

Perspectives in Cultural-Historical Research 7

L. S. Vygotsky

L. S. Vygotsky's Pedological Works

Volume 1. Foundations of Pedology

*Translated with notes and lecture outlines
by David Kellogg and Nikolai Veresov*

 Springer

Perspectives in Cultural-Historical Research

Volume 7

Series Editors

Marilyn Fler, Peninsula Campus, Monash University, Frankston, Australia

Elena Kravtsova, Russian State University for the Humanities, Moscow, Russia

Nikolai Veresov, Faculty of Education, Monash University, Frankston, Australia

Founding Editor

Fernando González Rey, Department of Psychology, University Centre of Brasília,
Brasília - DF, Brazil

There is growing interest in the work of LS Vygotsky internationally, but also in finding new ways and perspectives for advancing cultural-historical theory for solving contemporary problems. Although Vygotsky has become one of the most influential scholars in education and psychology today, there is still a need for serious studies of his work because so much remains unexamined.

The books in this series draw on the collected works of Vygotsky as a primary source of authority. They go beyond secondary sources and discuss Vygotsky's original ideas in the context of a system of concepts or through the elaboration and theorisation of research findings so that contemporary problems can be addressed in new ways.

This series collectively brings together under one umbrella a more equal representation of works from scholars across both the Northern and Southern continents. In the context of a large volume of contributions to cultural-historical theorisation and the empirical work from North America, there is an urgent need for making visible the works of scholars from countries who reside in countries other than North America.

More information about this series at <http://www.springer.com/series/13559>

L. S. Vygotsky

L. S. Vygotsky's Pedological Works

Volume 1. Foundations of Pedology

Translated with notes and lecture outlines by
David Kellogg and Nikolai Veresov

 Springer

L. S. Vygotsky (Deceased)
Moscow, Russia

Translated by
David Kellogg
Sangmyung University
Seoul, Korea (Republic of)

Nikolai Veresov
Faculty of Education
Monash University
Frankston, VIC, Australia

ISSN 2520-1530 ISSN 2520-1549 (electronic)
Perspectives in Cultural-Historical Research
ISBN 978-981-15-0527-0 ISBN 978-981-15-0528-7 (eBook)
<https://doi.org/10.1007/978-981-15-0528-7>

© Springer Nature Singapore Pte Ltd. 2019, corrected publication 2020

This work is subject to copyright. All rights are reserved by the Publisher, whether the whole or part of the material is concerned, specifically the rights of translation, reprinting, reuse of illustrations, recitation, broadcasting, reproduction on microfilms or in any other physical way, and transmission or information storage and retrieval, electronic adaptation, computer software, or by similar or dissimilar methodology now known or hereafter developed.

The use of general descriptive names, registered names, trademarks, service marks, etc. in this publication does not imply, even in the absence of a specific statement, that such names are exempt from the relevant protective laws and regulations and therefore free for general use.

The publisher, the authors and the editors are safe to assume that the advice and information in this book are believed to be true and accurate at the date of publication. Neither the publisher nor the authors or the editors give a warranty, expressed or implied, with respect to the material contained herein or for any errors or omissions that may have been made. The publisher remains neutral with regard to jurisdictional claims in published maps and institutional affiliations.

This Springer imprint is published by the registered company Springer Nature Singapore Pte Ltd. The registered company address is: 152 Beach Road, #21-01/04 Gateway East, Singapore 189721, Singapore

The original version of the book was revised: Copyright page text has been updated with author name. The correction to the book is available at https://doi.org/10.1007/978-981-15-0528-7_8

Setting the Stage

From a cultural-historical point of view, a man's death is the moment when both his inner and his oral speech must be replaced with what Russians call his "written speech". The slim volume of written speech you now hold in your hand contains seven lectures given by the Soviet teacher and researcher L. S. Vygotsky in the very last year and a half of his life. These lectures constitute the material for *Foundations of Pedology*, a course taught to in-service and preservice teachers at the Herzen Pedagogical Institute in Leningrad from 1932 until Vygotsky's death on 11 June 1934. Shortly thereafter the lectures were made available to the students as mimeos by the dean, S.Z. Kazenbogen, who was then arrested as a "Trotskyite" and subsequently shot. The students who took the course were, for the most part, sent home without any certification, but the mimeos of what must have been very memorable lectures were preserved by one of these students, S.A. Korotaev, and published after his death by his daughter G.S. Korotaeva (see her introduction to Выготский 2001).

Today, eighty-five years after the course concluded, the science of pedology to which Vygotsky devoted this course and the bulk of his professional interest in the last months of his life is virtually unknown. It is also unknown virtually: if you Google the word, you will likely not come up with anything that Vygotsky and his co-thinkers intended by the term, namely a "science of a natural whole" that takes the individual, and hence non-divisible, child as an irreducible unit of human development. Instead, the search is liable to inform you that "pedology" refers to a branch of soil science. It is fortunate, then, that this course is a foundational one; it provides the soil in which we can replant, the grounds on which we can rebuild—or at least an outdoor stage upon which we can re-enact—the lost science of pedology, should we so choose. The goal of setting the stage here is to make the case that we should.

Let us set this stage in three different ways. In the first place, let us argue for the value of pedology in its own right and on its own terms. Vygotsky himself provides an excellent delimitation of the object of study in the very first lecture, and we will not steal his thunder, spoil your suspense, or attempt to second-guess the master's own determination of his subject matter. Instead, we will try to define what Vygotsky meant by "a science of a natural whole" and to situate sciences of natural wholes like pedology in relation to more familiar sciences like physics, chemistry,

biology, psychology, child development, and education. So, in the second place, let us argue for the value of pedology as a way of better understanding other branches of knowledge, both those branches explicitly treated in this course (viz., genetics, sociology, psychology, and physiology) and those today most often associated with Vygotsky (thought and language, cultural-historical psychology, activity theory, child development, and the practice of education). Last but not least, let us argue for the historical and biographical value of pedology in understanding Vygotsky as a thinker, teacher, and researcher in a now rather distant tradition of instruction where, for better or worse, the knowledge to be conveyed was not always separated from the personalities that conveyed it. While eschewing any morbid fascination with the fate of those who embodied this knowledge and while abjuring all of the hagiographic cult of personality Vygotsky himself so despised, let us acknowledge that it is in these lectures that we find, at one and the same time, the most comprehensive and developed form of Vygotsky's thinking on the child (Schneuwly and Léopoldoff-Martin 2012) and the most foundational, fundamental, and even popular form in which Vygotsky himself expounded it to his own beginner-level students (Мещеряков 2008).

Pedology in Its Own Right and on Its Own Terms

Vygotsky's argument for studying the child as a natural whole is not merely a moral one, like the judgement of Solomon. Nor is it simply a pedagogical strategy, like discovery learning. Pedology has its own rationale for independent existence and its own constellations of concepts for charting a course amongst the sciences.

Writing in his notebooks sometime in early 1927, Vygotsky remarks that in introducing that rationale to students, teachers have to begin with a leap of faith: "You must believe me that there is something vital, something psychological, etc. Soon we will see what it is". Because we don't yet have a definition of life (that is, "something vital"), we must begin our study of biology before we can really define what it studies; the subject matter of psychology cannot really be determined before there is a science of psychology. In general, the subject matter of any science is a certain area or "sphere" of reality, but it is that sphere of reality represented in concepts, and the concepts are only defined and fully determined by the science itself. "Psychology is the science of mental life. But what is mental life?" Vygotsky asks. "The answer is psychology as a whole" (see Zavershneva and Van der Veer 2018: 109). The way out of this apparent tautology is itself long and somewhat circuitous: it is to understand science as a special kind of activity and a specific form of human behavior. But as Vygotsky is fond of reminding us, behavior can only really be understood as the history of behavior (1997b: 43). For Vygotsky as for Marx, there was "one single science, the science of history" (Marx and Engels 1969: 17f) which although it could be approached from the side of the environment (nature) or from the side of consciousness (humans), was essentially one and the

same, as humans are themselves merely that part of nature that has become conscious of itself.

When, in 1929, Vygotsky begins the very longest work to be published in his lifetime, a *Pedology of the Adolescent* (Вьготский 1929), he divides the sciences not into “human” and “natural” sciences, as Comte has required us to do, but rather into sciences of a natural whole such as ecology, geography, geology, and astronomy, in which the object of study is to be found whole in nature, and more analytical sciences such as mathematics, physics, chemistry, biology, and political economy, in which the object of study is itself the product of conceptual analysis (number, particle, element, cell, commodity). Jean-Paul Bronckart (2018 and forthcoming) points out that unlike Comte’s division of the sciences into “soft” social sciences on the one hand and hard physical sciences on the other, Vygotsky’s division of the sciences into sciences of a natural whole and sciences which take the abstract products of human analysis as objects of study is highly porous. All sciences of a natural whole, in order to develop, reach out to embrace concepts which lie in far-flung but neighbouring spheres of reality. There are sound genetic—that is, historical and developmental—reasons for this inter-compatibility. Viewed historically, all sciences originated in sciences of natural wholes. So in turning to their own offspring for help, these parent sciences do not give up their original aims and goals. When pedology turns to psychology or paediatrics to understand mental or physiological development, its aims are not reducible to psychology or its goals to those of paediatric medicine, any more than the aims of physical chemistry are reducible to those of physics or the goals of physics, when it employs the methods of mathematics, can be reduced to mathematical goals.

