pointing allow us to identify what is being pointed to, for only relevant things are pointed to, and pointing points to relevant things. Texts and their (sub-) titles stand in a similar constitutive reflexive relationship; and in this constitutive relation, reading finds materials for organizing itself.

In proceeding, reading finds a first (one-sentence) paragraph about the voyage of New Horizons past Jupiter. The second (one-sentence) paragraph makes a statement about how some ‘gravity ‘kick’’ will accelerate the probe. The third (one-sentence) paragraph tells the reader about observations made as the probe passes Jupiter on its way to a ‘rendezvous with Pluto and its moons’. In the next (three-sentence) paragraph, reading encounters materials related to what the main title introduces as the (main) topic, the volcanic eruptions on Jupiter’s moon Io. In the third sentence, reading encounters the fallout announced in the title: ‘It’, the

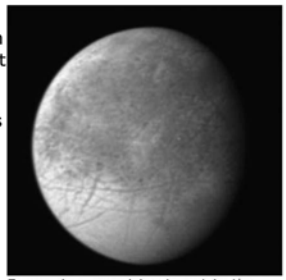
Subsurface ocean

Europa is an attractive target; planetary scientists consider it one of the best places in the Solar System to find extraterrestrial life forms.

Beneath its outer shell of ice, the moon is thought to host an ocean of water warmed by heat from the interior.

The little red spot, or Red Jr, is a swirling storm that formed from three smaller features between 1998 and 2000.

Its larger counterpart, the great red spot, is Jupiter's most famous feature. It has been in existence for at least 130 years.



Europa is a promising target in the search for extraterrestrial life

After an eight year cruise across, New Horizons will conduct a five-month study of Pluto and its three moons in 2015, characterising their geology, structure and composition.

Fig. 13.5 Section 3 of the BBC science news on a volcanic eruption on the moon of Jupiter.

volcano, ‘is surrounded by a dark patch the size of Texas consisting of the fallout from the eruption’. The final (one-sentence) paragraph is about observations of the icy moons Europa and Ganymede, which we know from the fourth (second-to-last) paragraph in the first section to be Jupiter moons.

‘Volcanic fallout’. The title orients and positions reading, much as an athlete orients and positions him-/herself for the competition to come. This positioning is indeterminate, it does not pre-specify which actions are taken and when. But it sets up what is to come by specifying sets of possibilities. The title offers reading with the possibility not only to orient and position itself but actively invites reading to search for that content that motivates the title. In the present case, this content does not extend over the entire section that follows the title; in fact only part of the physical subtext is subtext in the metaphorical sense. The title orients reading to find in the section that text that further deals with the announced topic and, as shown in the section below, provides further instructions and pedagogy for reading the top-most images.

Upon proceeding, reading notices the same structure in the final and third section of the news feature, where, directed by the subtitle ‘subsurface ocean’, reading is provided with a resource for finding the information that beneath the ice that makes Europa an ‘icy moon’ there is thought to be ‘an ocean of water warmed by heat from the interior’ of the moon (Fig. 13.5). There is nothing about these oceans in the three paragraphs that follow. The title therefore constitutes something like a sign post for part of the content that follows.

Image/Caption Ensembles

The figures (images) in the online science websites always are associated with text. This text, the subtext or caption of the figure, clearly is set apart from the remaining text in its smaller font and different color (grey). It is physically separate from other text, always spans the image width, and is printed immediately (empty space is ¼ the size of a capital letter in the caption) below. A figure caption is text associated with a figure and has dual function: as title and description of the figure content and as instruction for finding what it describes. The caption therefore constitutes a form of pedagogy specifying the content of the image and the instructions for how to find this content. 'Captions' in fact constitute resources for reading to configure itself to find the intended features in the image; and anything found can be tested against the text to see whether it is the thing projected to be found. Let us do an exemplary reading of the first caption, that is, let us concretely realize possibilities that exist for a cultural praxis of reading to organize itself.

The first caption reads, 'The plume is seen as an umbrella-shaped feature in the long exposure image to the right'. 'The plume'. The definite pronoun 'the' provides reading with a resource for taking the plume that is the subject of this sentence as a plume that it has encountered before. In the unusual and infrequent configuration of this website, the only text preceding the caption and image is the title, which announces the spying of some (undefined) moon's volcanic plume as the news to be looked out for and found in this BBC science feature. The predicate begins with the passive formulation 'is seen'. The definite article has announced an explicit subject of the sentence, which now is specified as something to be seen. 'The plume is seen' therefore constitutes a statement that the image allows a plume to be seen. It is a description not merely of what *can be* seen but especially of what *is to be* seen. The purpose of the image is to display the plume that is (part of) the newsworthy content of the article. More so, 'the plume is seen' directs reading to the image to search for *the* (specific) rather than *a* (possibly one of many) plume, or something that only might be a plume. At this point, reading might take the image preceding the text as its object, which in fact consists of two images. Where is the plume? In which of the two parts is the announced to be seen? Where is it to be looked for and found?

In this paragraph, as elsewhere in this chapter, I use the term 'therefore' (beginning of line 9). As innocuous as it appears, this term, as all its other appearances and those of all the '"thus's", "hence's", "since's" . . . point[s] to orderlinesses of work practice' (Livingston 1987: 103). Here, this is the work of reading concretely realized for the purpose of this article with the text at hand. Such organizational remarks tell us what the reader does with the text to produce the reading it projects and prefigures.

As reading continues in the caption, the predicate specifies the plume to be seen 'as an umbrella-shaped feature'. Reading now has a more specific description of what it is to be on the lookout for. In fact, the term 'umbrella-shaped feature' constitutes a resource for reading to configure itself in such a way that it can find not just any feature that can be subsumed into the category collection comprising volcanic plumes – there are different phases, each associated with a different shape,

such as vertical column – but directs it to look for features that resemble in some way an umbrella. Reading is directed in this way because there is something in the image that occasions the description, which now, reflexively, becomes an instruction to search for the feature that occasions it. There are many circular features spread all over the left of the two images, whereas there are at least two small 'bumps' attached to the white surface in the 1:30 position of the right image, and another, faint and grey, above the white surface in approximately the 11:30 position.

As reading proceeds on its trajectory in and through the caption, it finds further directions and specifications for accomplishing its work. It is to seek for the announced umbrella-shaped feature 'in the long exposure image'. At this point, experience with photography and the development of pictures from negatives is required to select *the* (specific) image that resulted from a long exposure rather than a regular or short exposure. In the presence of such past experiences, reading is directed to the right. In the absence, it may go on to find more specification in the remainder of the caption. If reading goes on, it finds out that the long exposure image is found 'to the right' and just where photographically experienced reading would have already directed its gaze. It is now evident that the plume – announced in the title and the subject of the caption as the subject of the image – is not to be found among the many dark spots in the left image. It is to the right that reading is directed. But the caption leaves out further specification that delimits the reading to one of the different features that it might have discovered. In fact, research on graphing shows that the uninstructed and inexperienced reading of graphs does not attend to the minute features that subsequently may be the real subject of a display. It is only with time and experience that minor variations become marked, remarkable, and therefore re-marked.

