Chapter 1
Forms of Knowledge: Problems, Projects, Perspectives[*]

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Types and Forms of Knowledge

Knowledge is a basic word not only in connection with the current discussions of the *knowledge society*. Different forms of knowledge play an important role in people's lives. This is the case with everyday habits, customs, competencies, and practices as well as in science, technology, and institutions of the modern civilized world. Therefore, the different forms of knowledge and in particular their interactions at the interface of human cognition, communication, and cooperation (hereafter, the CCC triangulation) deserve increased attention and should be analyzed and reflected on thoroughly.

The point in this article is not to give an airtight definition of knowledge, as is still the case, for instance, in the endeavor to define knowledge as "justified true belief" (as Plato, 1990c, 201c–201d, did in his *Theaitetos*). Such a definition meets with criticism, as can be made clear by the following two easily construable examples: (a) cases that are not concerned with knowledge but in which the definition given complies with the requirements for knowledge, or (b) cases that deal with knowledge but where the definition does not cover the case. Gettier's (2000) objection to the conception of knowledge as justified true belief is famous. It contains cogent examples of why that definition is incomplete and why it does not represent any sufficient condition for knowledge (see Gettier, 2000).

It is important to see that it is not vital to come up with a subtle revision of the definition mentioned. As soon as the paradigmatic cases have been taken into consideration, it is a question of elucidating different forms of knowledge, which one does not need to define but which one encounters and presupposes by the very act of meaningfully talking, thinking, and acting. The human activities of communicating, thinking, and acting are always already connected with an understanding and a sense of "knowing." In this sense the word knowledge already has its meaning. Meaning does not have to be bestowed on the word by a definition.

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[*] The following text is a revised version of Abel (2004, pp. 319–348).

But this assumed and implicit meaning of knowing—and of knowledge (including its different sense-critical presuppositions)—has to be made explicit and, if necessary, examined most critically. In the case of scientific knowledge (which is strongly allied to truth and justification), this requisite leads to the claims of knowledge and the critical examination of the requirements for knowledge in the "logical space of reason" (Sellars, 1997, p. 76).

Research into the cognitive and normative roles of knowledge (including the roles of uncertainty and of not-knowing) is relevant not only in its narrow epistemological sense. It is also relevant because it deals with profiles of worlds of knowledge possibly important in the future, with human self-understanding, and with important aspects of orientation in and the future development of modern societies and human forms of life.

Upon closer examination, it is striking how many different meanings the words knowing and knowledge have, meanings that can be found in very different contexts beyond the fields of science and technology. Just think of expressions such as *to be in the know*, *to let someone know*, *to know how to help oneself*, *to the best of one's knowledge*, *you never know*, *not to know anything*, *to know which way the wind blows*, and many more. As always in thinking about knowing, distinctions have to be made. Let us start with three of them.

In view of the variety just mentioned, it is important to distinguish between a narrow and a broad sense of knowing and knowledge. The narrow notion of knowledge refers to knowledge obtained by a methodically well-regulated procedure bound to justification, truth, and verification. It is essential with such knowledge that one be able to talk about it and that it be communicable, transferable, intersubjectively verifiable, and interchangeable *salva veritate*. This notion of knowledge is particularly applicable with reference to the sciences.

The broad notion of knowing and knowledge refers to the ability to adequately grasp what something is about (e.g., what a sentence or a picture is about) on the one hand and the domain of human capacities, competencies, skills, practices, and proficiencies on the other. People are, for instance, very familiar with this domain within their everyday lives (know-how). For the purpose of orientation in the world, we constantly revert to this notion of knowledge and apply it successfully. The use of this broad notion of knowing and knowledge is normally so self-evident that its cognitive, action-stabilizing, and orienting role is not noticed at all until it fails to function smoothly. Such failure occurs when disturbances or problematic situations arise and when it therefore becomes important to reestablish a clear and failure-free situation.

In elucidating the narrow sense of knowing and knowledge, one also has to say a word about other related aspects, for instance, about beliefs, opinions, experiences, skills, verification, justification, and proof. In addition, such elucidations have to include remarks about the possibility and function of error, doubt, not-knowing, and ignorance. Knowing and knowledge are always loaded with preconditions. It is not possible to conceive of knowledge without preconditions, a point already emphasized by Aristotle. There is more to knowledge than we know. For

instance, the question of the rationality of forms, practices, and dynamics of knowledge includes more than a relation between theory and observation (which was the dominant aspect within the classical epistemology and philosophy of science), and it includes more than structural characteristics of theories (the latter understood, for instance, as deductive systems of interpretation). Without the broad notion of knowing and knowledge (including the features of un-knowing, not-knowing, not-yet-knowing, and no-longer-knowing), it is not possible to give a comprehensive and satisfying philosophy of human communication, thinking, knowing, perceiving, and acting.

Furthermore, one should distinguish different forms of knowledge. They are very familiar to us because we usually understand the differences that are related to them directly and operate successfully with them. Thus, we distinguish in particular between (a) everyday knowledge (knowing where the letterbox is), (b) theoretical knowledge (knowing that $2+2=4$ or, within classical geometry, knowing that within a triangle the sum of the angles equals $180°$), (c) action knowledge (knowing how to open a window), and (d) moral or orientational knowledge (knowing what ought to be done in a given situation).

Across these fields of knowledge (narrow/broad sense; different forms) the following important distinctions and pairs of concepts have to be taken into account: (a) explicit and implicit (tacit) knowledge, (b) verbal and nonverbal knowledge, (c) propositional knowledge (that which can be articulated in a linguistic proposition) and nonpropositional knowledge (that which is not articulable within a *that*-clause), (d) knowledge relating to matters of fact and knowledge based on skills and abilities.

Explicit knowledge is articulated and unfolded, that is, displayable—as in a scientific treatise. In contrast, tacit knowledge means those aspects of knowing that are implicit in situations of perceiving, speaking, thinking, and acting but are not made explicit, are not disclosed at surface. In some sense tacit knowledge does not even have to be made explicit for perception, speech, thoughts, and action to be successful. If one knows that a noise coming from the sky is that of an airplane, one knows a good deal of other things not necessarily explicit in that given knowledge, for instance, that it is possible for machines to leave the earth and that they can move in the air.