In these lectures, Vygotsky creates a range of original, pedology-specific concepts, including:

- Central/peripheral neoformations and central/peripheral lines of development
- Social situations of development
- Zones of proximal development (pedologically, the “next zone of development”)
- *Perezhivanie* (the unit of analysis for the development of consciousness Vygotsky proposes in these lectures).

With the exception of the last term, *perezhivanie*, these will not be explicitly defined by Vygotsky until the second volume of this series. Not only did Vygotsky delay offering definitions, he often resisted naming the concepts until the content was clear. So, for example, the term “neoformation” merely means a new form and tells us nothing at all about the content of development; a “social situation of development” simply states the obvious fact that the child’s situation is not bricks and mortar, walls or windows: it is a relationship with people in his or her surroundings. Similarly, the meaning of the zone of proximal development cannot be derived, as has too often been done in educational research, from the constituent parts: “zone” does not refer to a level but rather to the relationship between two different pedologically defined levels; “proximity” must be measured in developmental years rather than in calendar or “passport” years, and “development” is

never reducible to learning to do some task without some outside help. With these terms, it is only the position of the concept within Vygotsky's developing system which will ultimately—in Volume 2—lend them definite content and allow Vygotsky to offer us a meaningful definition.

In contrast to these terms which are left undefined in this first volume, *perezhivanie* plays a central role in Lecture Four on the environment, and it presents an immediate problem for the translator. It is both an everyday concept and a scientific one—that is, it has an everyday meaning familiar to every Russian, which is equivalent to undergoing an experience of some kind, but it is, in Vygotsky's pedagogical work, invested with much more precise and abstract content: a *perezhivanie* is a unit of analysis for the whole of human consciousness. For Vygotsky, it has the same relationship to the developing mind as an individual cell has to the growing body. At the same time, *perezhivat'* is a verb, meaning to have that experience. In these lectures, we have adopted the rather quirky solution of translating *perezhivat'* as “to experience” or “to undergo an experience” when Vygotsky uses it as a verb, particularly when he uses it in the everyday sense. When Vygotsky uses *perezhivanie* as a scientific concept, that is, as a unit of analysis, we have chosen not to translate it at all, but merely to transliterate it as *perezhivanie*.

One final concept would by itself entirely justify reformatting pedagogy as a methodological tool: the method of analysis into holistic units, which Vygotsky insists upon repeatedly in the lectures and which he himself employs from their beginning to their very end. Prior to elaborating this method, Vygotsky had offered a “functional method of dual stimulation”, also called the experimental-genetic method. This was a kind of retrospective application of the same well-known technique he used for diagnosing the proximal or next zone of development: the child was given one stimulus in the form of a task beyond his or her independent problem-solving capacity and a second one in the form of a means with the potential for its solution. This could, Vygotsky reasoned, serve not only to objectivize still maturing functions, but also to de-automatize and thus externalize functions which had already matured. This method had constituted Vygotsky's central method for studying the development of separate higher mental functions in their transition from inter-psychological plane to intra-psychological plane (Vygotsky 1997b: 106). In the pedagogical works, Vygotsky found that this method was not applicable to study the qualitative reorganisation of inter-functional relations and the metamorphoses of entire psychological systems. As these systems were understood as complex and dynamic unities of psychological functions, and greater than the sum of their constituent parts, a new method of analysis was developed, the method of analysis by units. Friedrich has argued that this new method was intended to be specific to pedagogy (2018 and forthcoming), but it certainly did allow Vygotsky to discover *perezhivanie* as a unit of consciousness (Vygotsky 1998: 294) and word meaning as the unit of analysis of developing unity of thinking and speech (Vygotsky 1987).

When Léopoldoff-Martin and Schneuwly compared the extant manuscripts of the *Foundations of Pedagogy*—the 1934 Moscow version, the 1935 Leningrad version, and the 1996/2001 version from Korotava on which the present volume is

mainly based—they discovered that the first two, published or prepared for publication during Vygotsky’s lifetime, do not actually have titles for the lectures, which are merely numbered one through seven (2015: 85). The lectures are, however, ordered in a way that suggests a particular development—each chapter is in some way differentiated from the previous one, thus:

1. The subject matter of pedology (to be addressed by the pedological method and approach)
2. The characteristics of the method in pedology (which emerge from the subject matter and the pedological approach)
3. The study of heredity and the environment in pedology (linked to and differentiated from each other by comparative and by pedological methods)
4. The problem of the environment in pedology (to be interacted with, influenced and mastered by the child in the course of psychological development)
5. The general laws of psychological development in the child (which emerge from the interaction of the hereditary endowment and the environment)
6. The general laws of physiological development: the endocrine system (which underlie the changes in psychological development)
7. The general laws of physiological development (the nervous system, which underlies the emergence of higher psychological functions and returns us once more to the ultimate source of development in the child’s social situation).

To understand exactly how Vygotsky differentiates each chapter from the previous one is to understand how higher functions of the mind and the elementary functions of the brain are both linked and distinct. And to understand this much is, in turn, to understand why pedology can belong neither to the human sciences nor to the natural ones. Nor can it serve as an interdisciplinary bridge between them or spring from their interaction. When we understand pedology on its own epistemological grounds, we see that the value of pedology is precisely that it rejects the division between human and natural sciences in the first place and addresses, instead, the moment when the latter becomes the former, and the former emerges from the latter. This brings us to our next argument for the value of these lectures.

The Value of Pedology for Neighbouring Sciences

From its foundation in America and Western Europe, and certainly during its rebirth in the USSR, pedology aspired to be much more than an applied science, a technology, or some field for applying theories developed by other sciences. This did not mean cutting itself off from other sciences: quite the contrary, as Vygotsky says, the pedologist has no other means than those of psychology for measuring the mental development of the child (1929: 35). But the pedologist’s different goals suggest rather different comparisons than those which occur to the psychologist or the educator: in his third lecture, on the role of hereditary and the environment in

pedology, Vygotsky argues that pedological comparisons favour diachronic over synchronic ones, regular over exceptional features of development, and highly modifiable over relatively stable traits. At the same time, the very different understandings that these different goals entail imply that pedology is not without theoretical insights for neighbouring sciences.

Take, for example, linguistics. Already in 1911, Ferdinand de Saussure had complained that linguistics, unlike other sciences, was not given an object of study in advance which it could then study from various points of view; instead, because language could be studied from the point of view of phonetics, grammar, semantics and even philology, it was many points of view, some situated in the natural and some in the social sciences, which alone defined the object of study (1916/1972: 8). Vygotsky understands that this problem is not at all unique to linguistics—the child too is just such a complex whole that may be observed from multiple vantage points. Yet we find, again and again in these lectures, Vygotsky leaving the sphere of reality proper to pedology in order to demonstrate how an object of study can and must include mental life, social action, and physical activity taken together as unique and unitary moments of development. When Vygotsky does this, it is often to the field of language, speech, and word meaning that he turns first.

Let us do likewise. Just before he died, the linguist Michael Halliday remarked that the greatest intellectual adventure of his life had been a year of unemployment that allowed him to observe speech development in his son while his wife, the late linguist Ruqaiya Hasan, paid the bills. With his first language, their son Nigel was creating categories that would become both categories of everyday experience and scientific concepts. One of the ways Nigel did this was to distinguish between “things that don’t grow” (e.g. rocks, sand, dirt) and “things that grow” (e.g. plants, animals, and little boys). Within things that grow, Nigel then distinguished between “things that grow but do not go” (i.e. plants) and “things that grow and go” (i.e. animals and little boys). Within things that grow and go, Nigel then distinguished between “things that grow and go but don’t talk” (i.e. animals) and “things that grow and go and do talk”, including little boys and girls (2004: 260).