The foregoing analysis shows that reading does not have to move through the text but may stop and scan the image prior to coming to the end of the text. Research on graphing shows that scientific readers often read images (figures) before attending to the captions and main texts, or move back and forth between the two forms of inscription before completing the reading of any one of them. Multiple readings are possible for the same agent and a more definitive reading has to remain open, unless further specification is found elsewhere in the text.

The final part of the caption teaches something else: how to distinguish long exposure photographs from other (regular?) photographs. Whereas the entity emerging from the dark in the left image shows many features, the one to the right is almost entirely white. If the two images are of the same object, 'long exposure' apparently effaces the textures and textured surface that other forms of exposure present in detail. Conversely, the image to the right exhibits features not seen in its partner to the left: these are features that are beyond the nearly circular boundary between the surrounding black and the object itself.

Captions and the photographs they accompany do not stand on their own but also stand in relation to the text. Further instructions for reading the first image can be encountered in the fifth paragraph of the second section (Fig. 13.4), where a repetition of the structure in the caption provides a resource to return to the image: 'The volcano can be seen in the '"11 o'clock" position'. Instead of having as subject the plume, the sentence instructs us to seek the volcano, which clearly is not

available in the ‘long exposure image’. But as even a quick glance to the right image shows, the plume is approximately in the ‘“11 o’clock” position’. In the corresponding position of the left photograph, reading may detect a white circular feature surrounding a black circular center and being surrounded by another dark grey circle. In the next sentence, we find the statement that ‘a dark patch the size of Texas’ surrounds the volcano, inviting reading to return to the image and find the dark patch. Here, then, reading is directed to organize itself and discover a dark patch, which, if not showing the volcano itself, nevertheless is indicative of the source of the plume and fallout.

In this instance, the text provides a description that reading can test in the appropriate part of the image. The term ‘“11 o’clock” position’ derives from another domain, analog watches and clocks, and the family resemblance of their circular characteristics. This, too, is a culturally and historically contingent resource. It could and possibly will be otherwise. In an age when only watches with digital displays were to exist, the instruction to look for the volcano in the ‘“11 o’clock” position’ would no longer make sense, unless the denotation somehow survived as a dead metaphor in the living languages at the time. That is, the denotation would have lost the figurative relation to the photograph in the same way that the Greek word ‘cylinder’, literally translated as ‘roller’, denoted rolling objects has lost its figurative relation in the languages that make use of the term today. In other instances, the captions do not constitute instructions for reading to engage with the image to find the instructed entity. Thus, for example, the third caption in this text, ‘Europa is a promising target in the sear for extraterrestrial life’, has the planet Europa as its subject, possibly and perhaps likely the moon visible in the image (unverifiable in the present instance). But neither the object (‘promising target’ nor its complement (‘in the search for extraterrestrial life’) can be found in the image, though it bears close categorical relationship with the contents of the first paragraph in the same section (Fig. 13.5).

Photos and captions are not related to the main text by the same means as they are to one another, that is, by proximity. As noted, reading discovers further descriptions and instructions for reading the first figure in the fourth paragraph of the second section and in physical proximity of another caption/image pair featuring a feature (‘Red Jr’) of the planet Jupiter itself (Fig. 13.4). In the same way, top-left to bottom-right reading first encounters text about a red spot in the last paragraph of the first section. In the second section, the ‘little red spot’ is featured somewhere in the image and in the associated caption, which specifies it in the predicate to be a ‘swirling’ storm to be found in Jupiter’s ‘atmosphere’. (No further resources than stating its presence are provided to find Red Jr among the many features possibly constituting the dialectical partner to the proper noun.) Because the surrounding text is about the voyage of the New Horizons spacecraft generally, its mission, and some of its other objects, the image | caption pair may appear ‘out of place’. Here, image and caption constitute a pair of resources that are related dialectically because of the mutual constitution of the contents the image is to convey and its title/description found in the text directly associated with it. In the third and final section, reading discovers two further paragraphs in which Jupiter’s (‘little’, ‘great’) red spots are the subjects.

In this subsection, we see the text below images function as a pedagogical device that reading may take to organize itself to see what the text describes. This is a special type of textual relation where the two partners come from different modalities. But this relation may serve us as a figure for thinking about any text, which not only communicates content but provides the pedagogical resources for finding the topic and content that it promises as findable within itself.

Body of the Text

Reading the article for the newsworthy item, literally and metaphorically is the pretext for following the hyperlink and for reading the associated article. This newsworthy item has already been (partially) found and prefigured in the hyperlink (title), so that reading now finds itself reading to disclose the subtext that provoked, and is constitutive of, the title (pretext). Reading, which proceeds from top left to bottom right already has covered the body of the text in the first subtitle, which, as noted, takes a position between, literally and figuratively, (sub-) titles and (sub-) text. As reading engages with the first parts of what from afar has been recognized as the body (based on color of text, size, relative amount [Fig. 13.2]), it finds the subject to be 'A massive dust plume'. The indefinite article 'a' generally is used to introduce a novel aspect, a 'massive dust plume'. But how does it relate to what reading has encountered before, which might motivate the introduction of the plume as topic (*τόποι*)? First, reading already has encountered a dust plume in the title and disclosed it as the newsworthy item. In the first paragraph of the first section, reading encounters the text that announces images of a 'huge volcanic eruption'. Already in the title, reading has discovered the category device that collects volcanic activities and plumes. The same collection now works here, and in drawing on the collection again, reading produces the coherence – via repetition – between the title, the first paragraph, and the subject of this second paragraph.

Following the subject, reading finds a ',' (comma), a physical feature that does not denote some thing or action, which reading expects following the subject and as first part of the predicate. The comma is a resource for reading to configure itself: what comes is a clause that modifies the noun (subject) that has preceded it. It is reading that configures itself, because in the reading | text pair, the second part does not change. But because the outcome of the process of reading is different, having given rise to *a different reading*, it is the other partner of the pair in which the change has occurred. Here, the 'massive dust plume' is 'estimated to be 150 miles (240 km) high'. The clause provides reading with a statement about the size of the plume, which allows reading to elaborate what it already has encountered twice: The enormity of the phenomenon is articulated first as a '*huge* volcanic eruption', which, then, is associated with a '*massive* dust plume'. The comma that follows next allows reading to reconfigure itself and now again look for the predicate that tells something about the subject introduced and modified.

The passive tense of the predicate-opening 'can be seen' announces that the subject is not in the role of the agent but the receiver of an action, which here is one of seeing. This form of action always is related to images in some form, in-

cluding photographs and their contents. In its binding to the visual category complex, the verb therefore reproduces the device that also includes the images that reading has encountered in the caption and first paragraph. It also reproduces an action from the repertoire that already contains the verb 'to spy' earlier found in the announcement of the newsworthy item in the title. As it continues, reading discovers that the plume is more than simply seen: it is seen 'erupting from Io's Tvashtar volcano'. The verb 'to erupt' exists in transitive and intransitive form, so that it, in its –ing form, could have completed the sentence, 'A massive dust plume can be seen erupting'. Reading would have stopped or changed itself had it found a comma or period, but the appearance of 'from' announces a complement of the verb, which turns out to be 'Io's Tvashtar volcano'. In the complement again, reading takes a non-letter sign to modify itself. Rather than erupting from Io, which the dust plume also does, in perceiving the apostrophe followed by an 's' in 'Io's', reading perceives 'Io' not as the place from which the plume can be seen to erupt but as the owner of the thing that does the actual erupting. This something announces itself by a name, which reading knows to come when it meets the 'T' in 'Tvashtar'. Had reading encountered a 't', 'tvashtar', the situation would have been strange indeed. The word would have been a category noun, but the absence of a definite or indefinite article did not prepare reading to anticipate and encounter such a thing. It is the word 'volcano' that resolves the open issue, allowing 'Tvashtar' to be read as the name of a volcano that belongs to Io.