Verbal knowledge means knowledge that can be and is articulated by using linguistic expressions. In contrast, the representation of nonverbal knowledge (e.g., pictorial or musical knowledge) is not bound to prerequisites characteristic of verbal forms of knowledge (on pictorial knowledge, see Abel, 2004, pp. 361–369). Forms of nonverbal knowledge are not, for instance, bound to the existence of an alphabet or to a linear arrangement of signs, nor are they bound to the requirement of semantic disjunctiveness of the elements of the system of signs that characterize verbal forms of knowledge.

Propositional knowledge is to be understood as knowledge that can be expressed in a proposition, which, more precisely, can be articulated by means of a *that*-clause (as in *knowing that Picasso was a painter*). In contrast, nonpropositional knowledge

is a form of knowledge that cannot be articulated in a *that*-clause. Rather, it is elusive in a characteristic way and cannot really be grasped by words (such as knowing how to understand a bodily movement but not being able to put it into words).

When we speak of knowledge of matters of fact, we mean the form of knowledge that refers to existing objects and events within the world—to tables, cars, molecules, and birthday parties, to that which is the subject matter of a perception, observation, or statement. In contrast, knowledge in the sense of *ability* (know-how) refers to human skills, for instance *knowing how to open a bottle of wine*.

By means of the above-mentioned differences in 1, 2, and 3, a complex matrix and a scaled taxonomy of forms of knowledge can easily be developed. It is a matrix or taxonomy of interest in both a descriptive and a normative sense. Just one of many examples within the field of tacit knowledge is the distinction one can make between the verbal and nonverbal aspects and between those nonverbal aspects that can be propositions and those that cannot, such as the genuine pictorial aspects. With those distinctions one can reconstruct and clarify the correlations between these different forms of knowledge much more precisely, including the possible clashes among them.

Before bringing up some of the problems, projects, and perspectives relating to a comprehensive philosophy of knowledge, I should mention three general aspects that are important when discussing forms of knowledge.

Traditionally, theories of knowledge are understood as answers to the challenge posed by philosophical skepticism. Theories of knowledge and epistemology are—such is the hope—keen to refute the skeptic either through deductive demonstrations (which, for logical reasons, is futile) or through attempts to push the skeptic to the internal limits of reasonable doubt and thus satisfy that person's challenge (which is the much more subtle and successful strategy by far). Conversely, nothing compels the human mind to enter in such a deep sense into the problems of knowledge and epistemology as internal (not external) skepticism does.[1] This statement is true for the skepticism (a) about the outer world, (b) on other minds, and (c) of inner experience, including introspection. When I talk of forms of knowledge in the rest of this chapter, their relation to the problem of philosophical skepticism should *not* be seen at the center of the discussion. The matter is not to refute or to eliminate skepticism by appealing to epistemological certainty. It is rather a matter of critically reconstruing, clarifying, and discussing given forms of knowledge in the sense stated at the beginning of this chapter.

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[1] The question of a successful answer to internal skepticism plays a central role in Abel (1995). The answer suggested in that book lies in appealing to the sense-logical presuppositions always accepted in given pragmatic and practical attitudes as well as in the proper functioning of an effective practice of using signs and interpretation. For more details on the antiskeptical capacities of such a philosophy of signs and interpretation (and on its advantages compared to other strategies of refuting skepticism), see Koehne (2000).

The epistemic situation of human beings is not one of an extraterrestrial standpoint or of an absolute conception. It is not a "God's Eye point of view" (see Putnam, 1981, p. 49), from which it would be possible to state in a definitive and generally obligatory way what can be considered metaphysically reliable knowledge and what cannot. As finite beings who are always bound to their particular perspectives within the world, we are cut off from such a standpoint not only for contingent but also for systematic reasons. Such knowledge would not be knowledge of our spirit. Knowledge can only be human knowledge in a human dimension. It cannot be knowledge of a divine dimension.

Explicit attention should be paid to the sense in which the term *form of knowledge*, or rather *forms of knowledge* (guiding this chapter throughout), is to be understood. The suggestion in this chapter is to use form (in line with Kant, 1787/1968, and Wittgenstein, 1980) as a paraphrase for *way* or *mode*. Form*s* of knowledge is then to be understood as ways of knowing/knowledge or modes of knowing/knowledge. Thus, form is *not* to be understood as a ready-made, preexistent, atemporal, and independent system of right order—and that point is crucial. Form is not to be understood as a kind of container into which knowledge has to crystallize to even count as knowledge. Thus form is *not* to be understood as a "universal and atemporal pattern or format of all knowledge."

Nor is it to be understood as a prefabricated or a priori order conceived of as an innate part of knowledge itself, presupposed to exist long before we (as finite and hence perspectivist minds) try to cast such knowledge and *its* "innate and prefabricated form" into one of the forms available to us (e.g., into a language form, a picture form, or an action form).

In both variants of these misleading notions of forms of knowledge (the preexistent atemporal type and the innate type), knowledge is understood as being independent of the form in which it is articulated or manifested. This idea is based on the image that forms of knowledge are just tools, means, instruments, vehicles, vessels, or canals by means of which the contents of knowledge are just transported, communicated, and mediated. But presupposing a pure content of knowledge that is totally unformed is a highly problematic and ultimately inexplicable presupposition. It is at a loss from the very beginning because that which is considered to be the content—the thing to be transported, communicated, and conveyed—cannot be specified without appeal to the underlying system of signs and interpretation. The notion of an epistemological primacy, of a ready-made individuated and specified content of knowledge that is there long before there is any form of signointerpretational articulation, is an empty notion. One should abandon both this notion and the search for a completely unformed content.

But then the interesting question concerning the role and function of forms in knowledge should be asked again in a different way. The thesis is that, for humans as finite and perspectivist beings, contents of knowledge and forms of knowledge *cannot* exist independent of the forms, practices, and dynamics of the underlying representational, interpretational, and sign system. Even for an omniscient and almighty God, forms of knowledge cannot exist completely independent of his

signointerpretational practices (for, among other things, such a presupposition would undermine the cognitive almightiness of God).

Forms of knowledge can be regarded as forms (i.e., ways or modes) of articulation and presentation determined by signs and interpretation. They are always based on a history and genealogy of their semantic and pragmatic features. And further changes might take place in the future. This is the case even concerning questions of possible revisions within the field of logic.

Thus, the crucial aspect with regard to the dynamics, justification, and progress of knowledge is not the appeal to something like "The Universal (The One and Only and the Perennial) Form of All Knowledge." What counts much more is whether communication, cooperation, and reference to the world can be continued smoothly, whether actions can follow or not.