It’s essentially by persevering with this kind of child analysis, in which undifferentiated categories are differentiated into lower and “higher-and-lower” categories, that Vygotsky arrives at a key insight in another neighbouring field, namely general psychology. Pavlov, Bekhterev, Watson, and Thorndike have already divided the mechanisms of behaviour into unconditional and conditional reactions. Vygotsky notes that from a historical perspective, this is merely innate behaviour and non-innate behaviour that nevertheless acts through that innate behaviour: hearing the bell may not be given to the dog by nature, but the dog’s salivation is innate. When we think of this distinction in terms of psychological functions—that is, the potential for mental action—we see that some biologically given functions like natural perception, animal memory, and practical thinking are simple, basic and primary, but other “higher” functions must act through them. Music acts through hearing on our auditory instincts, painting acts through seeing on our spatial senses, and cooking through motor skills on taste and hunger. Viewed sociogenetically, these “higher” functions are cultural-historical rather than biological in their origins,

and they bear the indelible stamp of that sociogenesis even where they act through the endowments of phylogenesis. So the toddler learning to speak is differentiating sociogenetically given grammar and vocabulary from phylogenetically given intonation and stress. Viewed ontogenetically, the whole process of teaching and learning may be defined as the struggle to bring about these “higher”, because historically derived, forms; the teen learning a sexual identity, for example, is struggling to bring about a historically derived form of emotion from a biologically given feeling.

After Darwin, there was a strong tendency to think of this process of development from the phylogenetic side, in biologizing terms. Germans like Haeckel and Americans like Hall saw humanity not as linked human types but as higher and lower races. Darwin himself, however, knew that there was no biological basis for this: since any healthy human male can marry any healthy female and have perfectly healthy children, the distinctions appeared to the author of *The Descent of Man* to be more sociogenetic than biological. Vygotsky, in Lecture Three on heredity, extends this argument to the higher psychological functions: any healthy child in the appropriate social situation of development can acquire any human culture and any human speech. So once again, humans appear, in the light of pedology, as types which can differ but in the final analysis must be taken, with their history, as more linked than distinct.

From this perspective, human development is not a process of adding on new accomplishments like beads on a string; development is a complex process of functional differentiations followed by structural reorganizations. Vygotsky’s first lecture summarizes this development as four “regularities” or “laws”—for they are both natural regularities and cultural-historical laws. With a little stretching and some lexical compression of the third law, we might remember them by the acronym ADAM: Achronological, Disproportionate, Alternating-evolutionary-and-involutionary Metamorphoses.

- (A) The law of achronological change. Development, whether viewed as the development of physiological structures, as the development of interpersonal and social relations, or as the development of separate psychological functions, does not coincide with chronological time. It is, compared with time, uneven and cyclical; the pace of change is always more like a sinusoidal wave (or, more dialectically, like a spiral) than like a simple linear function.
- (D) The law of disproportionate functioning. Since there are different waves of development, there are, as a direct consequence, radical imbalances and disproportions in functioning and in the structures that exercise functions.
- (A) The law of alternating evolutionary and involutionary epochs. From the point of view of a single function or even structure underlying the function, there are periods of evolution, where the function is undergoing maximal development, and periods of involution and decay. From the point of view of the system of functions as a whole, the imbalances and disproportions may take the form of reverse dependencies, with the rise of one function or structure inexorably linked to the decline of another function or structure.

- (M) The law of qualitative metamorphoses. These reverse dependencies in turn result in metamorphoses, with qualitative and not simply quantitative transformations of the entire system of functions and structures.

These laws, as well as the methods for recognizing them as regularities within the subject matter, apply to the child as a whole but also to the separate aspects of development treated in neighbouring sciences and in subsequent lectures. To take the law of achronological development as an example, psychological functions such as affective perception and memory each in turn enter maximal periods of development and then move to the background. On the physiological plane, we find, on the one hand, the rise and fall of particular glands in the endocrine system, where dominance is first exercised by the thymus, then by the pituitary and the thyroid, and only later by the sex glands, and on the other, the rise and fall of particular centres in the nervous system, where dominance is first exercised by lower centres associated with perception and sensation, and only later by the higher centres we associate with reason and volition. Like the economic and social development of a country, the child's physiological and psychological development is uneven—scanty in places and concentrated in others, incremental at times and highly intensive at others.

Similarly, with the law of disproportional development, Vygotsky claims that the cyclical rhythm described in the law of achronological development results in disproportionality, and as a consequence, we may expect the development of relationships rather than merely the development of individual elements. This is precisely what Vygotsky finds in psychological development, described as a sequence of age periods, where each age period corresponds to a particular system of psychological functions, at first dominated by affective perception, then by memory, and then characterized by a complex process of differentiation without dominance. It is likewise what Vygotsky finds in the endocrine system, where the school age period is characterized by some researchers as a "pituitary period", because of the dominance of the endocrine system by the pituitary glands, and adolescence is the moment where this role is taken over by the gonads. As for the nervous system, the "old brain" centres located in the medulla, the midbrain, and the cerebellum dominate in turn; today, we can find correlates in the cortex itself which create increasingly complex systems as the child develops.

So too with the law of alternating involutionary and evolutionary epochs. Just as disproportionality results from the uneven nature of development, dependencies result from disproportionality. In psychological development, the child at first finds it extremely difficult to remember anything not actually or potentially present in the perceptual field. In this way, memory is initially dependent upon perception, and a change in perception is required to bring about a change in memory. But this dependency can be reversed; an older child will remember where something is and then look for it. In physiological development, the rise of the sex glands has a depressing effect on the operation of the pituitary glands, something that Vygotsky demonstrates negatively with the example of "eunuchoid growth", in which the sex glands fail to depress the pituitary, and the result is a form of gigantism. Vygotsky

also uses pathogenic data to demonstrate how higher centres arise from lower centres but then dominate them: lesions on a brain area in childhood prevent the emergence of these higher centres and the domination of lower centres, but the same lesion in an adult can be compensated for by an even higher centre that has already developed.

But what of the metamorphoses, and Vygotsky’s claim that the development of the child’s higher psychological functions was more like the development of a pupa into an insect than like the development of a mountain, a plant, or even an animal? The general principles that Vygotsky established for the development of the separate aspects of the child—psychology, physiology, and within the latter the endocrine system and the nervous system—are now shown to apply to the development itself. The development of development is uneven: the means of development goes from a system in which one function is king and then another to a far more complex system, where dominance is now unclear and differentiation depends on the exchange of functions that takes place when one system replaces another. Moreover, there are changes in relations and periods of maximal development in development itself: infancy is a period where physiological development appears to dominate, but in subsequent periods psychological development plays a dominant role. Finally, Vygotsky concludes, we need to ask whether it is growth that enables development, or rather developmental crises which enable the next relatively stable periods of growth. These crises are simply the expression of the fact that the means of development itself develops.

It is instructive to compare these four laws of “ADAM”—Achronology, Disproportion, Alternation and Metamorphosis—to the way the last three lectures are organized, shown in table form below:

General Laws of Development	5 Psychological Development	6 Endocrine Development	7 Neurological Development
Achronological, uneven, but cyclical development	The consecutive differentiation of mental functions	Uneven and consecutive development in glands	Upward transfer of functions (i.e. their uneven, consecutive development)
Disproportionality, with changes in relations and different periods of maximal development	Dominance of one mental function and creation of different systems of inter-functional relations	Involution and evolution in the endocrine system	Subordination of one brain centre to another
Alternation of involutory epochs and evolutionary epochs of development	Maximal development for one function at the expense of others	Reverse dependencies and dominances between endocrine functions	The laws of emancipation and compensation, i.e. reversible dependencies
Metamorphoses, with qualitative and not simply quantitative transformation	The qualitative difference of transitions from system to system from preschool age	The qualitative changes brought about by the endocrine system on the organism as a whole	Vygotsky’s conclusion: qualitative change enables a next phase of quantitative growth

The lectures are essentially working out of the laws in the domain of psychology, endocrinology, and neurological development. And this is not accidental or simply a pedagogical conceit. For Vygotsky, these pedological laws offer more than a kind of interdisciplinary framework for the various “real” sciences; they offer us the kind of transdisciplinary framework akin to the framework which in the nineteenth century the recognition of the sheer vastness of historical time offered geology, botany, and zoology. In Vygotsky’s terms, pedology offers us the opportunity to build a science of child development that is not merely phenotypical but genotypical, not merely descriptive but developmental. Perhaps this is why, even though pedology did become a lost science, Vygotsky’s thinking has given rise to important theoretical innovations in understanding diverse fields like linguistics (thought and speech), cultural-historical psychology (normal and pathological development), and even dialectical logic, historical materialist philosophy, anthropology and sociology. Some of these theoretical innovations, e.g. activity theory, have gone on to apply the laws and methods we have discussed to adult development. Not the least of the many benefits which the re-excavation of the foundations of pedology can offer us is the chance to see what Vygotsky the pedologist might have thought of this work. This brings us to our final argument for the value of these lectures in support of resurrecting pedology: that it may enable us, at long last, to put Vygotsky in context.