Reading has already encountered Io in the previous paragraph and knows it to be (one of) Jupiter's moon(s). In the volcano, reading also finds again a category that fits with the collection repeatedly denoted and produced in reading so far. On the other hand, in encountering the indefinite article preceding the 'massive dust plume', reading finds a new topic. This announcement of a new topic stands in contrast with the definite article with the same noun 'plume' that has announced it as a known entity. This fact points to what reading may encounter as a contradiction between the physical arrangement of text and image | caption, where the trajectory reading normally takes leads to the introduction of the topic *after* it was already used in the article as an introduced (known) topic.

As it continues, reading encounters additional features, generally introduced as objects of the actions of familiar agents and entities, in clauses and modifiers, as complements of nouns and verbs. Thus, the categories first announced in paragraph 3 of the first section (Fig. 13.1) are repeated in various paragraphs of the second section. It finds the time of the encounter between spacecraft and Io ('Wednesday') to be elaborated in the first paragraph of the second section ('at 0543 GMT (1243 EST) I Wednesday'); it finds again the fact that the probe was 'flying by' the planet Jupiter; it reads again about the role of Jupiter's gravity in boosting the probe's speed in the second paragraph of the second section; and it finds a restatement of the 'ultimate target' of the probe, Pluto.

Online News Media: Opportunities for Rethinking Scientific Literacy, Interest, and Science

In this chapter, I exhibit the normally invisible work of reading online science texts by moving slowly and meticulously through the semiotic resources that the display offers to the reading process. That I take reading to be lived work can be found in the many verbs that are associated with it in this text: reading 'departs', 'finds', 'encounters', 'self-organizes', 'bootstraps itself', 'configures', 'takes', and 'arrives'. In this work, the text and reading have a curious relationship that repeatedly and glaringly jump into the reading eyes: The text no only is the object of the activity of reading but also it provides the instructions for *how* it is to be read. *The text therefore also is a description and articulation of the work of reading itself.* On first sight, this ethnomethodological formulation of reading might appear strange. Let us therefore consider another situation where the focus of the action is on producing something other than a reading – e.g., instructions for putting together prefabricated furniture pieces that require assembly after purchase. If we accomplish the assembly efficiently and competently, that is, when the piece of furniture stands before our eyes, it is said that we have followed the instruction. The instructions will have done beautifully and efficiently so, which is especially clear when we read but initially do not understand a set of instructions and yet, once familiar with what these describe, find no better alternative. In this situation, we have not merely followed the instruction: after the fact, the instructions constitute a description and an account for the construction work that has been done. The instructions for (descriptions of, account of the work of) building the furniture from the materials provided and the building itself stand in a reflexive relation: The instructional text motivates the actions, and the efficient and competent actions are such that they motivate the description. Imagine someone asking how you assembled the furniture, and you might say, 'I followed the instructions, which said . . .' or respond by saying something like, 'First I did. . . . Then I did. . . .', where your descriptions have a high degree of family resemblance with the instructions found with the furniture in the packaging.

Returning now to reading online science materials (or any other form of text), we note that the question 'What have you done (on the plane, train, while waiting)?' might be answered by saying, 'I read'. The question 'What did you read?' might be answered by stating the title of the piece, 'Probe spies moon's volcanic plume', by retelling the text read or, in some instances, by reading aloud from it. Here, reading is an action, and the result or outcome of the reading (as process) is the reading (as product). When we follow the instructions in the caption and relevant paragraphs in the main text, then we do precisely what the text describes; and when we find the news in the link (title) of the text then we precisely do the work that the link describes, we find the newsworthy item. The text, after the fact, therefore also is an account of the work that effective and knowledgeable reading has achieved, the reading. Thus, when asked what we think of the article, the response might begin, 'In my reading . . .' followed by an account of what the reading (as process) has produced. That is, the response is about the reading as an accomplishment rather than a statement about reading as a process. In the same way that

the lived (knowledgeable) work of constructing the furniture and the instruction constitute an inseparable pair, so does the text and the work of reading: The text constitutes not only an instruction for reading but also a description and an account of what knowledgeable reading has achieved once completed. The two moments constitute a dialectically related pair of structure and the embodied agency that mobilizes it. This pair, I denote by the term reading | text, which therefore constitutes a new higher order communicative unit that retains and overcomes the contradictory relation of the two terms. These cannot be separated and understood independent of one another, because considering one implies considering the other, because the lived work of reading and an account of this reading always go hand in hand.

My analysis does not just tell about but actually exhibits how reading organizes itself in the process of reading. This text is already framed because it falls into the section 'science'. All forms are possible and can be found on the BBC website. So in each case, reading has to self-organize so that can in each case read the text for what is. In the texture emerging from the reading | text dialectic, new resources become available for reading that change how reading engages with the text. The text provides reading with instructions for how it has to read so that prospectively the text read will become a description and articulation of the lived work of reading.

In reading the hyperlink (title) for the newsworthy item, reading encounters its outcome ('the reading') in the way one might encounter the finished painting when apperceiving the first sketches that come to configure the space of the canvas. What comes thereafter fills in, elaborates, provides detail, and, in repeating forms and aspects, provides resources for reading (seeing). (On many days, I personally only scan the headlines without actually reading the texts, providing me with a sufficient sense of 'what newsworthy events have happened in the world'.) This subsequent reading makes the connections that result in a unique and singular reading of 'the news' rather than dispersed reading that arises in and from texts intended to give rise to the multiple readings of many poems and literary texts such as the following opening of a well-known and infamous text, *Finnegans Wake*: 'riverrun, past Eve and Adam's, from swerve of short to bend of bay, brings us by a commodius vicus of recirculation back to Howth Castle and Environs' (Joyce 2000: 3). Confronted with unusual organization of text, categories, reading has to make greater efforts in producing a reading, which, because of the nature of the text as an open work, will be only one in a range of many different possible readings.[3] Thus, 'in language, Joyce finds the possibility for a range of coexisting perspectives which, at the level of rigorous scientific conceptualization, would be mutually exclusive. *Finnegans Wake*, for example, produces a crisis in the notions of time, identity and causal connections that suggests certain cosmological hypotheses that go beyond the theory of relativity itself' (Eco 1989: 74).

[3] In fact, an anthropological and ethnomethodological strategy to get the work of reading exhibit itself and make itself visible would consist in doing 'breaching' experiments where the normal work of reading encounters trouble and then externalizes itself to itself to grabble with the problem.