The appeal to actions that can connect to and continue communication, cooperation, and reference to the world can also be made fruitful in the realm of questions concerning the generation and the development of knowledge and science. The transition from one epistemological constellation to another—in other words, to the next relevant one—and the dynamics of knowledge included in such a transition cannot be described as though there were a prefabricated rule or set of rules, the core of which one has hit when progress has been made in knowledge and science. If such description were possible, one would just have to figure out this one definite rule or set of rules governing the production and progress of knowledge in philosophy and other sciences. Strictly speaking, it should then be possible to derive and realize the best possible development of knowledge and science from this rule or set of rules. The fact that there is no such access to the optimal development of knowledge and science has been shown by epistemological reflections in contemporary philosophy, as in the thesis of the "underdeterminacy" of scientific theories (Quine, 1969, pp. 302–304), the thesis of the "indeterminacy" of translation of languages in sciences (Quine, 1960, p. 27) and by Putnam's (1983) model theoretical arguments (see also Abel, 1999, pp. 101–120; 2002). In regard to empirical perspectives, an equivalent point is effectively demonstrated by the history of science. There are always different directions of developments possible that can be successfully connected to a given constellation or that can follow it. The development and dynamics of knowledge and of sciences do not work according to principles like The One and Only and External Rule. Rather, they work given the best and creative brains in a particular field at a given time and according to the currently accepted state of the art and its successor states.

Just as the use of forms of knowledge is to be understood in the outlined sense of a possible plurality of ways and modes of knowing/knowledge, there cannot be the one and only linear and a priori history of knowledge and sciences. At the same time, it must also be recognized that the "history of knowledge" and the "philosophy of knowledge," as well as the "history of science" and the "history of philosophy," should no longer be treated independent of each other; they have to go into alliance. In this chapter some problems, projects, and perspectives will be outlined that could be subjects for future research on questions of forms, practices, and dynamics of knowledge.

Information and Knowledge

Information has become a key notion in our times: in the sciences (especially physics, biology, and the cognitive sciences), in the world of the media, and in what is called the new information technologies. As shown elsewhere (Abel, 2004, pp. 290–302), it is also a central notion in philosophy, particularly the philosophy of mind (where the concept of information seems to be able to bridge between cognition and brain, given that information can be realized both physically and phenomenally). Against this background, modern and highly technological societies are often referred to as information societies, and the present age is described as an information age. When information moves into such a fundamental position within these different levels and the aspects mentioned above, it is tempting to grant information priority over knowledge and to grant an information society priority over a knowledge society. At times, the latter is equated with the former. Information is then considered to be knowledge.

If this equation were justified, an information theory of knowledge would be required. One would then expect knowledge to be defined in terms of information. But what has been said elsewhere (see Abel, 2004, pp. 302–304) about the limits of an information theory of the "meaning" of words, sentences, and the human "mind" can also be said about knowledge. In order to focus on the aspects relevant to information, one has to know what one is looking for and what one wants to do with it. Information is always only information in the light of certain knowledge and of a presupposed (syntactic and/or semantic) system of signs and interpretation — not the other way around. From the sense-critical point of view, it is not possible, strictly speaking, to explain what it means to be able to speak of information independent of any form of knowledge, entirely nonepistemically—completely independent, that is, free of signs and free of interpretation. Forms of information are not yet forms of knowledge, and information spaces are not yet knowledge spaces. This point has to be accented despite the fact that in the picture outlined above (which is predominant within the current information- and media-technology society) information is seen to be prior to knowledge, that the possession of information is the possession of knowledge, that forms of information are actual forms of knowledge, and that people initially and primarily live in information worlds.

The following three research desiderata result from this diagnosis: (a) One needs a precise conceptual clarification of the relation between information and knowledge and between information society and knowledge society. Given that both information and knowledge move within signs and interpretations, knowledge now appears as a fourth element beside the clarification of the relations between information, signs, and interpretation (see Abel, 2004, pp. 302–304). (b) The logic and particularly the consequences of the topsy-turvy world outlined above must be analyzed. Although a priority of knowledge over information should be assumed if their relationship is considered systematically, a priority of information over knowledge seems to be prevalent if today's public social opinion is taken as basic. A superabundance of information can perfectly lead to a reduction in knowledge. (c) The specifically

normative and the specifically human character of knowledge, which is proper to human beings and which humans strive for by nature according to Aristotle (trans. 1995, vol. 5, book 1, first sentence), must be stressed and spelled out. Because of the dominance of information worlds over knowledge worlds, this excellent virtue threatens to fall by the wayside. In this sense media-mediated information worlds often manifest themselves (particularly in the media) as worlds of opinions and beliefs. So it is also important to spell out the differences between opinions, beliefs, and knowledge, which is also to spell out the prerequisites of knowledge.

Opinion, Belief, Knowledge

Knowledge, as underlined in the first section of this chapter, is a matter loaded with preconditions. This characteristic can be seen in the interrelations between opinions, beliefs, and knowledge. The classical position in this matter is that of Plato, as can be found in his *Theaitetos*: knowledge (*epistéme*) is true belief (*dóxa*) joined with explanation (*lógos*). Within the field of today's epistemic logic, this view is rephrased with the help of the following three elements: A person *S* knows that *p* is the case if, and only if, (a) *S* believes that *p* is the case, (b) *p* is true, and (c) *S* has the justified belief that *p* is the case.

It is true that the connection between knowledge and belief is relevant within the platonic model of knowledge. But the more important point in Plato is that belief and opinion (*pístis*) are to be regarded as mere prephilosophical stages of a truly philosophical and, at best, perfect knowledge (see Plato, 1990a, 454d; Plato, 1990b, 509d–510a, 407b–e). Such a claim, however, does not yet take into account the factual correlation between opinions, beliefs, and knowledge, which plays an important role in theory as well as in actions.

A fundamental breakthrough is found first in the work of Kant (1787/1968). He distinguishes between opinion, belief, and knowledge (the three "modes of holding-for-true" (*Critique of pure reason*, B850)) in relation to the degree of their obligation: (a) Our opinions are not even subjectively obligatory. (b) Our beliefs are a way of holding-for-true, whose obligation is already subjectively sufficient (if one believes in something, one is prepared to accept the consequences). (c) Knowledge is the mode of the holding-for-true, which both subjectively and objectively obligatory.