The Value of Pedology for Understanding Vygotsky as a Teacher and Thinker

Let us begin with just one, seemingly minor, problem that might be resolved by historicizing Vygotsky in this way. Because Vygotsky’s readership today is often confined to the professoriat and/or to persons involved in professions (e.g. business consultancies), there has been a strong interest in putting Vygotsky’s ideas to work with university undergraduates and free-range adults. Acquainting ourselves with these late pedological works, we can better understand the distortions at risk. More generally, we can clarify the actual position that Vygotsky held during his lifetime and we can rectify an ahistorical and anachronistic reading of the authorial works published while he lived. More specifically, we can at long last pose and answer precise questions like: what did Vygotsky’s work mean to his students—and what did Vygotsky’s own job description mean to him?

As an undergraduate, Vygotsky studied law and language, and towards the very end of his life, he attended a medical school in Kharkov. Both interests illuminate the lectures in this volume, but neither appeared as such in his *curriculum vitae* or on his pay stubs. It is equally misleading to think of him as employed in activity theory, cultural-historical psychology, or socio-cultural scholarship: no such disciplines then existed. When Vygotsky taught, attended conferences and published papers—and even when he saw patients—it was usually as a practitioner of one of

three disciplines that no longer exist today: in addition to pedology, there was “defectology” (that is, the treatment of developmental disorders of various kinds, including blindness, deafness, and “moral insanity”, i.e. juvenile delinquency) and also a discipline called “psychotechnics” that was, in some ways, the Soviet equivalent of business consultancy and human resource management. Because the USSR aspired to plan its labour market and especially because Soviet educational resources were scarce, psychotechnics was supposed to assure the maximal selection and professional training of particular “psychological types” for particular jobs.

At one conference on psychotechnics in 1930, Vygotsky was asked by a colleague if a pedology of the adult might be possible, and if so, whether this pedology would make the psychotechnical enterprise more feasible. Vygotsky replied:

I think—and, again, it seems to me that there is an objective foundation for this view—that pedology is the science of the child in development and not that of the person’s development to the end of life. I think that those who wish to extend pedology from the cradle to the grave, those who wish to put on the same plane of development that of the child and that development which adults go through, are, without realizing it, doing the same thing as the authors of antiquity who affirmed that the child is only a midget adult; that is to say, they deny the qualitative uniqueness of the processes of development of the child in comparison to the processes and changes that are produced in a relatively stable situation. I do not think that adults do not develop, but I believe that they develop according to other rules and that for this development there are other characteristic lines than those of the child; it is the qualitative uniqueness of child development that is the direct object of research for the pedologist. In my view, speaking of a pedology of the adult is not only false from the point of view of the very name ‘pedology’ but above all from the point of view of prolonging, in one and the same line of specificity, the process of child development and the process of adult transformation. (cited in Léopoldoff-Martin 2014: 289)

Having children, undergoing a midlife crisis, retirement, old age and death are all in their own way forms of development, but for Vygotsky they are not pedological developments. Did Vygotsky ever change his mind on this?

Not on the evidence of these lectures. But Vygotsky did develop his pedology in many other directions, and the development of his ideas bore all the hallmarks of the four laws that he discerns in pedological development. It was uneven in tempo: there were frenetic periods of intellectual activity punctuated by long periods of hospitalization for the tuberculosis which eventually killed him. It consisted of disparate strands of thinking, none of which were developed in an even or linear fashion: at the outset of his career, he was intensely interested in the psychology of art, and in the last years of his life he was preoccupied with neuropsychology, semiology, and the evaluation and selection of children’s toys (Zavershneva and Van der Veer 2018). Some themes of his work seem to be in a relationship of inverse proportionality: themes such as “complexive thinking” wane, while other themes such as scientific concepts wax (compare, for example, Chap. 5 of *Thinking and Speech* written in 1931 to Chap. 6 written just two or three years later). At times, entirely new configurations appear to emerge from apparently unrelated forms, like a butterfly from a cocoon: the semantic, systemic approach to consciousness that he introduces in the next book of this series is not obviously connected to any of the lectures in this one, and still less to his earlier work.

This strong sense of non-linear development has made it possible and even popular to periodize his written *oeuvre*. In contemporary Vygotskian studies, there is a traditional and widely accepted scheme of doing this: Stage One (before 1927); Stage Two (1927–1930/31), with Stage Three, the stage in which these lectures were staged, lasting from 1932 until 1934. This periodization of Vygotsky’s life and work has created a common platform for generations of contemporary researchers for advancing and improving Vygotsky’s theory. Interestingly, many are building their improvements on the second stage, the instrumental period in Vygotsky’s evolution (e.g. Cole, Engestrom, and Wertsch). In the last decade, a “revisionist” trend has emerged, claiming that in the last stage Vygotsky rejected this second period and returned to his early preoccupations with personality, fantasy, imagination and emotions (Gonzalez Rey 2011, 2017). So recently published materials (Zavershneva 2010; Zavershneva and Van der Veer 2018) are cited as evidence that Vygotsky was moving in the direction of a new theory of consciousness that rejected the whole distinction between higher and lower mental functions and instead focused on the relations between functions and on understanding consciousness as a dynamic semantic system.

In these lectures, Vygotsky obviously draws from both the second and third stages, demonstrating that these two phases represent aspects of his total thought rather than different lines of thought. This in turn brings new fuel to the debates on the questions: What actually is what we call the cultural-historical theory and methodology in terms of laws of development, in terms of main concepts and in terms of the research method? And even more, what differentiates the cultural-historical theory of development of higher mental functions from the discipline called “pedology”? What does it mean to study child development holistically from a psychological perspective and to study the child holistically from the pedological perspective? Can we then correctly understand the theoretical content of main concepts and principles of the cultural-historical theory in isolation from pedology? Given that the *Pedology of Adolescent* was published in 1929–1931 and written earlier, how it should be located into the so-called “instrumental period” without the rethinking of the whole content and contexts of this period? And, finally, do we have enough grounds to keep talking about the “instrumental period” at all?

Unlike William James, Vygotsky did not criticize his attempt to take consciousness itself as an object of study, nor did he abandon the search for a characteristic “dominant” in each stage of development, nor did he relinquish the conviction that speech development and word meaning lies at its core: all of these are present and accounted for in Vygotsky’s last works. When we look at his 1931 manuscript *History of Development of Higher Mental Functions* (1997b) we can find the formulation of the general law of development almost exactly as Vygotsky repeats it in the fourth lecture on the environment in this volume. Although the theoretical links between earlier cultural-historical theory and pedology are not always linear and simple, there are definite moments of continuity as well as discontinuity (Dafermos, 2018). When we compare a relatively early work such as “Consciousness as a Problem in the Psychology of Behavior” (1925/1997a) or “Principles of Social Education for Deaf and Dumb Children in Russia”

(1925/1994) with the lectures in this volume, we are most struck by the robustness of Vygotsky's early insights, the doggedness of his pursuits, and consequently the continuity rather than the crisis-ridden character of his thinking. Perhaps it all depends on your point of view, and this in turn depends on your point of departure. We are more likely to notice the moments of discontinuity when we start with earlier works and follow their development in historical order, and we are more likely to notice the moments of continuity when we begin with a late work like the pedological lectures and look back.

Vygotsky himself, in his 1927 essay on the crisis in psychology, liked to quote Marx: "Our own anatomy holds the key to the anatomy of the ape". Marx was actually not speaking of evolution at all, but rather of how the key to every ancient and premodern society is actually right before our eyes, in a rather distorted form, in our own laws: the key to tithes and tenancy and serfdom are right there in taxes and interest and mortgages, and the key to Greek tragedy is in Hollywood movies. But these keys are only clear in retrospect because it is only in retrospect that we can discern roads taken from those not taken. Similarly, many researchers have seen Vygotsky's thinking as one crossroads after another, simply because they commence with the "instrumental" method we find in early works like *Ape, Primitive, Child: Studies in the History of Behavior* (Luria and Vygotsky 1930/1992) and conclude years later with the very different theory of semantic and systemic structure of consciousness described in *Thinking and Speech* (Vygotsky 1934/1987). With the pedology, however, it becomes possible to reverse this: we can show that in both cases the road taken is always that which best explains the development of the child taken as a whole. So perhaps, to paraphrase poor old Marx once more, the anatomy of Vygotsky's pedological works holds the key to the anatomy of *Ape, Primitive, Child*.