But such is not the kind of reading that I am concerned with here, as the links, titles, and texts in news outlets are not constructed in the same way as poems or literary texts but precisely such that reading can configure itself to find the newsworthy item. It is only when the newsworthy item has been found and disclosed that reading has achieved what it was intended to achieve; and precisely at this point does the text describe the accomplishment of reading. Reading the science news in an online medium therefore has a normative component constitutive of competent reading. Only when reading finds the news as intended has the work embedded in and exhibited by the text been accomplished; in this case, the text constitutes a precise description of the work that has been accomplished. In this instance, reading online science news features is the cultural practice that I studied here. If, on the other hand, reading was to configure itself to produce readings in the way it does with *Finnegans Wake*, then my anthropology would have been a different one: that of poetic texts.

IV

FROM RESEARCH TO PUBLICATION

14

Writing Your Research

New scholars frequently approach me – sometimes even more senior scholars do the same – sending or handing me a paper and ask: 'Where do you think I can publish this?' My response, in a kind way, tends to be: 'Wrong!' I then elaborate by saying that it is important to write for a chosen audience rather than to write something and then look for an audience, which, for any one specific paper, may not exist at all. For example, in science education or educational psychology journals, there are particular questions that interest members of the community; the methods used to study the questions tend to be empirical. Philosophical papers are of lesser interest, if they are of interest at all, to these audiences. Similarly, first-person methods do not tend to be accepted, even though there are well known precedents of highly regarded natural scientific scholars (e.g., Francisco Varela) and philosophers (Maurice Merleau-Ponty, Alva Noë, Natalie Depraz, Jean-Luc Nancy, Jacques Derrida, Michel Henry) who provide convincing analyses of experiences that generalize to human experiences broadly. Moreover, recent neuroscientific work has shown, for example, that the manner in which Merleau-Ponty describes spatial cognition is consistent with the manner in which neurons encode our experiences – e.g., a cube exists in the form of different perspectives on the cube that can be transformed one into another. Other research shows that without mirror neurons, we cannot perceive actions or emotional qualities in other individuals of our species. They provide for the crossing over that exists between individual experience and collective experience. Whether a study that makes use of a first-person approach can be presented as such, therefore, depends on the journal audience. Before writing up your work, you need to be familiar with your target audience and address it.

Writing to Learn

Becoming Part of the Community My general advice to newcomers tends to be to read the equivalence of all publications that a journal publishes over a two-year period. Reading this many articles of a single journal will give you a sense for the kinds of concerns that the readership is interested in, the methods they describe,

and the genres they privilege. You thereby become part of the community of readers. When I started out as a scholar, I did not have colleagues, teachers, or mentors who would show me how to write for publication. But I did find a method that worked really well for me. When I had an idea for a paper that I thought would fit a particular journal, I would take two or three studies that I liked among those that the journal had published. I posted or leaned them against the wall behind the desk where I was writing. I then emulated the style of writing of those articles but in my own context. For example, the methods sections tend to be structured in a particular way, providing accounts of the participants, research context, data collected, data transformations, and data analyses. Depending on the journal, there may be subsections entitled 'Credibility', especially when a study is of interpretive nature rather than employing instruments and statistical methods. Similarly, articles differ in the way they structure and label the research findings. Thus, some journals prefer standard labels, such as 'Introduction', 'Methods', 'Findings', 'Conclusions', and 'Implications'. Other journals and authors prefer descriptive titles, which allow readers to anticipate, for example, the contents of the findings (see chapter 13 on reading). Rather than beginning the findings section with the heading 'Findings', I chose 'Laughter as an Interactive Phenomenon' for a recent article, which immediately allows readers to anticipate that the analysis will show that laughter is not something that we can relegate to the individual but that needs to be understood as a collective phenomenon.

Writing to Learn Rather than to Publish First and foremost in my consideration of the first-person approach actually is not publication but rather the practical, carnal understanding of the phenomenon of interest. Whether I can actually publish the research as a first-person study is only of secondary interest but may not be of interest at all. But when there is an occasion to draw on these materials, then I will make use of them. Occasions may arise, for example, when I am invited or decide to do a book review or when I am invited to write a chapter on a topic where my first-person investigation is pertinent. One of my first published studies employing first-person methods was a book review. The author of the book I was reviewing had made the claim that 'everything is text and discourse' and that there is nothing other that matters. My sense was, however, that my incarnate presence in the world comes with dimensions that are not accounted for in a statement such as *Il n'y a pas de hors-texte* ('There is no[thing] outside of [the] text'). I have had this sense even though I also employ, where pertinent, various forms of discourse analysis as method, where appropriate and suitable to the object of inquiry. In that review I was drawing on my research notes, where I had a brief description of an event in which I had solved a mathematical puzzle (chapter 11). I used it as the data for an analysis to show that there are dimensions of mathematical engagement that cannot be reduced to text. There are incarnate dimensions to life that escape description. To understand life, we need to understand these carnal dimensions and 'experiences'. Text itself cannot get outside of itself, which is why I commented in a criti-

cal way on the hermeneutic phenomenological pretension to understand life through the analysis of textual supplements.[1]

I turned to a first-person approach when I became intensely interested in understanding *why* others acted, reasoned, thought, and talked in the way they did. Beginning with the assumption that no person deliberately acts, reasons, thinks, or talks in a 'stupid' way implies that if I do not understand another's actions, reasons, thoughts, or talk then I do not understand how the world looks to them. '*What* is apparent to students', I asked myself, 'when they do this or that in a science laboratory?' If what they see differs from what I see, then I need to understand the very perceptual processes that allow us, human beings, to perceive some phenomenon in different ways. We perceive them differently rather than 'interpret' them differently, for, as my first-person studies revealed, I do not 'interpret' the world but I know my way (immanently) around in it. That is, I turned to the first-person approach because I wanted to access other ways of seeing that were not initially and preferentially my own. This led me to the variation of my experiences. As a consequence of having different experiences, I was then enabled to study how these different experiences came about, that is, what the conditions were to have one rather than another experience.

Take as Many Notes as Possible As soon as there is something that strikes me, I capture as much as possible of the event and phenomenon as I can. For example, in the case of the broken pocket door described in chapter 11, I took photographs and wrote three pages of notes that described what has happened, sometimes only in words or half-sentences but containing sufficient 'information' to return later to get back into the situation. When I have more time, such as during my fellowship at the *Hanse Institute*, then I write more and, upon re-reading what I have written, elaborate on previous writing, add to it, or put another layer of analysis on top of it. Writing, as I show in this book, is a process of change, opening up new ways and contents of thinking – inherently erasing previous understandings and contents of thinking. Writing is a productive process. The more frequently you do it, the easier it comes – which is also of benefit when you actually work on a research article.

These new kinds of theoretical understanding arising from my first-person investigations allowed me to change my research focus and how I analyze the data that I collect. I could show, for example, by means of a third-person analysis, how people talk about phenomena that they have never considered before, as per their own statements. If someone has never talked about something before and yet talks about it at the moment of an interview, then we cannot make the assumption that the person as a cognitive structure that is dumped and made public in the process of talking. Talking is a process indistinguishable from thinking and a person finds her thoughts in what she has spoken. Although this understanding has arisen for me in first-person investigations, I actually published this realization of the rela-

[1] In cultural-historical activity theory, there is a dialectical relation of the ideal and the material. The human life form encompasses both these dimensions. The analysis of texts does not get us out of the ideal, and, therefore, it does not get us out of ideology. Ideal life, however, is impossible without material life. Ideal life is enabled by material life. The kinds of first-person methods I advocate are designed to get beyond the 'phallogocentric' effort concerned with the sole analysis of the ideal moment of life.

tionship between thought and language in the form of third-person studies much more appropriate for the science education and educational psychology audiences that I had chosen for the purpose.