The crucial point is that the three modes are pyramidal in the sense that they are arranged like a cone that is open at its bottom end (see Abel, 2004, pp. 161–169). The arrangement can be read top-down as well as bottom-up. Top-down means that in order to know something, one must always already have a lot of beliefs and must assume even more opinions. When a person *S* "knows that *p* is the case," then the person also "believes" "that *p* is the case." One cannot conceive that *S* "*knows* that she has a toothache" but does not "*believe* that she has a toothache." Bottom-up means that from the vast realm of opinions one can reach the narrower field of

subjectively binding beliefs and from there can arrive at the small terrain of the methodically justified, subjectively, and objectively obligatory binding knowledge.

If one can conceive of (a) knowledge as the third mode of holding-for-true and more precisely as "adequately justified true belief" in the sense mentioned above, and if (b) knowledge is, as emphasized, bound to its articulation and to communicability, and if (c) believing can be construed as a variant of interpreting, then knowledge can be understood as "adequately justified true interpretation based on and determined by a system of signs and interpretation." If the modes of holding-for-true are understood as modes of using and understanding signs and interpretations, then knowledge can be conceived as a specific mode of signointerpretational relations (see Abel, 1995, pp. 317–426; 1999, pp. 304–310).

Knowledge in the narrow sense of the word as well as its epistemic objects are not decreed from an extraterrestrial or God-like point of view. Instead, they are built bottom-up from having opinions to having beliefs and from there up to having knowledge. In this sense one can speak of a genealogy of knowledge growing out of life worlds, a process with an increasing degree of distinctiveness and conceptual normativity. This genealogy is still mirrored even within the epistemic logic, that is, within the logical analysis of the notion of knowledge. In epistemic logic believing is not understood as a momentary mental state or act but as a disposition to act, and knowing (like knowledge) is understood as true belief. We are living in opinion-made worlds, in belief-made worlds and—to a much smaller extent—in knowledge-made worlds.

From this assumption the two following research desiderata result: (a) The reciprocal correlations between opinions, beliefs, knowledge, and, correspondingly, between opinion societies, belief societies, and knowledge societies have to be investigated for their conceptual, notional, and empirical components. (b) Coherent concepts of the objectivity and rationality of knowledge and sciences are required in the light of the above-outlined conditional relations between opinions, beliefs, and knowledge.

Essentialism, Relativism, and Science

In epistemological respects it is crucial with regard to knowledge to escape from the stranglehold of the dichotomy between the claim of absoluteness (essentialism, God's point of view) and the claim of relativism. The strategic task is to get a foothold beyond that dichotomy (as in Abel, 1995). The forms of scientific knowledge, and more precisely the strictness of scientific methods and the validity of their results, are based on the fact that the sciences are tied to the regulative presuppositions of intersubjective communicability, of formal consistency, justification, repeatability, verification, empirical validity, objectivity, and truth.

These presuppositions mean that systems of rules function differently at different levels. First-level and object-oriented rules (e.g., the law of energy conservation

in physics) have a role and function different from meta-theoretical and second-level rules (e.g., the quest for simplicity or the regulations for what counts when as a scientific argument), which pertain to methods for revising and, in rare cases, even discarding the first-level rules. And as soon as it becomes relevant to ask what the validity of these meta-rules is based on and how they, in turn, are justified, background worldviews of the sciences and regularities they include come into the picture. The background and the network of those presuppositions and stipulations are characteristically of a public nature (given that they are presuppositions and regularities shared with other speakers and listeners and, in the case of the sciences, with the other members of the scientific community). For that reason, these aspects have been spelled out in more detail elsewhere, within the context of the relations between "Science and the Public" (see Abel, 2004, pp. 391–395; on the relation between rules and meta-rules, see Poser, 2001, pp. 199–207).

The Character of Knowledge with Regard to Worldview, Models, and Symbols

The realm of projects and perspectives that should be subjects of future research (oriented to forms, practices, and the dynamics of knowledge) also includes questions about the role and function of worldviews, models, and language within the sciences. Only a few aspects are hinted at in the following passages (for more details, see Abel, 2004, pp. 117–149 and 370–387).

On the one side, sciences always presuppose a worldview in the way they operate and the way they set up of theories. For example, classical modern physics as shaped by Newton emanates from the background assumption that a physical process is a certain behavior of heavy masses within a coordinate system of absolute time and space. On the other side, this particular scientific worldview shows that sciences not only depend on worldviews but can generate a new worldview (see Mittelstrass, 1989, p. 232). Scientific theory-building and the scientific worldview can be subject to changes and revisions. Thus, to extend the example above, the notion that space and time are absolute coordinates, as thought within the classical physical tradition, is opposed by the view that they can no longer be understood as absolute coordinates and that the space-time is to be seen as a function of the distribution of energy and matter within the universe. Obviously, a fundamental and extremely consequential revision of the underlying worldview is manifested in this contrasting idea.

As to the processes of generating and revising knowledge, it is important to investigate the interaction between, for instance, a scientific theory and its corresponding scientific worldview not only in a narrative and historical but primarily in a systematic way. With regard to the modern scientific establishment of theories, one must focus on the interactions and interpenetrations happening in a revolving-door kind of way between scientific theories, new technologies (e.g., particle accelerators within modern physics or new observation instruments within today's astrophysics, such as the Hubble space telescope), and changing scientific worldviews.

The power of a scientific worldview is also manifested by the profiles of models within science and the way in which they are set up (for additional details on the power of worldviews and pictorial worlds, see Abel, 2004, pp. 117–149). Modeling knowledge plays a key role in articulating, presenting, and storing knowledge. Hence, questions arise concerning the way forms of knowledge are incorporated and articulated by means of models. In this sense models can be understood as knowledge constructions, and, more specifically, as signointerpretational constructions. In other words the term *model* is to be understood in its broad sense as a reconstruction of central characteristics of an object, process, or system. With respect to the triangulation of human cognition, communication, and cooperation (the CCC triangulation) as outlined in the beginning of this chapter, one of the important tasks for future philosophical research lies in elaborating a comprehensive and integrated model theory. Because all setting up of knowledge and of theories is formulated *in* or *by means of* symbols and interpretations, questions of models and of modeling models always presuppose a theory of symbols and interpretation. Hence, it is necessary to broaden the project of an integrated philosophy of models by including a general theory of signs and a general theory of interpretation, both presupposed in modeling knowledge. Finally, a comprehensive model theory would have to be construed as a signointerpretational theory of models. This project is a philosophical desideratum. In this sense, knowledge worlds based on modeling can be viewed as signointerpretational worlds.