Vygotsky ends his very first lecture by dividing theories of development into three, and except for his last one, the three groups of theories still sound very familiar to our ears today. The first group are naturalistic ones, which claim that development is a natural process whose potential inheres entirely in the child himself/herself. As Halliday points out, this is the central assumption of "childism", on which so much Disney literature for children and "discovery" learning methods are based (Halliday 2004: 251). The second group of theories Vygotsky discusses are mechanistic ones, which claim, contrariwise, that development is a socially driven process of adaptation to environmental conditions. As Halliday points out, there isn't any necessary connection between this view and associationist psychology, or, for that matter, between the naturalistic view and a "language acquisition device" with certain hard-wired hypotheses about language to be tested by the child (Halliday 2004: 29). We can very easily imagine an environmentalist form of teaching based on discovery learning, and this is perhaps the dominant view of Piaget's work today. We can equally imagine "childist" teaching based on stimulus-response theory or shaping, and in fact that is perhaps the dominant "scaffolding" view of Vygotsky's own zone of proximal development (for an excellent critique of this interpretation of Vygotsky, see Chaiklin 2003).

The one group of theories that does not seem to have been much cross-coupled with teaching techniques today is precisely the one that Vygotsky lays out here—the theory that development necessarily involves, on the one hand, the creation of potential that was not inherent in the child at the outset and, on the other, exaptation rather than adaptation: the use of organs, systems, and functions that were biologically given for purposes that were not biologically given at all. Speech development, Vygotsky’s favourite example, provides instances of both. On the one hand, by learning speech, the child creates a vast potential for enculturation that was not at all present in the child at birth. On the other, the learning of speech involves exapting organs, systems, and functions given at birth for biological purposes (breathing and eating) for socio-cultural purposes that were not. But studying that speech development in a child is not something we can do by putting the child against the kitchen doorway and marking height with a pencil, or even by using time-lapse digital photographs. Studying speech development, and with it studying the overall psychological and physiological development of the whole child, is something for which we need a new method. This method must be holistic but analytic, comparative but genetic, and clinical but experimental. Vygotsky’s method is holistic because it is analytic: it can break down processes like speech into units that have in a simple form the process whose development we wish to explain: words and wordings. It is also genetic because it is comparative: it can explain speech development as the history of development, through diachronic comparisons. It is also clinical because it is experimental: it is not simply symptomatic but also capable of abstraction that can isolate causes.

Each of these points is presented in these lectures as a kind of “*aporia*”, that is, a rhetorical doubt raised for the purpose of imparting not only the certainty of facts but also the means by which we arrive at facts and at certainty. Vygotsky teaches us, near the end of Lecture Four, that this kind of *aporia*, this kind of contradiction, this kind of apparently unresolvable but actually resolvable paradox is a characteristic feature of ontogenesis. It is not marks on the kitchen wall but the resolution of these paradoxes that provide the only really reliable guide to measuring the child’s developing potential. These *aporias*, these contradictions, and these paradoxes must be resolvable, because in at least some form the child will find them, in the environment, already resolved. Unlike, say, phylogenesis, or even sociogenesis, we find that when individuals develop, they do so face to face with more complete, “ideal”, forms. As usual, Vygotsky takes his favourite example from speech development—from the interaction of the child with the mother. But we can say that the same relation holds true to some extent with the interactions between the student and the teacher, and even the reader and the author.

Translators are readers too. Granted, we tend to be readers of an officious, obtrusive and overbearing kind, the sort who will read over your shoulder and offer often unsolicited commentary. As you can see from the sheer length of these prefatory remarks, we have not tried to minimize or hide this role; we have embraced it. But we have also tried to make our intrusions entirely optional, by carefully demarcating them from Vygotsky’s own text. In addition to this stage-setting section, the reader will find our interventions only in the form of a

general outline¹ at the outset of each lecture, in explanatory and biographical footnotes, and in a closing section called “leaving the stage”. We justify these additional demands on your attention with the same three arguments we have put to you here—the epistemological foundations of pedology as a science of a natural whole, the links between pedology and the sciences you are more familiar with, and the compelling presentation of an important thinker who also happened to be a remarkable teacher. To these arguments, however, that remarkable teacher might add the promise of developing them for our own time and for future use—yes, the same happy paradox that enables children, at one and the same time, to resemble their ancestors, to be faithful to their own promise, and to bequeath all their unrealized potential to a next generation.

David Kellogg
Sangmyung University, Seoul, Korea (Republic of)

Nikolai Veresov
Monash University, Frankston, Australia

References

- Bronckart, J.-P. (2018 and forthcoming). *Understanding the place of pedology amongst the once and future disciplines to better understand what pedology is*. Presentation at the 7th International Seminar on Vygotsky in Geneva, Switzerland. See forthcoming article in *Mind, Culture, and Activity* special issue.
- Chaiklin, S. (2003). The zone of proximal development in Vygotsky’s analysis of learning and instruction. In A. Kozulin, B. Gindis, V. S. Ageyev & S. M. Miller (Eds.), *Vygotsky’s educational theory in cultural context* (pp. 39–64). Cambridge: Cambridge University Press.
- Dafermos, M. (2018). *Rethinking cultural-historical theory: A dialectical perspective to Vygotsky*. Singapore: Springer.
- Friedrich, J. (2018 and forthcoming). *Emergence and perezhivanie—the double face of the concept of development*. Presentation at the 7th International Seminar on Vygotsky in Geneva, Switzerland. See forthcoming article in *Mind, Culture, and Activity* special issue.
- González Rey, F. (2011). A re-examination of defining moments in Vygotsky’s work and their implications for his continuing legacy. *Mind, Culture, and Activity*, 18, 257–275.
- González Rey, F. (2017). Advances in subjectivity from a cultural-historical perspective: Unfoldings and consequences for cultural studies today. In M. Fleer, F. González Rey & N. Veresov (Eds.), *Perezhivanie, emotions and subjectivity: Advancing Vygotsky’s legacy* (pp. 173–195). New York: Springer.
- Halliday, M. A. K. (2004). *The language of early childhood*. London: Continuum.
- Léopoldoff-Martin, I. (2014). *La science du développement de l’enfant: La conception singulière de Vygotskij*. Genève: Université de Genève. These No. 561.
- Léopoldoff-Martin, I., & Schnewly, B. (2015). Histoire du développement des fonctions psychiques supérieures et Fondements de la pédologie: Deux points de vue sur un même développement. In J.-Y. Rochex, C. Joigneaux, & J. Netter (Eds.), *Histoire, culture,*

¹Outlines can be located in the book’s webpage (<https://doi.org/10.1007/978-981-15-0527-0>).

- développement: Questions théoriques, recherches empiriques. Actes du 6e séminaire international Vygotski*, (pp. 81–96). Paris: CNAM.
- Luria, A. R. & Vygotsky, L. S. (1930/1992). *Ape, primitive man, and child: Essays in the history of behaviour* (Evelyn Rossiter, Trans.). New York and London: Harvester Wheatsheaf.
- Marx, K. and Engels, F. (1969). *Selected works. Vol. 1*. Progress: Moscow.
- Saussure, F. (1916/1972). *Course in general linguistics*. Peru, IL: Open Court.
- Schneuwly, B., & Léopoldoff-Martin, I. (2012). Le travail pédologique de Vygotski: Une réponse au diagnostic de la crise en psychologie? (pp. 51–78). In Y. Clot (Ed.), *Vygotski maintenant*, Paris: La Dispute.
- Vygotskij, L. S. (2018). *La science du développement de l'enfant: Text pédologiques (1930–1934)*. Traduits par I. Léopoldoff-Martin. Collection Exploration: Peter Lang.
- Vygotsky, L. S. (1987). *The collected works of L.S. Vygotsky* (Vol. 1). New York: Plenum Press.
- Vygotsky, L. S. (1925/1994). Principles of social education for deaf and dumb children in Russia. In R. Van der Veer & J. Valsiner, (Eds.), *The Vygotsky reader*. Oxford and Cambridge USA: Blackwell.
- Vygotsky, L. S. (1997a). *The collected works of L. S. Vygotsky* (Vol. 3). New York: Plenum Press.
- Vygotsky, L. S. (1997b). *The collected works of L. S. Vygotsky* (Vol. 4). New York: Plenum Press.
- Vygotsky, L. S. (1998). *The collected works of L. S. Vygotsky* (Vol. 5). New York: Plenum Press.
- Zavershneva, E. (2010). The Vygotsky family archive: New findings. Notebooks, notes, and scientific journals of L.S. Vygotsky (1912–1934). *Journal of Russian and East European Psychology*, 48(1), 34–60. doi:[10.2753/RPO1061-0405480102](https://doi.org/10.2753/RPO1061-0405480102).
- Zavershneva, E., & Van der Veer, R. (2018). *Vygotsky's notebooks: A selection*. Singapore: Springer.
- Выготский, Л. С. (1929). *Педология подростка. Задание 1–8*. Москва: Издание бюро заочного обучения при педфаке 2 МГУ.
- Выготский, Л. С. (1934). *Основы педологии*. Москва: Издательство второго московского медицинского института.
- Выготский, Л. С. (1935a). *Основы педологии*. Ленинград: Государственный педагогический институт имени Герцена.
- Выготский, Л. С. (2001). *Лекции по педологии*. Ижевск: Издательский дом “Удмуртский Университет”.
- Мещеряков, Б. Г. (2008). Взгляды Л.С. Выготского на науку о детском развитии. *Культурно-историческая психология* (3). С. 103–112.