Find Your Best Writing Time and Consistent Block it Out My best writing time is in the morning. I get up early and, for a few hours or the entire working day, I write. I block the morning so that I can write. (My attitude is that if I were teaching at the time, nobody would expect me to answer the telephone or attend faculty meetings. Research is another dimension of my work, and I need to acknowledge and guard it to the same extend as I guard my teaching.) There are in my life, as in the lives of other people, instances when I do not feel like writing, for example, after having slept poorly and waking up tired. In this case, I nevertheless sit down to do some writing, not specifically to write an article or a chapter, but just to write. I may begin by writing some emails. I may begin by writing in my research notes about not so important issues, or I may write a more routine methods section. Anything that gets me to start writing is appropriate. After a little while, I tend to become absorbed and able to write what I really want to write or have planned to be writing for the day. This is not unlike what I experience with physical exercise, when on some days I feel too tired to get on the bicycle for my ride. But I know that if I only start, and start slowly, within about half an hour, it becomes pleasurable. The folk explanation is that the endorphins begin to kick in. That is, even though I may not be 'motivated' to write (cycle), doing it will bring 'motivation' even though I began in a different state. In a contradictory kind of way, unmotivated writing (cycling) produces motivated writing (cycling). Also apparent in the preceding description is the fact that I think about what to write on the night before, as a way of priming what I will be doing. In this way, I do not have to figure out what to write after getting up but simply start to write.

Getting Started Just how the idea to write a particular article comes about is inaccessible to our consciousness (see chapter 10). It arises from the dialectical tension between the data we have and the claims that these support, on the one hand, and the going interests in a particular research community, on the other hand. Sometimes I read a particular article and then find myself thinking that I have data that disconfirm the claims the author/s make. This then constitutes an occasion to write an article for the same audience with the explicit aim to provide counter evidence. It provides me with the beginning of an argument that takes approximately the following shape: 'In (science education, educational psychology) there are studies that show (claim) . . . This study was designed to analyze. . . . The data provide evidence that the limit the generality of previous research'. This, then, is the structure of the argument. There are studies that make certain claims and my contribution to the field consists in exhibiting the limitations of such existing claims.

Before I begin to work on an article, I write a focal paragraph. This paragraph – which may become, in some form, the abstract of the paper – outlines the form and content of the paper. It sketches the argument or process of the paper. It therefore constitutes a form of text that is both outside and inside the text. It is outside in that it describes the content of what follows but it is also integral to the publication. The paragraph needs to articulate the (a) current state of the art, (b) the problem

in/of this state, (c) the articulation of the study and how it addresses and resolves the problem, (d) the findings, and (e) possible conclusions and implications. The purpose of the paragraph is not initially to write an abstract but to orient myself. If the subsequent writings deviate from the programmatic paragraph, then the latter will be changed so that it corresponds again to the text that it is a description of. The paragraph has to have definitive statements of what you do in the text. You have something to report and this needs to be reflected in the abstract. If you were to say, 'this study explores . . .' then you suggest to the reader that you do not really know what there is to be reported but that the text constitutes an exploration. Why would I, a reader, want to read an 'exploration' rather than to find information and articulations of new knowledge? On the other hand, if you write 'This study presents the results of a first-person exploration of . . .' then you have made a definitive statement on what the article is doing: report findings rather than the wanderings of a research process.

Researching and Reporting Using First-Person Method

A first-person approach may be suitable for and accepted by an audience that predominantly consists of educational psychologist. That is, there is no inherent reason why a particular article is not accepted just because of method – though in some fields, the likelihood is high that a study might be rejected just because of the method employed (e.g., cognitive psychology, educational psychology). In this section, I present and comment on an excerpt from an article in which my co-author and I used a first-person approach to understand why some science lectures are difficult to understand even though, on the surface, they may employ everyday examples (Roth and Bowen 1999). The excerpt below consists of the entire subsection 4, one of the five of which the 'findings' section exists.[2] In the methods section, already, we write about how our different disciplinary backgrounds – Michael Bowen has a graduate degree in biology, mine are in physics and statistics – provide us with different readings and hearings of the lectures we analyze and that the results of the study arise from playing these different hearings against each other.

The excerpt begins with the descriptive title, which allows readers to anticipate that the text that follows its heading; it then makes the claim that there is a 'structural incompatibility between vernacular and scientific examples'. The lectures often use graphs, and some of these are difficult as our preceding work among high school students, university students, and scientists have shown. The opening statement suggests the use of vernacular examples in teaching that have a different 'deep structure' than the scientific examples that they are supposed to help in understanding. The second statement puts these results in a context of the current study, whereas the third sentence makes the claim: 'ecology lectures are not different'. The article then quotes from the lecture that presents the data ultimately supporting the claim. We then quote what Michael Bowen has said about this part of the lecture, that is, we quote him providing an articulation of his experience when

[2] The excerpt can be found, in subsequently edited form, in Roth and Bowen 1999: 247–249.

originally experiencing the lecture while attending it and then revisiting the tapes during our analyses.

Structural Incompatibility between Vernacular and Scientific Examples

At least two studies suggest that even experienced and highly competent teachers and professors use vernacular examples that have a different deep structure than the scientific referent which the lecture attempts to elaborate (Roth, McRobbie, Lucas, & Boutonné, 1997; Roth, Tobin, & Shaw, 1997). That is, in terms of our framework developed here, the structural relationships between the objects in narratives from shared R–I domains do not map onto the to-be-explained relationships in the S–R domain. Our analysis of the following excerpt shows that the present texts (ecology lectures) are not different.

The isocline lecture continues, 'And complementary resources are complementary. When they are taken together you need less of each, so having them both together means you do relatively better. A good example of complementary resources are rice and beans. Rice is low in amino acid lysine it's high in sulfur-containing amino acids, these are essential amino acids. Beans are high in lysine and low in sulfur. So when you have them both together you can get by with less because they complement one another. The other ones, if one of them is high then one of the other ones is low. And here we have complementary resources when you have both here you can have less of them then the condition when you have more of one but very little of the other. Any questions about this? [PAUSE] This of course is maybe one of the reasons why rice and beans are the main staples of food especially in Central and South America in a lot of areas'.