Propositional and scientific knowledge is tied to its articulation and presentation within a language. The languages of knowledge and the languages of the sciences are (as stressed above) not just vehicles or containers of pure contents of knowledge. What may count as knowledge at all always depends on the forms and properties of the system of signs and interpretation in use—articulating, formulating, and presenting knowledge. For example, a mathematical formalism describes and articulates the states of a physical system by means of mathematical symbols and parameters, that is, by vectors. Making distinctions beyond this epistemic situation and additionally between the signointerpretational functions on the one side and the states "in themselves" independent of signs and interpretation on the other leads to well-known epistemological problems. At the same time, one begins to recognize the deep sense in which the signointerpretationally determined languages of knowledge are internally intertwined with what counts as the real objects, states, and processes denoted.

The Dynamics of Knowledge

Human knowledge (and correspondingly the realm of not-knowing) and, more specifically, the contents of knowledge change are bound to context, time, and situation. Furthermore, those contents can be expanded, modified, revised, transformed, represented in different ways, arranged in new ones, evaluated differently, characterized by continuities and by discontinuities or ruptures, may depend on

the operating scopes of technical instruments, can be forgotten, can completely vanish, but can also be recovered. In short, processes and contents of knowledge are substantially of dynamic nature. Two aspects in particular should be elaborated in more detail: (a) the dynamics of knowledge have (among other things) to be displayed as the dynamics of signointerpretational systems, and (b) the dynamics of knowledge have to be understood and construed in correlation with the other two modes of holding-for-true, that is, in connection with the dynamics of beliefs and of opinions.

With regard to the forms of knowledge, one of the results of my analysis was that the forms of knowledge, that is, the ways and modes of knowledge, are not secondarily and contingently, but primarily and necessarily, dependent on the logical and representational properties of the signointerpretational systems in use and the underlying practices. Knowledge is determined by its signointerpretational character as well as by its time and process character (with its time and process character being possible to rephrase and conceptualize out of the former). Therefore, the question concerning the dynamics of knowing can be treated as a question of the dynamics of the underlying signointerpretational systems.

Within the realm of the narrow sense of knowledge—that is, within, say, the theoretical knowledge and, for instance, the structures of theories—that approach to the dynamics of knowing particularly concerns the sign and symbol relations within the formation of hypotheses and the inductive, deductive, and abductive forms of conclusion. As Peirce (1976, 1977) noted, the latter can be displayed through diagrammatic and pictoriological representation of procedures and notations.

Within the broad sense of knowledge (e.g., tacit and nonpropositional knowledge), this approach especially concerns the relation between an occurring sign (which has become problematic with regard to its semantic and pragmatic features) and continuously comprehensible signs that follow. Given the fact that the relation between a sign and an easily comprehensible subsequent sign is neither logically nor causally deterministic, one is concerned here, too, with the important aspect of creativity in the use of signs, that is, with the new and creative use of signs and interpretations. Thus, one can make a connection between the dynamics of knowledge and creativity (see Abel, 2006). Up to now this connection has been a mysterious, but obviously a constitutive, element for the dynamics of knowledge.

The previously mentioned correlation between opinions, beliefs, and knowledge (see the third section of this chapter) has one important, not yet adequately examined, consequence for the dynamics of knowledge. It is that the dynamics of knowledge are always tied to and involved with their underlying dynamics of believing and with the even broader field of the dynamics of opinions.

Those correlations and dependencies enclose aspects that can be seen top-down as well as bottom-up. Viewed bottom-up, these aspects entail the possibility that changes within the field of epistemic belief (i.e., within the dynamics of believing)

may lead to changes in the field of knowledge (i.e., the dynamics of knowledge). Consider the following thought experiment—may heaven or any other powers prevent it from becoming real!—that the modern scientific worldview goes out of style. Further suppose that there are no historians of science left and no testimonials reporting what had happened in the past. Lastly, suppose that an animistic or even a demonic worldview has gradually become accepted anew. It is easy to imagine that completely different scientific contents would then be accepted as contents that count as knowledge. If, as the saying goes, mountains can be moved by faith, then belief can certainly change knowledge.

Seen top-down, these suppositions mean that the dynamics of knowledge may have an influence at the level of the contents of beliefs and can lead to changes there. Revolutionary discoveries in science (such as the heliocentric worldview, evolutionary theory, the theory of relativity, the big-bang theory, today's theory of the human brain, and the genome theory) are obviously examples of the effects in that direction. When fundamental results of scientific research are widely accepted, patterns of beliefs change bit by bit, and eventually patterns of opinions do also. One no longer believes, for instance, that the earth is the center of the whole universe, or that humans have nothing to do with animals in terms of evolution (i.e., that the human genome is totally different from that of animals). Knowledge not only changes the world but can also change beliefs and the realm of opinions.

Of course, the results of empirical verification or falsification of theories, hypotheses, assertions, and models (especially within the empirical sciences) are an important part of the dynamics of knowledge and science. The dynamics of sciences that depend on those factors have been the subject of detailed investigations within recent theory of science (as in discussions about the positions of Karl R. Popper and Thomas S. Kuhn in Lakatos and Musgrave (1970), Laudan (1977), as well as Wolfgang Stegmüller (1979), who calls attention to the dynamics of models (see also Poser, 2001, part B)). If the empirical evidence exceeds a critical limit of previously accepted basic scientific principles, then these principles will have to undergo a revision. This sort of revision has to take place in a way that allows individual occurrences to be reintegrated within the horizon of the changed forms of knowledge and theories. This revision also leads to the fact that hitherto problematic or disparate cases now reasonably fit into the revised patterns of organization. In this sense the dynamics of knowledge are also an interactive balancing and a dynamic reciprocal adjustment of common basic principles and empirical facts. This view can perfectly well be understood in the sense of what Goodman (1983) developed within the field of logic and of what Rawls (1971) called the "reflective equilibrium" (p. 20).[2]

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[2] Under the heading "equilibrium of understanding" in the philosophy of signs and interpretation, the principle has been applied to the processes of the successful understanding and using of signs. See Abel, 1999, p. 95.

Of course, the aspects concerning the epistemological situation of the sciences (see the fourth section of this chapter) are significantly involved in the dynamics of knowledge and science, particularly in the sense that one cannot assume a stable, rigid, or even fixed relation between (a) first-level object-related methodological fixations (e.g., the axiomatic fixation of the energy conservation law in physics), (b) second-level fixations (by means of which changes of first-level rules can be undertaken and justified, such as the demand of simplicity within the organization of matters-of-fact or the consistency of theories), and (c) third-level regulations (understood as the worldview which governs its time and culture and to which one appeals when justifying the second-level rules as the "ultimate" foundation of the scientist's activities. Those different ways of suppositions and fixations are not bedded on top of or underneath each other in a strict metatheoretical stratigraphic sequence. Instead, they are connected with each other in a revolving kind of way and are like loop-forming processes leading back into one's own beginnings. Those sorts of loop processes are also responsible for the dynamics within the relations between the model character and sign character of knowledge.