Contents

1 The Subject Matter of Pedology	1
Outline of Lecture 1	1
Lecture 1	3
References	20
2 The Characteristics of the Method of Pedology	21
Outline of Lecture 2	21
Lecture 2	23
References	42
3 The Study of Heredity and the Environment in Pedology	45
Outline of Lecture 3	45
Lecture 3	48
References	63
4 The Problem of the Environment in Pedology	65
Outline of Lecture 4	65
Lecture 4	68
References	84
5 The General Laws of Child Psychological Development	85
Outline of Lecture 5	85
Lecture 5	88
References	103
6 The General Laws of Physical Development in the Child:	
The Endocrine System	105
Outline of Lecture 6	105
Lecture 6	107
References	124

7 The General Laws of Physical Development in the Child:
The Nervous System 125
Outline of Lecture 7 125
Lecture 7 128
References 142

Correction to: L. S. Vygotsky’s Pedological Works C1

Leaving the Stage 143

Index 157

Chapter 1

The Subject Matter of Pedology



Outline of Lecture 1

In this lecture, Vygotsky covers three general topic areas of his subject matter: definitions, laws and theories. Taking the word “pedology” literally, Vygotsky defines it as knowledge of the child, but he qualifies this as the knowledge of the child in development. His “laws” of development are rather loose-fitting descriptions that might apply to any form of development (development is “ADAM”: Asynchronic, Disproportionate, Alternating and Metamorphic). But in his conclusion, Vygotsky shows how taken together, his definition and his “laws” of development must lead us to reject the vast majority of extant theories on child development and construct an entirely new one.

Definitions. As we remarked in our prefatory “Setting the Scene”, the content of a concept cannot be conveyed merely by naming or paraphrasing it. In his notebooks, Vygotsky argues that all definitions are ultimately tautological because they replace words with other words: it is through practice that definitions show what they can do for us and what they cannot (2018: 108). So after Vygotsky declares that the subject matter, or object of study, in pedology is child development, he asks us what development is. He proposes to answer this question in practice by outlining a number of laws (regularities, or patterns) that will make this clear.

Laws. Vygotsky then lays out four fundamental regularities, or laws, of development. Vygotsky considers these laws to be comparable both to laws of nature and to laws of human history: humans are in the final analysis part of nature. Although modern natural science depends very much on discoveries made firmly within human history (and often within living memory), these laws are objective and not simply attendant upon our discovery of them. Vygotsky was not a post-modernist or even what we call a social constructivist today: he was, as Bakhurst has argued, a philosophical realist (2011). In contrast, theories do depend upon our knowledge, our understanding and our experience, and they are indeed socially constructed: for that very reason, they must be tested against the laws. It is also for that reason that they can

give concrete, operational content to our definitions (which are likewise dependent on and constructed by our knowledge, understanding and experience).

Vygotsky's first fundamental law is that development may be temporally differentiated into moments (e.g. a beginning, a middle and an end). These moments are not dependent parts; each one is a functional and structural whole in itself. But these moments are also linked in a complex nonlinear way that does not correspond to clock or calendar time or to the "passport age" of the child. Vygotsky then raises two questions having to do with the method of study:

1. How can a pedologist determine whether development is in advance of the norm or not? Obviously, if we define the child's developmental age according to the child's ability to perform this or that task, the whole procedure will become circular: the child's developmental age will be "diagnosed" by the ability to do tasks only because the developmental age is defined by nothing other than the tasks themselves. This is something we often see in educational research: the ZPD becomes little more than the belief that the child will learn to do alone whatever he or she is able to do with assistance (something that is both trivial and manifestly untrue of many important interactional skills such as conversation). Vygotsky is aware of this problem: he argues that statistical material will allow pedologists to use the "passport age" of the child to establish normative standards for speech acquisition just as they allow doctors to establish normative standards for the child's weight and body temperature. Advancement and retardation are then determined in relation to this norm.
2. Since development doesn't take place in a linear fashion, how does it take place? Vygotsky answers that it takes place in a way that is both progressive and cyclical; the pace of development rises and falls like a sinusoidal wave or a zig-zag rather than a simple rising line or curve. This is why, according to Vygotsky, developmental periods have very different lengths—so, for example, the age of infancy is less than a quarter the length of the preschool age.

The second fundamental law of development is concerned with changing proportions and with changes in the relations between various aspects of development. Proportions and relations are never constant, neither for physical nor for psychological development. On the contrary, at any given time, one aspect (higher or lower, physical or mental) is developing more quickly than others. Vygotsky concludes that some aspects of development are prerequisites for others. This suggests a certain logical progression to development, and Vygotsky suggests that understanding these regularities or patterns of development might be of great practical importance in teaching.

The third fundamental law of development is that of interweaving of progressive evolution and retrogressive involution, that is, an inverse proportionality, where, for example, one function (e.g. crawling or babble) wanes while another function (e.g. walking or speech) waxes. Without involution, traits that characterized earlier stages persist as infantilism.

The fourth fundamental law of development is concerned with qualitative transformation, or metamorphosis: development is a complex process unfolding unevenly

through time which includes both falling and rising and which culminates in qualitative and not merely quantitative transformations. Revisiting Rousseau, Vygotsky reminds us that just as the child is not a small adult, the schoolboy is not a miniature adolescent, nor the preschooler simply a short schoolboy.

Theories. Having defined the topic and formulated four basic laws, Vygotsky moves on to theoretical generalizations, something he will do throughout this course. He lays out three groups of theories: the theory of preformism, the theory of external determination and a group of theories that we may call “emergent” in two different senses: methodologically, they are theories which emerge from the negation of the previous two theories, and in their content, they are also theories which posit the emergence of new formations that inhere neither in the organism nor in the organism’s environment. Vygotsky argues that only this third group of theories holds out any promise for the science of pedology. In particular, only this third group of theories suggests a workable approach and a working method for a science of the whole child.

Lecture 1

Today, we must, together, begin our course in pedology. This course is a propaedeutic course, and it must acquaint us with the basic concepts of this discipline and with the methodology of child research, just as any propaedeutic course in clinical science begins with a review of the basic concepts included in the given discipline and explores the methodology of clinical research. Subsequent to this course, a course on age pedology must follow, and this should familiarize you in a systematic way with the basic periods of child development.¹

Today, our first introductory lecture must be devoted to the clarification of two questions: the subject matter and the method of our science, i.e. what pedology studies and how it studies this. These are the two foundational questions with which we must acquaint ourselves today at the beginning of our course.

First of all, let me begin with the first question, what pedology studies, and when we are familiar with the subject matter of pedology and with its features, we will, naturally, be able to answer the second question: how the study of this subject should be done and the specificity of the methods of pedology compared with the methods of other sciences.

¹Vygotsky is referring to the follow-up course to “Foundations of Pedology” which was apparently called “The Problem of Age” and is included, in a partial form, in the Korotaeva volume (see “Setting the Scene”). As we pointed out in “Setting the Scene”, the original lecture did not have any title when it was published in Vygotsky’s lifetime, but titles were added by Korotaeva in 1996 and changed in 2001. In her title of this lecture, предмет *predmet* can mean various things in Russian (just as “subject” means different things in English). It can mean “subject” (i.e. a school subject, a scientific discipline), “subject matter” and even “object” (i.e. the object of study, the object of a science). We have chosen “subject matter”, because Vygotsky does not use предмет in the first paragraph in discussing the discipline but he does use it in later paragraphs, discussing what the discipline studies.

Translated literally into the Russian language, pedology means “the science of the child”. But, as is often the case, the literal translation of a given science does not yet adequately express precisely what it is that is studied by the science of a subject matter. We could study the illnesses, the pathologies of the age of childhood, and this also, in a certain sense, would be a science of the child. We could study the enculturation² of the child in pedagogy, and this too, in a certain sense, would be a science of the child. We could study the psychology of the child, and this as well, to a certain extent, could be a science of the child. So it is necessary to establish, from the very beginning, what precisely in the child constitutes the object of pedological study. And so we ought to state, more precisely, that pedology is the science of child development. **The development of the child is the direct and immediate subject matter of our science.**

But such a definition shall always remain still very incomplete, for it must now give rise to such questions as: Very well, we have a science of pedology and it is about child development, but what is this child development? Without an explanation of this, we will never quite thoroughly understand what the subject matter of pedology consists of. So let me, in defining the subject matter of pedology, highlight some of the main features and some of the foundational, most general, laws of child development. If we learn these laws, we can generalize them and say what child development is. Then we will be able to proceed to the question of how it ought to be studied—to the method of pedology.