> To me, this example is confusing, partly because there is no suggestion about why they are essential – the whole process of this essentiality is black-boxed and de-contextualized. Part of this confusion stems from, again, the lack of a THIRD dimension – they are referred to as essential but not essential for WHAT. Is it still assumed to be 'growth', because other possible outcomes have been given since that general claim was made. But also it is confusing because I am unclear why the discussion of lysine and sulfur would not fit better with the 'essential nutrient' isocline example earlier. [GMB]

As in the case of the substitutable resources, the narrative about rice and beams appears plausible on the surface. However, close reading reveals that the underlying issues are much more complex. Using an arbitrary set of numbers, three examples are sufficient to show the complementarity of rice and beans, that is, that the total amount of rice and beans to be eaten is much smaller in the middle than toward the extremes (all rice or beans) if the requirements in lysine and sulfur are to be met.[7] However, the details of this case only become clear when we plot a larger number of data points. A mathematical analysis shows that beans and rice are not an example for a different category of resources, but an example of essential resources in a new set of coordinates (with lysine-sulfur as the two essential resources). The change from the essential resources lysine and sulfur to beans and rice, each

of which contains both resources, corresponds to a non-orthogonal rotation (plus an additional stretching). This rotation changes the slopes of the isoclines: instead of being parallel as with the original axes, they are now sloped with respect to the new axes leading to a graph similar to Figure 1c.[8] We therefore see that the case of rice and beans is fundamentally the same as the case of two essential resources. One mathematical operation and its inverse suffice to transform one example into the other, constituting a proof for the equivalence of the two examples as the same case in two frames of reference.

The vernacular example maps onto essential resources rather than the desired complementary resources. This does not resolve the question if there are complementary resources that are not combinations of simpler resources. For example, one resource may enhance the uptake of another so that, when taken together, the total requirement for growth is significantly smaller.

Notes

[7] In our analysis, we used the following example. Given: (a) a basic daily requirement of 100 mg lysine, 120 mg sulfur; (b) contents (per 100 g of B, R): B contains 60 mg lysine and 30 mg sulfur, R contains 20 mg of lysine and 70 mg of sulfur. Then: To get a full complement of lysine and sulfur, it would take (a) 400 g of B alone; or (b) 500 g of R alone; or (c) 100 g B and 133 g R taken together.

[8] The mathematical analysis proceeds as follows. If 100 g of beans contain 60 mg of lysine and 20 mg of sulfur, and rice contained 30 mg of lysine and 70 mg of sulfur, we get the following matrix relation for calculating the amount (in mg) of lysine, l, and sulfur, s, in any combination of amount of bean, B, and rice, R (in grams).

$$\begin{pmatrix} l \\ s \end{pmatrix} = A \begin{pmatrix} B \\ R \end{pmatrix} \quad \text{where } A = \begin{pmatrix} .6 & .2 \\ .3 & .7 \end{pmatrix}$$

then any point (l_i, s_i) in the original l-s plane can be transformed in to a corresponding point (B_i, R_i) in the B-R plane by means of the transformation:

$$\begin{pmatrix} B_i \\ R_i \end{pmatrix} = A^{-1} \begin{pmatrix} l_i \\ s_i \end{pmatrix}$$

If this is done on the lines of a graph (essential resource) with 100 mg lysine and 120 mg sulfur as essential requirement, the appropriate new graph results.

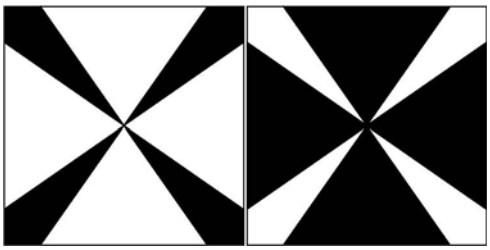
We then begin our analysis stating that the use of rice and beams to constitute a plausible analogy even though Michael Bowen had found this stretch of the lecture confusing. We suggest that a mathematical example would show the resources to be complementary – i.e., reinforce each other – rather than merely substitute for each other. In the former case, the relation between the two resources is non-linear, whereas it is linear in the latter case (i.e., substitutability). However, the mathematics is not actually shown in the text but pushed into footnotes 7 and 8. It had been my way of making sense and concrete proof of the true relationship between the food items. But the mathematics that I had used in my first-person approach is beyond what most readers would be able to understand, so I decided to place this aspect in the two footnotes. The mathematics, only indexically referred to in the

text, provides proof that the rice and beans example is structurally similar to the interaction of ‘essential resources’ rather than ‘complementary resources’ as the lecture has claimed.

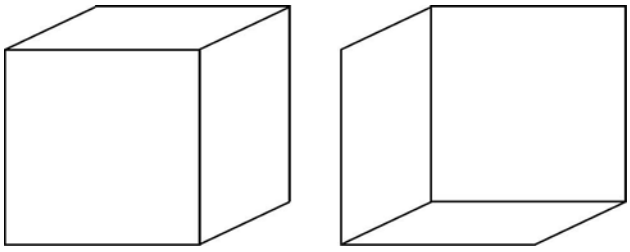
In this article, therefore, we fundamentally use a first-person approach to investigate what makes these lectures that we had recorded and analyzed so difficult. We often found that Michael Bowen could say that something is confusing and where the possible sources for the confusion lies. The other method – that of seeing and hearing the lessons through my eyes and ears – revealed the mathematical structure underlying the vernacular and scientific examples. It is this form of analysis, which uses one type of vernacular example in three variations to exhibit the difference of its deep structure with that of the intended scientific concept of ‘complementarity’. Variation, here, is instantiated by different individuals, Michael Bowen, on the one hand, and myself, on the other hand.

Appendix

A1. The Maltese cross Two white (black) crosses can be seen. Switching back and forth between the two crosses in a representation such as that of Fig. 2.1 allows an investigation of the conditions under which one or the other is seen.



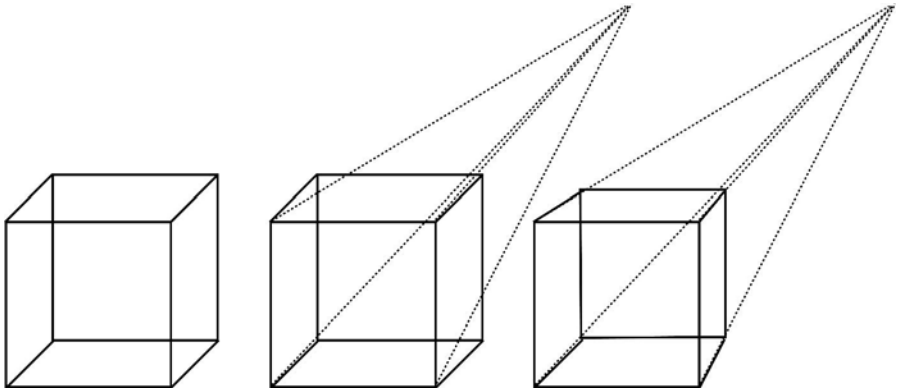
A2. What makes a cube a cube? Depending on which lines are deleted, the cube in Fig. 2.4 will appear.



Readers can easily verify that the outlines of the two cubes are identical. What differs between these figures and the one in Fig. 2.4 are the internal lines. Of those within the outer boundaries, the removal of one set of three lines produces the illusion of a cube seen from the top and oriented toward the right (left), whereas the removal of the three complementary lines leads to the impression of a cube seen

from below and oriented toward the left (right). In fact, the two drawings are not unambiguous, for they can also be seen as boxes that are cut open, where the left one allows us to look into the open box from below and the right one from above.

A3. The construction of a perspectively correct cube Knowing that we see the parallel rails of a railway track seem to meet in the distance, we can use this principle to construct a perspectively correct cube in the three stages shown.