It is almost needless to say that the dynamics of knowledge proceed in correlation with time, situation, and context. This relationship is threefold. (a) With regard to form and content, identities and stabilities of knowledge contents tend to cut across time, situations, and contexts. (b) With regard to changes in form and content, ruptures, discontinuities, modifications, revisions, and revolutions are possible and to be noted. (c) Forms and contents of knowledge can or cannot be successfully applied at different times and in different contexts and situations. The clarification of those interrelations has to be seen as a research desideratum, too. Insofar as the point of relevance is the interface of cognition, communication, and cooperation (action)—the CCC triangulation—there is a need to clarify the internal relations between the cognitive, communicative, and cooperative (action-related) dynamics within the different levels of the signointerpretational processes. This clarification then has to be inscribed within the macroperspective of a self-reflection of knowledge and the sciences.

Propositional and Nonpropositional Knowledge

Under the heading "forms of knowledge," the difference and relationship between propositional knowledge (that which can be expressed in a linguistic proposition) and nonpropositional knowledge (that which cannot be articulated in a *that*-clause) are of particular significance. An example of nonpropositional, particularly nonlinguistic, knowledge is visual or pictorial knowledge, that which is incorporated, presented, and expressed in visual experiences and pictures. This form of knowledge is very familiar in human visual experiences, the pictorial presentations and representations that people encounter in daily life, the sciences, the arts, and technology.

Admittedly, it does not seem easy to describe and explain this self-evident familiarity in detail with pictorial elements and structures. Figuratively, one may

apply to visual and pictorial experience the point that St. Augustine so aptly made in his well-known answer to the question "But what really is time itself?" As long as nobody explicitly asks what time is—or, similarly, what visual experiences and pictures are—people know very well what they are. But if asked to spell out this self-evident knowledge, one no longer appears to know the answers that used to be a matter of course. In what follows in this section, only a brief remark is made about this point.[3]

Propositional and nonpropositional forms of knowledge are both equally fundamental within the processes of human communication, cognition, and cooperation/action, that is, within the CCC triangulation activities. The classic form of propositional knowledge (both explicit and tacit/implicit) is *knowing that p is the case*, in which *p* is an abbreviation for a whole proposition, as in *knowing that Paris is the capital of France*. In contrast, nonpropositional and nonlinguistic knowledge cannot be formulated in predicative terms. This form of knowledge can exist within a subjective or phenomenal state of experience, such as knowing what it feels like to be sad, without the knower yet being able to manage the predicative and terminological use of "sad." The particularity of this form of knowledge is reflected also in the fact that the contrary cannot be the case: From the mere acquaintance with the meaning of the word "sad" it does not follow that one knows what it feels like to be sad.

Forms of nonpropositional knowledge also become manifest in a person's practical skills, pictures, shapes, sounds, gestures, or mental images. This fact is proved by psychological studies on color perception that show how human sensory ability to discriminate and recognize shades of color is far more fine-grained than the human linguistic ability to discriminate colors by means of sentence predicates. In this case the sensoriphemonenal discrimination cannot be reduced to the linguistic and grammatical predication as used in judgments.

An important field of inquiry within future signointerpretational philosophical research will be to describe and elucidate the differences and the interaction between (a) the propositional and the nonpropositional, (b) the verbal and the non-verbal, (c) the explicit and implicit (tacit) forms of knowledge, including the multiple cross-connections of these three pairs of concepts, processes, states of affairs, and phenomena. The clarification of those relations and their internal connections obviously are of fundamental relevance not only within the realm of philosophy but also for all the sciences and arts and for everyday practices, feeling, perceiving, speaking, thinking, and acting. Ultimately, our orientation in the world, to ourselves, and to other persons depends considerably on the successful interplay and interpenetration of those components.

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[3] Abel (2004, pp. 349–369) deals with the question of whether the signointerpretational approach is capable of accounting adequately for the genuine features of pictures (as opposed to languages, for example); the nonlinguistic character of the pictorial, visual knowledge; and for the internal relation between images and cognition.

Know-How and Rationality

If a person knows how to do certain things, such as how to swim, open a bottle of wine, or hit a volley in tennis—that is, if that individual masters certain abilities, skills, and practices—a question then may be whether he or she does so by referring to or instantiating and executing a "pure form of knowledge." Does the person follow a method or a rule that proceeds in distinct steps, as is the case when following a calculus with preestablished rules? Has the person even found an algorithm (albeit very complex) and then applied it successfully? And does a person who is swimming need to be explicitly conscious of the whole extent and all the facets of what he or she "knows" of swimming (e.g., the individual rules that have to be followed when learning how to swim) in order to be able to swim? Is the person who possesses the know-how of swimming an omniscient superintelligence, someone who makes the decision to either do or leave XYZ after knowing all the relevant cognitive factors with regard to actions and decisions in the sense of maximizing the expectable utility (by using the Bayessian theory of decision)? And do only those decisions and actions that have been accomplished under these circumstances deserve to be called rational? In other words, are only those decisions and actions acknowledged as signs of rationality?

Presumably, it is accepted that the thesis that a person's actual knowledge in the sense of abilities and skills (and the nonlinguistic, nonpropositional, and nonexplicit knowledge manifest therein) *cannot* be adequately described, framed, modeled, and adequately justified by means of the figures mentioned. For example, one does just swim, open the wine bottle, or hit the volley. Were it a conditional requirement for a person to analyze actions and performances in an anticipatory way, that is, were it a condition to separate them into all possible elements and then to assemble and construct those elements in a methodical way as in a calculus in order to start his or her action and performance, that person surely would never start to accomplish acting at all.