The first and fundamental law that characterizes childhood development is that, unlike a number of other processes, child development has a very complex temporal organization. Like all processes, child development is a historical process, i.e. it takes place over time; it has a beginning, it has certain temporal stages in its development, and it has an end. But development is not organized in time in such a way that, if we may put it this way, the rhythm of development coincides with the rhythm of time; it is not organized in such a way that each chronological time segment the child traverses will unfold some set segment of its development. Say that a year has passed—the child has advanced so much, next year, so much and so on. That is, **the rhythm of development**, the sequence of steps that takes place in child development, the sequence of which is necessary to ensure that the child passed each stage does not match with the rhythm of time, **does not coincide with time chronologically calculated**. This can be clarified with the aid of two examples.

First, from the astronomical, chronological point of view, a month is always equal to any other month, and a year is always equal to any other year. But from the point of view of development, the value of each month, the value of each year is measured by **what place this month takes in the developmental cycle**. For example, you know

²Vygotsky uses the term *воспитание* *vospitanie*, which can be translated as “upbringing”, “child-raising” or (at school age) “education”. No precise English equivalent exists; here we have chosen “enculturation”. It is accurate enough but more Latinate and less familiar in English than it would be in Russian. It is an everyday Russian word.

that it is likely that during the very first few months of life, the child will develop very quickly, very intensively, and that in particular, the weight and size will increase rapidly. Here the length of each month will be a very important step in terms of height and increase in body weight. In a few months, the child will double the initial weight. But then, if you take, say, school age, you will see that not only will the child for several years fail to double the weight with which he entered the age period but the weight increase will be insignificant in magnitude, merely a few percentage points, while the magnitude of the age increase over that same period of time can be put at one hundred percent.³

Now just imagine to yourselves that concerning some child or other you are told that he lags behind in growth by 3 months to 6 months. Is that a lot or a little? If this is in the first year of life, it is very much, but if it is in the 13th year of life—it's nothing serious and it hardly matters at all. Every month may be astronomically equal to every other month, but this in development loses all meaning. A month's value depends on the cycle of development in which the month is to be found and upon the place that it must occupy. If you are told that a two-year-old child has fallen behind by a year in their mental development, this is a great deal, and this is a child who is very different from other two-year-olds. But if you are told that a fifteen-year-old adolescent has the mind of a fourteen-year-old, i.e. he lags behind by that same one year, the extent of retardation will turn out, obviously, quite insignificant.

Once again: the value of a time segment from the developmental point of view is not simply determined by the length of this time segment—1 year or 5 years, or months—it is also determined by the position of this time span in the cycle of child development. This is due to the fact that **the tempo of development and the content of development are changing with different years in the life and development of the child.**

The second example will clarify this for you a bit more. With this example, you will encounter from the very outset the methodology of pedological research in children. Imagine to yourselves that we take children born on the same day and at the same time. That means that these children are the same cohort—peers. Now just imagine that we research these children after 3 years' time. The question is whether all the children who were born the same day and the same hour and lived in more or less similar conditions—will all of them be at a given level of development? By their passport age, they are the same, to the day and to the hour, but if you observe their development it turns out that these children, born the same day and the same hour, will never develop uniformly, in lockstep, like, say, clocks which we wound up and let go at exactly the same time, coinciding minute by minute with each other. If we observe some of the children, and even more if we examine many more, it turns out that some are in advance of their peers in their development and some are behind, while others are somewhere in between. That means that if we take children born on

³Today, normal weight gain during the school years is around two or three kilograms a year, which is about ten percent of the child's school entry weight. Contrary to what Vygotsky says here, a normal child with an adequate diet will indeed double her or his weight in elementary school (from around twenty kilos to forty or fifty kilos). Perhaps Vygotsky's assertion that a school age child who doubles in age experiences only a miniscule weight gain should be seen in the context of widespread malnutrition in the USSR in the 1930s.

one and the same day and at the same hour, then, as they develop, it turns out that although according to the astronomical scale they are at one and the same period, and they have the same number of years, months and days on their passports, they are, in fact, at different levels of development.⁴

Let us take the simplest example. Children in learning speech, as you know, begin to talk more or less tolerably at around two years of age. We take several children who were born on the same day and the same hour, and we see what happens in two years' time. One signifier of how well children speak at two years of age is the appearance of the first phrases.⁵ Instead of speaking in individual words, the child now for the first time links them in some way into a phrase. So, it turns out that in one of our cohort of peers, a linked-up phrase will first appear at 1 year and 8 months, but in another at two years, and in the third, at 2 years and 2 months. You can see that the same level of development of speech is reached by one child a little earlier, by another it is reached at the time when he was supposed to reach it, and by the third a little later. It becomes necessary to determine, not the passport age of the child, but **his pedological age, i.e. the level of development which is actually reached.** For

⁴Soviet citizens carried internal passports after age 16. These passports would, of course, include information like the time and place of birth. Passports did not allow travel abroad, but they did allow them to live, work and enjoy the social services of a particular city and also kept population movements to a minimum. *Kolkhozniki* (collective farm agricultural workers) did not have passports until 1974; to move to another place, they required permission from the local Soviet authorities.

Vygotsky uses six different terms to refer to two different concepts of age. On the one hand, he uses "passport age", "astronomical age" and "chronological age" to refer to the child's age in days, months and years, recorded in the child's passport, measured in revolutions of the earth around the sun, or timed by revolutions of the hands of a clock. On the other, he uses "pedological age", "speech age" and even "real age". These terms refer to what the child can actually do, or rather, the relationship between what the child can actually mean, say, and do and what other children of his or her age can actually mean, say and do.

Age	Unit	Type	Organization
Passport age, astronomical age, chronological age	Abstract, equal units, e.g. years, months, days: aliquot and fungible	Absolute, i.e. progression from an origin	Simple, incremental, linear
Pedological age, speech age, real age	Concrete, unequal units, e.g. deviation of the moment of emergence of first utterances from the age average: non-aliquot and non-fungible	Relative, i.e. deviation from a mass average	Complex, developmental, uneven

⁵Vygotsky uses the word "предложениям" *predlozheniye* which means a "sentence" or a "phrase". Since a "sentence" in English is often defined orthographically (e.g. something that begins with a

example, can we say on the basis of the passport that all these children are two-year-olds? Yes, on their passports, the age is 2 years. But their pedological age—their speech age—is two years and four months for one, for the other, two years, and for the third one year and ten months. What does this speech age signify? It signifies the real level of development reached by these children. We can say of the third child that he, although two years old on his passport, is only one year and ten months according to his level of speech development. About the second, I may say that passport and pedological age coincide. Of the first, I can say that his pedological age is 4 months ahead of his passport age. Consequently, whenever we take a large group of children, it turns out that some of them are ahead in development compared with the ages on their passport, while another part of the children are lagging behind compared with their passport ages. Some capability for the determination of the pedological age of the child, i.e. the level of development which a child is at, is one of the main devices with which pedology operates. It operates with a child's pedological age, and its discrepancy with the passport age of the child, the degree of divergence ahead of it or behind it.

Here arise two questions that need to be looked into. You might ask me, first of all, how do I know that in two years the child should utter a first phrase?—from what source do I know this? I proceeded from the assumption that every child should say a first phrase at 2 years. So I said that this one was ahead, with a passport age of one year and eight months and a speech [age—T] of two years. How can I make this comparison? To which the answer, which you will learn more about in the seminar,⁶ is: pedology utilizes what are known as standards and standard values to determine differences between the passport age and the pedological age. This standard value is a constant, taken as a measure in order to judge, by the deviation from this value, the degree of divergence between the expected course of development and the actual course of development as it occurs. Say, the standard value of our body temperature is 37°—a deviation to one side or another of this standard value [reflects—GSK] a degree of raised or lowered temperature.⁷

How then are these **pedological standards** obtained? They are obtained by means of a statistical **study of children en masse**. We study, for example, a large number of children, say, one hundred children with a healthy family history, without a history of severe diseases, developing normally and under the same conditions, such as in

capital letter and ends with a period), we are translating it as a “phrase”, and assuming that what is meant is something that is semantically a command, offer, statement or question, but which is not necessarily grammatically any of them yet.

⁶In the Soviet university system, courses like this one would consist of lectures by professors followed by seminars led by junior lecturers or by teaching assistants. Lectures were mostly monologues, but seminars were quite often interactive, and students could make short presentations as well. Vygotsky seems to have brought in some of his patients for the students to examine during seminars.