References

Anderson, J. R. (1985). *Cognitive psychology and its implications*. San Francisco, CA: Freeman.

Aristotle. (1889). *The organon, or logical treatises*. London, England: George Bell & Sons.

Aristotle. (1907). *De anima (On the soul)* (H. Lawson-Tancred, Trans.). Harmondsworth: Penguin.

Bakhtin, M. M. (1981). *Dialogic imagination*. Austin, TX: University of Texas Press.

Bakhtin, M. M. (1993). *Toward a philosophy of the act*. Austin: University of Texas Press.

Bakhtine, M. [Volochinov, V N.] (1977). *Le marxisme et la philosophie du langage: essai d'application de la méthode sociologique en linguistique*. Paris, France: Les Éditions de Minuit.

Bourdieu, P. (1980). *Le sens pratique*. Paris: Les Éditions de Minuit.

Bourdieu, P. (1992). The practice of reflexive sociology (The Paris workshop). In P. Bourdieu & L. J. D. Wacquant, An invitation to reflexive sociology (pp. 216–260). Chicago, IL: University of Chicago Press.

Busse, T. (1999). Mathematik ist eine süße Frucht.... *Forum Kritische Psychologie, 41*, 91–112.

Chalmers, D. (1996). *The conscious mind: In search of a fundamental theory*. Oxford, England: Oxford University Press.

Clancey, W. J. (1997). *Situated cognition: On human knowledge and computer representation*. Cambridge, England: Cambridge University Press.

Csikszentmihalyi, M. (1990). *Flow: The psychology of optimal experience*. New York, NY: Harper & Row.

Eco, U. (1989). *The aesthetics of chaosmos: The middle ages of James Joyce*. Cambridge, MA: Harvard University Press.

Deleuze, G. (1994). *Repetition and difference*. New York, NY: Columbia University Press. (First published in 1968)

Depraz, N. (2009, September 12). D'une science descriptive de l'experience en première personne. Paper presented at the Faculté protestante de Paris, France.

Depraz, N., Varela, F. J., & Vermersch, P. (2002). *On becoming aware: A pragmatics of experiencing*. Amsterdam, The Netherlands: John Benjamins.

Derrida, J. (1967a). *La voix et le phénomène: Introduction au problème du signe dans la phénoménologie de Husserl*. Paris, France: Presses Universitaires de France.

Derrida, J. (1967b). *L'écriture et la différence*. Paris, France: Éditions du Seuil.

Derrida, J. (1967c). *De la grammatologie*. Paris, France: Les Éditions de Minuit.

Derrida, J. (1972). *Marges de philosophie*. Paris, France: Les Éditions de Minuit.

Derrida, J. (1986). *Parages*. Paris, France: Galilée.

Derrida, J. (1993). *Khôra*. Paris, France: Galilée.

Derrida, J. (2000). *Le toucher – Jean-Luc Nancy*. Paris, France: Galilée.

DNGHU (2007). *The Proto-indo-germanic etymological dictionary*. www.dnghu.org.

Dreyfus, H. L. (1991). *Being-in-the-world: A commentary on Heidegger's 'Being and Time,' division I*. Cambridge, MA: MIT Press.

Franck, D. (1981). *Chair et corps: Sur la phénoménologie de Husserl*. Paris, France: Les Éditions de Minuit.

Franck, D. (2008). *L'un-pour-l'autre : Levinas et la signification*. Paris, France: Presses Universitaires de France.

Freud, S. (1999). *Gesammelte Werke Band XVII.* Frankfurt/M, Germany: Fischer-Verlag.

Garfinkel, H. (1967). *Studies in ethnomethodology*. Englewood Cliffs, NJ: Prentice-Hall.

Garfinkel, H. (1996). Ethnomethodology's program. *Social Psychology Quarterly, 59*, 5–21.

Garfinkel, H., & Sacks, H. (1986). On formal structures of practical action. In H. Garfinkel (Ed.), *Ethnomethodological studies of work* (pp. 160–193). London, England: Routledge & Kegan Paul.

Hegel, G. W. F. (1835). *Vorlesungen über die Aesthetik Erster Band.* Berlin, Germany: Duncker und Humbolt.

Hegel, G. W. F. (1979). *Werke Band 18: Vorlesungen zu Geschichte der Philosophie*. Frankfurt/M, Germany: Suhrkamp

Heidegger, M. (1977). *Gesamtausgabe. 1 Abteilung: Veröffentlichte Schriften 1914–1970. Band 5: Holzwege*. Frankfurt/M, Germany: Vittorio Kostermann.

Heidegger, M. (1977). *Sein und Zeit*. Tübingen, Germany: Max Niemeyer. (First published in 1927)

Heidegger, M. (1985). *Unterwegs zur Sprache*. Frankfurt/M, Germany: Vittorio Kostermann.

Heidegger, M. (2000). *Gesamtausgabe. 1 Abteilung: Veröffentlichte Schriften 1910–1976. Band 7: Vorträge und Aufsätze*. Frankfurt/M, Germany: Vittorio Kostermann.

Henriksson, C. (2008). *Living away from blessings: School failure as lived experience*. London, Ontario: Althouse Press.

Henry, M. (1990). *Phénoménologie materielle.* Paris, France: Presses Universitaires de France.

Henry, M. (2000). *Incarnation: Une philosophie de la chair*. Paris, France: Éditions du Seuil.

Hester, S., & Eglin, P. (1997). The reflexive constitution of category, predicate and context in two settings. In S. Hester & P. Eglin (Eds.), *Culture in action: Studies in membership categorization analysis* (pp. 25–48). Washington, DC: University Press of America.

Holzkamp, K. (1983). Grundlegung der Psychologie. Frankfurt/M, Germany: Campus.

Hsu, P.-L. (2010). Thinking dialogically about thought and language. In W.-M. Roth (Ed.), *Re/structuring science education: ReUniting sociological and psychological perspectives* (pp. 155–165(. Dordrecht, The Netherlands: Springer.

Husserl, E. (1939). Die Frage nach dem Ursprung der Geometrie als intentional-historisches Problem. *Revue internationale de philosophie, 2,* 203–225.

Husserl, E. (1977). *Die Krisis der europäischen Wissenschaften und die transzendentale Phänomenologie: Eine Einleitung in die phänomenologische Philosophie*. Hamburg, Germany: Felix Meiner Verlag. (First published in 1969)

Husserl, E. (1980). Vorlesungen zur Phänomenologie des inneren Zeitbewußtseins. Tübingen, Germany: Max Niemeyer.

Husserl, E. (2001). *Analyses concerning passive and active synthesis: Lectures on transcendental logic*. Dordrecht, The Netherlands: Kluwer Academic Publishers.

Jackson, M. (1999). *Malt whisky companion* (rev. ed.). London, England: Dorling Kindersley.

Joyce, J. (1986). *Ulysses*. New York, NY: Vintage.

Joyce, J (2000). *Finnegans wake*. London, England: Penguin Books. (First published in 1939)

Kant, I. (1956). *Werke Band II: Kritik der reinen Vernunft.* Wiesbaden, Germany: Insel. (First published in 1778)

Lakoff, G. (1987). *Women, fire, and dangerous things: What categories reveal about the mind*. Chicago, IL: University of Chicago Press.