Too much explicit knowledge can foil the orienting power of tacit/implicit knowledge and can even lead to disorientation: paralysis by analysis. In many cases, not-knowing (in the sense of not explicitly knowing) can be constitutive for starting as well as for accomplishing an action. Furthermore, satisfactory prognoses of what a person will do next or what that person will leave or do in a similar situation are possible just on the basis of an analysis whose grade of detail does not go beyond what is sufficiently clear with regard to the purpose of the action. If one wants to make explicit as much implicit knowledge as possible before performing a communication, cognition, and cooperation (hence, a CCC activity), the very opposite of successful communication, cognition, and cooperation will often arise. That phenomenon is very familiar. It is also known as the centipede syndrome. As soon as the centipede wants to explicitly show how he is capable of so elegantly coordinating his many legs and move along so smoothly, he gets entangled. To give another example, if the answer to the question of whether or not my tennis partner will hit *this* ball as a volley is made conditionally dependent on the complete analysis

of the trajectory of *this* ball at *this* time, including all the other basic conditions with regard to my partner, then neither he nor I will arrive at a conclusion in the face of the never-ending series of ever further fine-graded factors. In other words, while I am still thinking about it, my partner has already scored, or the ball has already hit the ground on his side of the court twice and he has lost the point.

The rationality of the know-how cannot—and that is the important aspect here—be described nor made explicit with regard to a calculus-like or algorithmic and logicomethodically organized sequence of steps (each of which is considered to be definitely determined) and their optimization. Further, it applies to know-how. As Wittgenstein (1980) has emphasized with regard to the actual speaking and understanding of a natural language, it cannot be understood as "operating a calculus according to definite rules" (p. 332, no. 81).[4]

Looking at this scenario from the point of view of a philosophy of signs and interpretation, one hits upon the priority of the performance of signs over the analysis, interpretation, and discursive nature of signs (thus the thesis of this chapter).[5] When our usage of signs in communication, cognition, and cooperation functions smoothly, we follow those signs and rules "blindly" (Wittgenstein, 1980, p. 386, no. 219). That is, those processes cannot be described as though we were following prefabricated criteria and external rules or even laws. We are simply grasping and using the possibilities to continue actions and carry them out smoothly. Whether we succeed or not can simply be seen by whether we are able to proceed without any problems with communication, cognition, and cooperation as well as with their triangulation—for the time being, of course.

In the case of knowing, it is not only with regard to those aspects that the question concerning the relation between knowledge and rationality becomes relevant. It is obvious that rational assumptions and requirements are important for both the broad and narrow notion of knowledge. Speaking of knowledge is internally and sense-logically tied and linked to rational assumptions. With regard to the narrow notion of knowledge, the rational assumption goes along with the characteristics of the notion itself. It is a question of knowledge understood in the sense of methodically obtained conclusions, which are tied to investigation procedures, provability, justifiability, well-grounded reasons, truth, consistency, inferential

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[4] Those aspects obviously also refer to questions of the "rationality of decisions." Unlike the classical cognitive studies and the classical economic and rational-choice theories, part of today's cognitive science research refers to "simple heuristics," not to the classical optimizing theorem (see Gigerenzer & Todd, 1999). Conditions of limited time, situation, and knowledge taken into account, "fast and frugal heuristics" can be understood as rules that facilitate rapid decisions, prognoses, and accurate strategies for action, which then can be qualified as rational. Perhaps it might be possible to pull these heuristics out of the actual processes, to model and to teach them, to practice and make them effective for the performances of life with regard to situations under conditions of risk and uncertainty.

[5] For details on this fundamental difference between the performance and the interpretation of signs within the philosophy of signs and interpretation, and on the internal relation of this question to the question of rationality in using signs and symbols, see Abel (1999, pp. 78–100).

certainty, coherence, and empirical validity. As previously underscored in this chapter, rationality assumptions are extremely relevant also with regard to the broad sense of knowledge, that is, to the realm of human capabilities, human competencies, practices, abilities, and skills—in short, to know-how. Admittedly, the important result has been made explicit enough: the rational assumptions within the broad field of knowledge are not just of the same kind and structure characteristic within the narrow field (in the sense of inferential conclusions, conjunctions, and connections that are characterized by explicit logicomethodological rules).

It is important with regard to the broad as well as to the narrow sense of knowledge that neither the rational nor the normative aspect is just of secondary importance but that it is already inherent in people's very speaking, thinking, and acting. If our communication, cognition, and cooperation can continue and proceed without problems, then we obviously have chosen the correct connecting, following, and proceeding action. If not, we find ourselves in problematic situations. We then try to reestablish a state where communication, cognition, and cooperation function failure-free again. In other words, the question of a "correct" use of signs and interpretations has become relevant. Hence, in both cases we are involved in the normativity question right from the beginning. This relation between knowledge and rationality has to be spelled out in a signointerpretational way, for the standards with regard to reestablishment of a failure-free use of signs (for the time being) and to performance of actions cannot be decreed from an external God's point of view. They can only be obtained with regard to those assumptions that we must presume to be satisfied within the failure-free functioning of the communicative, cognitive, and cooperative signointerpretational processes. This dimension of the problem of knowledge is of fundamental importance to our human self-understanding and to our orientation in the world as well as to other persons.

A Unified Theory of Knowledge and Action

Knowledge and action are broader and more fundamental notions than science and theory-building. Neither within the natural and technical sciences nor within cultural, social, media, and cognitive studies is a self-understanding of the sciences able to manage without them. Detailing a unified theory of knowledge and action means placing knowledge and action on common ground. It means neither that knowledge is reduced to action nor that action is reduced to knowledge. One must avoid the praxeological fallacy ("In the final analysis, knowing is nothing but action") as well as cognitivist fallacy ("In the final analysis, action is nothing but determined by knowing").

As mentioned at the beginning of this chapter, one must distinguish between narrow and broad knowledge. But it is also necessary to distinguish between narrow and broad action. Action in the narrow sense can be understood as a conscious, deliberate, goal-oriented, and directed doing. Action in the broad sense can be

understood as behavior and response within practical contexts and situations of life.

Considerations have to be based on the reciprocal cross-connection and interplay between knowledge and action within life worlds. Human beings orient themselves within their worlds and with other persons by means of both knowledge and action. And they do that out of and toward the practices of their lives. If life worlds can be characterized as signointerpretational worlds, then one can take the relations included therein as the common and quasi-foundational ground for a unified theory of knowledge and action. More specifically, the desire is for a theory that provides the possibility and the basis for being able to ascribe dispositions of action to a person by means of the interpretation of that person's knowledge. Conversely, the desired theory has to provide the possibility and the basis for being able to ascribe knowledge to a person by means of the analysis of his or her actions and dispositions of actions. Such a theory has been developed within the scope of the general philosophy of signs and interpretation (for its fundamental outlines and details, see Abel, 1999, pp. 299–339). At the level of the formation and elaboration of theories, the theory of knowledge (epistemology) and the theory of action can be formulated as two different, but reciprocally referring, versions within the more general philosophy of signs and interpretation.

Basically, the relation between knowledge and action is a matter of aspects cross-connected in a revolving-door or loop kind of way. Every piece of knowledge has a background in, and is based on, aspects of the practice of life and actions; and if one starts an action, one does so on those assumptions that one considers to be determined and certain, that is, on what one *knows* of the situation in question. More precisely, knowledge can (as noted in the third section of this chapter) be characterized as a mode of holding-for-true and, more specifically, as the third mode of the signointerpretional states of affairs and relations.

The internally interpretative character of knowledge is manifested in other respects as well (in addition to the signointerpretationally determined genealogy of knowledge drawn from the realm of beliefs and opinions), especially in the following five ones: (a) the ascriptions of knowledge; (b) the reports of knowledge; (c) the explanations of knowledge; (d) the methodical organization of knowledge; and (e) the fact that explicit knowledge is (in the above-mentioned sense) tied to its articulation in a symbolic, representational, and inferential system in a deep way that cannot be repealed or jumped over. Ascribing knowledge, reporting about knowledge, giving explanations of knowledge, organizing knowledge methodically, articulating and presenting knowledge—all these activities and processes depend on epistemic perspectives and are performed with reference to determinate contexts and out of points of view and of inquiry. Last but not least, they are occurrences in and by means of signs and interpretations. They can basically be characterized as signointerpretative activities and processes. Knowledge depends constitutively and conditionally (and not only optionally) on a number of signointerpretational aspects.

Given that background, it seems a matter of course to shift from the notiological analysis to the signointerpretatiological analysis of knowledge. Supplying a

notiological analysis means stating the truth conditions of sentences like *S knows that p*. This procedure does not get far and, in the twinkling of an eye, it forces one into holistic dimensions. Therefore, it is not implausible to broaden the whole investigation as in the above-mentioned sense and to analyze knowledge, including the following five aspects: (a) the three modes of holding-for-true; (b) the conception of knowledge as "adequately justified true belief" and, more precisely, as "adequately justified true interpretation determined by signs"; (c) the rules of action internally affiliated to the forms of knowledge; (d) the language-impregnated, the symbol-theoretical, and the life-world-determined contexts; and (e) the justification and argumentation with regard to claims of knowledge, a social practice that is shared with other speakers and listeners and is, hence, public in nature.

Actions can be conceived as interpretational constructions as well (as shown by Lenk, 1978). Drawing a line between mere behavioral occurrences (understood as spontaneous movements or as processes of stimulation and reaction) and actions (understood as conscious activities aimed at a purpose) can always be understood as drawing a line that is intrinsically interpretative in character. And the results of such organizational classifications can be labeled "interpretational constructions." By the way, both aspects are already in place when one spatiotemporally localizes and individuates actions and contents of action. And both are signointerpretational processes and results. The sense in which actions can be characterized as perspectival, conjectural, projecting, and constructional—in short, as interpretative—was elaborated by 20 elements of a "signointerpretational theory of action" in Abel (1999). An example is the fact that a person, in taking action, takes up and executes a point of view. Other examples are the facts that scopes of actions are circumscribed and limits are drawn; that selections, preferences, deletions, or completions are made; that newly arising situations are evaluated and put into a given or new taxonomy; and that viewpoints are taken and ascriptions made. The signointerpretational character of these processes is a matter of course for the third-person perspective of an external observer (who ascribes something to someone else) as well as for the first-person perspective of a person taking action. And it is a matter of course not only retrospectively (i.e., not only in reports on or judgments and evaluations of actions) but constituently as well. Actions are performed and executed out of and toward signointerpretationally determined horizons and practices.

Knowledge and action are situated and entrenched within the human practice of life, which is articulated in signs and interpretations. It is important to emphasize the asymmetrical aspect of the fact that a theory is situated within a practice but that the practice is not situated within the theory in the same way. But it is not enough to say that knowledge is entrenched in action. One has to go one crucial step further and see both knowledge and action entrenched within human practices of life, that is, among other things, entrenched within our practices of using and understanding signs and interpretations.

With the help of the heuristic three-level model of the signointerpretational states of affairs and relations, one can adequately take into account and spell out the

complex relations between knowledge and action suitably.[6] The distinction between three different levels of the signointerpretational states of affairs and relations can be used to elucidate the specific components, roles, and functions of knowledge and action and in particular to describe their interactions and cross-effects. With regard to these heuristic and methodical instruments, it is possible to elucidate the following four aspects: (a) the entrenchment of knowledge *within* action, (b) the reciprocal cross-relation of knowledge *and* action, (c) the dependency of action *on* horizons of knowledge, (d) the entrenchment of both action and knowledge *in* the signointerpretational practices of human life worlds. Only those four respects and their correlations permit speaking suitably of a unified theory of knowledge and action in a nonreductive way.

The relation between knowledge and action at the primary level of the actual performances of knowing and acting has to be distinguished from the relation between the theory of knowledge and the theory of action. The difference is between first-order and second-order knowledge. One can formulate the latter relation in two ways via signointerpretational relations: first, by concentrating on the theories of knowledge and action with regard to their signointerpretationally determined character (theory internally depends on its articulation and presentation by means signs and interpretations); and second, by focusing on the fact that every second-order kind of knowledge, that is, all knowledge of reflection, depends on the condition that one cannot pursue reflections in a nonsignointerpretational way. If the primary signointerpretational performances (and not the additional interpretations of signs) are seen as the basic processes, then the crucial question with regard to the form of a theory of knowledge and action is how it might be possible to represent this basic performance and process character at the level of articulated reflections and theory-building and how to make it the leading way to form theory.

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[6] For more detail, see Abel (1999, pp. 328–336). The model has been developed in Abel (1995) and applied to different fields in *Sprache, Zeichen, Interpretation* (1999) and in *Zeichen der Wirklichkeit* (2004). The model distinguishes different signointerpretational processes, states of affairs, and relations on different levels. Heuristically speaking, there are three levels: (a) the acquisition of something by means of signs and interpretation (such as through a word, a sentence, a hypothesis, or an explanation). From that level we can distinguish (b) habitually entrenched patterns in our perceiving, speaking, thinking, and acting (such as patterns of language, behavior, and customs). From both of these levels, we can distinguish (c) basically categorizing and organizing activities (such as the spatiotemporal localization of events, objects, and persons, and the profile and working of individuation principles within perception, language, and thought).

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