Lave, J. (1993). The practice of learning. In S. Chaiklin & J. Lave (Eds.), *Understanding practice: Perspectives on activity and context* (pp. 3–32). Cambridge, England: Cambridge University Press.

Lao Tsu. (1972). *Tao te ching*. New York, NY: Vintage Books.

Lee, M., Lee, E., Lee, M. E., & Lee, J. (1996). *The healing art of tai chi. Becoming one with nature.* New York: Sterling.

Levinas, E. (1971). *Totalité et infini: Essai sur l'extériorité*. The Hague, The Netherlands: Martinus Nijhoff.

Levitin, K. (1982). *One is not born a personality: Profiles of Soviet educational psychologists*. Moscow, Russia: Progress Publishers. (http://www.marxists.org/subject/psychology/works/levitin/not-born-personality.pdf)

Livingston, E. (1987). *Making sense of ethnomethodology*. London, England: Routledge & Kegan Paul.

Luria, A. R. (1973). *The working brain: An introduction to neuropsychology*. New York, NY: Penguin Books.

Maine de Biran, P. (1841). *Œuvres philosophiques.* Paris, France: Librairie de Ladrange.
Maine de Biran, P. (1859). *Œuvres inédites Tome II.* Paris, France: Dezorby, E. Mageleine.
Mainland, J., & Sobel, N. (2006). The sniff is part of the olfactory percept. *Chemical Senses, 31*, 181–196.
Marion, J.-L. (1996). *La croisée du visible*. Paris, France: Presses Universitaires de France.
Marion, J.-L. (1997). *Étant donné: essaie d'une phénoménologie de la donation*. Paris, France: Presses Universitaires de France.
Marion, J.-L. (2010). *Certitudes négatives*. Paris, France: Éditions Grasset & Fasquelle.
Merleau-Ponty, M. (1945). *Phénoménologie de la perception*. Paris, France: Gallimard.
Merleau-Ponty, M. (1964). *Le visible et l'invisible*. Paris, France: Gallimard.
Meshcheryakov, A. (2009). *Awakening to life*. Pacifica, CA: Marxists Internet Archive. (Original English publication by Progress Publishers, 1979)
Nancy, J.-L. (2000). *L'intrus*. Paris, France: Galilée,
Nancy, J.-L. (2002). *À l'écoute.* Paris, France: Galilée,
Nancy, J.-L. (2003). *Noli me tangere*. Paris, France: Bayard.
Nancy, J.-L. (2006). *Corpus*. Paris, France: Éditions Métailié.
Nancy, J.-L. (2007). *Tombe de sommeil*, Paris, France: Galilée.
Nietzsche, F. (1954). Werke in drei Bänden. Band 3. Munich, Germany: Hanser.
Oxford English Dictionary (OED). (2011). Online version [www.oed.com]. Oxford, UK: Oxford University Press.
Parmenides. (1906). Peri physeos. In H. Diels (Ed.), *Die Fragmente der Vorsokratiker: Griechisch und deutsch* (pp. 113–126). Berlin, Germany: Weidmannsche Buchhandlung.
Piaget, J. (1970). *Genetic epistemology*. New York, NY: W. W. Norton.
Rey, A. (2011). *Le Grand Robert de la langue française*. Online version. http://gr.bvdep.com/version-1/
Rizzolatti, G., Fadiga, L., Fogassi, L., & Gallese, V. (1997). The space around us. *Science, 277*, 190-191.
Roth, W.-M. (2003). *Toward an anthropology of graphing: Semiotic and activity theoretic perspectives*. Dordrecht, The Netherlands: Kluwer Academic Publishers.
Roth, W.-M. (2004). Theory and praxis of metacognition. *Pragmatics & Cognition, 12*, 157–172.
Roth, W.-M. (2006). *Learning science: A singular plural perspective*. Rotterdam, The Netherlands: Sense Publishers.
Roth, W.-M. (2008). The nature of scientific conceptions: A discursive psychological perspective. *Educational Research Review, 3*, 30–50.
Roth, W.-M. (2011). *Passibility: At the limits of the constructivist metaphor.* Dordrecht, The Netherlands: Springer.
Roth, W.-M. (in press). Through the eyes of the learner. *Éducation & didactique.*
Roth, W.-M., & Bowen, G. M. (1999). Complexities of graphical representations during lectures: A phenomenological approach. *Learning and Instruction, 9,* 235–255.
Roth, W.-M., & Hsu, P-L. (2008). Interest and motivation: A cultural historical and discursive psychological approach. In J. E. Larson (Ed.), Educational psychology: Cognition and learning, individual differences and motivation (pp. 81–105). Hauppauge, NY: Nova Science.
Roth, W.-M., McRobbie, C., Lucas, K. B., & Boutonné, S. (1997). Why do students fail to learn from demonstrations? A social practice perspective on learning in physics. *Journal of Research in Science Teaching, 34*, 509–533.
Roth, W.-M., & van Eijck, M. (2010). Fullness of life as minimal unit: STEM learning across the life span. *Science Education, 94*, 1027–1048.
Sacks, H. (1974). On the analyzability of stories by children. In R. Turner (Ed.), *Ethnomethodology: Selected readings* (pp. 216–232). Harmondsworth, UK: Penguin.
Sartre, J.-P. (1956). *L'être et le néant*. Paris, France: Gallimard.
Sheets-Johnstone, M. (2009). *The corporeal turn: An interdisciplinary reader*. Exeter, UK: Imprint Academic.
Supèr, H. (2006). Figure-ground activity in V1 and guidance of saccadic eye movements. *Journal of Physiology, 100,* 63–69.
Thompson, E., Noe, A., & Pessoa, L. (1999). Perceptual completion: A case study in phenomenology and cognitive science. In J. Petitot, F. J. Varela, B. Pachoud, & J.-M. Roy (Eds.), *Naturalizing phenomenology: Issues in cotemporary phenomenology and cognitive science* (pp. 161–195). Stanford, CA: Stanford University Press.
Varela, F. (1996). Neurophenomenology: A methodological remedy for the hard problem. *Journal of Consciousness Studies, 3*, 330–350.

Varela, F. J. (2001). Intimate distances. Fragments for a phenomenology of organ transplantation. *Journal of Consciousness Studies, 8,* 259–271.
Varela, F. J., & Shear, J. (1999). First-person methodologies: What, why, how? *Journal of Consciousness Studies, 6,* 1–14.
von Weizsäcker, V. (1973). *Der Gestaltkreis.* Frankfurt/M, Germany: Suhrkamp.
Vygotskij, L. S. (2002). *Denken und Sprechen*. Weinheim, Germany: Beltz.
Vygotskij, L. S. (2005). *Psikhologija razvitija cheloveka*. Moscow, Russia: Eksmo.
Waldenfels, B. (1999). *Sinnesschwellen: Studien zur Phänomenologie des Fremden 3*. Frankfurt/M, Germany: Suhrkamp.
Wittgenstein, L. (1975). *Philosophical remarks*. Chicago: University of Chicago Press.
Yarbus, A. L. (1967). *Eye movement and vision*. New York, NY: Plenum.

Index

D

E

F

G

H

I

J

K

L

M

N

O

P

R

S

T

U

V

W