⁷In this paragraph, the word “age” was inserted by the translators. All such insertions will be placed in square brackets and marked “—T” for “Translators”. The word “reflects” in this paragraph was inserted by Galina Serpionovna Korotaeva, who compiled the stenogrammes and first published them (Вьготский 2001). All insertions by her will be placed in square brackets and marked “—GSK”.

Moscow's nurseries, where there is more or less the same food and other conditions for their development, and we establish that on the average, these children show the hallmarks of their first phrases at two years. There exists an average statistical value, which the mass of material will show us, i.e. when the average child of this mass will manifest a symptom. And with this mass value, I may compare each individual child and say, if the average of the mass of children shows this symptom at two years, and if my child shows this symptom at one year and eight months, then obviously he is developing faster than the average of the mass of children is developing.

Consequently, pedology takes as its basis such standards, such constant values, in the characterization of development and the comparison of the passport age of the child with his real age and the establishment of deviations in one direction or the other.

What this means is that we have, in two examples, seen that development does not take place in time in such a way that the rhythm and tempo of development coincides with an astronomical, chronological rhythm of time passing. We have seen that for growth and for weight five months in the first years of life—this is not the same thing as five months for a twelve-year-old. We have seen that on the passport children may be the same age but they may reach the same level in real age at different ages. And this convinces us that, in both the one example and the other, **development**, although it unfolds over time, **is not merely organized as a temporal process, but instead organized in a complex way**; its rhythm does not coincide with the rhythm of time.

It may be asked, how then does development proceed over time? The answer to this, thus far, may only be made in a very general way: development proceeds cyclically or rhythmically; i.e. development takes place in such a way that if we wanted to plot its line on a blackboard, it would appear not as a straight line which slowly and gradually rises along the vertical axis so that each given year accounts for an equal portion of development. This would be a misconception of development. And if we wish to trace the development of any aspect of the child, for example, the increase of weight, the increments in height, or in speech, it always turns out to be a wave form, which rises then falls and then moves upwards again, i.e. it is as if the development were occurring in cycles. **The tempo of this development does not remain constant.** Periods of intense resurgence in development are followed by periods of deceleration and decay; development presents a series of different cycles, a series of different epochs, a series of different periods within which the pace of development and the content of development turn out to differ. It is clear that if a given change in the child's development is a decline during a period in which I should expect a steep rise in development, this change has one meaning, and, if it takes place when I should expect a gentle fall rather than a rise, it has a different meaning. Say, for example, you are told that in the past year a child did not put on weight or only added a little weight. If in this year there is a failure in real development **at this moment**, then this is very bad; it must make you consider why he has not gained weight when other children are gaining abruptly. But if you are told that at another moment he did not gain weight, then this is no great matter, for he is going through a period when weight gain is feeble. The value of each individual change and of

each event in development is determined by the developmental cycle with which it is linked.

Such cycles of development and such waves of development are observed both with respect to separate aspects of development, such as height, weight, speech, mental development, memory and attention and with respect to development as a whole. If we wanted to give a picture of the child's development as a whole, we would also make use of a wave form. **Such separate cycles of development, taken as a whole, are known as ages. An age is nothing but a given cycle of development, which appears as if set off by itself, separated from other cycles, which has its own specific pace and its own specific content of development.** And if you took the basic ages of childhood, then you would also see that they do not coincide with each other in duration. For example, the first age—that of the newborn—lasts about a month in total, and yet it is a whole age.

The subsequent age—infancy—lasts about nine or ten months; it is about two years for the next and the next—preschool—lasts for almost four years. So, you see that one age lasts four years, and another nine months. This means that age cycles do not coincide in time, that they are not distributed in time just so, at certain intervals; the path of development also has some specific segments. **So, this is the first law, or the first specificity of child development, that it is a process that proceeds through time, but which proceeds cyclically.**

We now introduce a second claim which is linked to this, and which will allow us to clarify more profoundly the features of child development. **This second feature is usually given the name of disproportionality**, or unevenness, in child development. A child is a very complex entity. All aspects of the child develop, **but the second basic law of child development states that given aspects of the child develop in a non-uniform and non-proportionate manner.** For example, it never happens that all parts of the child's body grow homogeneously. Instead, we have, let us say, some increased growth in this age for the legs and torso with the head growing relatively less. Never does it happen that all of the organs, such as the muscular system, the nervous system and the digestive system, grow uniformly. Always, in each period, it happens that one system grows powerfully while others grow in relatively smaller amounts. Say if you take the age of infancy—we know that in this period there is fast, very intensive development of the nervous and digestive systems but relatively slow development of the muscular system. In this way, the separate system and the various organs also do not grow in proportion to each other. Some separate aspects of child development—let's say the child's physical growth or mental development—are linked, but we do not observe direct uniform proportional relationship between the development of, say, body height and the development of the mind. We do not have here a direct uniform motion. And the mental life of the child never happens in such a way that for a given period of development, let us say, his perception, his memory, his attention and his thinking develop quite evenly and equitably. At all times, there is one aspect of mental life which is developing rapidly and another developing more slowly.

This means that development never occurs uniformly and proportionally in relation to the child's organism or to the whole child personality. This leads us to two corollaries of the highest degree of importance which we may call laws.

The first of these consists in the fact that since development does not take place uniformly and proportionately, **each new stage of development not only occurs with a growth in body parts or in functions but also changes the relations of the parts of the body.** When, for example, in this period the child grows unevenly in his head, legs, and torso, this leads to the fact that **the proportions of the body are changed.** After, say, three years, his legs grow more than his head. What will happen? The whole structure of his body will be quite different. Formerly, he was short-legged and big-headed, but now he is leggy and relatively small-headed.

Since the functions and certain aspects of the organism grow unevenly, then at each individual stage what takes place is not only a greater or lesser growth of individual aspects, but a restructuring and regroupment of the relationship between individual aspects of the organism, **i.e. the structure of the organism and the structure of the personality themselves change at each new age level.** This is the first claim.

The second claim consists in this: that there are still some basic regularities, which show that in each age certain facets of the organic life of the child and his or her personality are advanced, as it were, to the centre of development; their growth is especially robust and especially rapid. Before and after that, their growth is significantly slower; they are, as we say, shunted to the periphery of development. **So, each facet of the child's development has its optimal period of development, i.e. the period when it develops optimally.**

Let us say that the child's walking develops most robustly at about one year of life, beginning somewhat earlier, ending somewhat later. We might say that it develops in this robust way from the end of the first year of life until the end of the second year. And prior to this, there is the development of walking, or at least the prerequisites of walking. We can predict at six months that a child will walk, depending on our observations of the formation and development of the skeleton and the development of the muscles, movements and the motility of the feet. But we cannot say that in the first year of life, walking develops just as robustly as between one year and two. Later, the development of gait can still be observed. We can say a schoolboy walks better than a preschooler. But can we say that walking is developing just as robustly as it did in the first period? No. This means that when you consider walking, you will find that in one period, there is a certain concentration of the most important events in the development of this function. Prior to this, there is preparation, and afterwards there is improvement, but both have a much slower tempo and impoverished content compared to those of the central development.

Take, for example, speech. When does it develop? Again—between about 1.5 and three, four, five years of age when the child usually acquires the basic forms of his or her native language. Does it develop earlier, in the form of babble? Yes. Does it develop later, after five years? Yes. But neither before nor after this age does speech develop so rapidly, so intensively, nor does it take the most important steps in its

development. The main period when it is at the centre of development falls in those years.⁸

In this way, we see that each function has its own favourable, optimal term for development, it advances in this period to the first plane of development, and then, having passed through its appropriate developmental cycle, it fades into the background, and some other functions comes to the first plane.⁹

In this way, **the disproportionality of development leads us** to this: that we are dealing with development which not only leads to an increase in the quantitative aspect of those features possessed by the child but also to a restructuring of the relations between the separate aspects of development, and this ensures that at every age the content of development differs from that of other ages. Some functions at this age are moved to the first plane, while others are on the periphery, and in the subsequent age other features that were on the periphery are advanced to the first plane, while those that now stand in the centre will move to the periphery.

In particular, there is a law according to which **the more basic functions mature earlier**. For example, perception develops earlier than the memory. This is understandable to us, because perception is a precondition; it is a more basic function. Memory can arise only when the child is able to perceive. Memory and perception develop before thinking. Or, which do you think develops earlier—orientation in space or in time? Orientation in space comes first; this is the precondition, the basic function. **Therefore, the sequences of functions have their own regularities**. Some functions mature earlier and some later. Some, in order to begin to mature, must have as their preconditions other functions, and so on. Consequently, this **disproportionality**, this uneven tempo of development and this development of content in specific cycles, determines **that the complex regular connections between the individual aspects of development are realized during these cycles**. Some are earlier, and some are later; however, these functions do not advance in a random order but rather according to a law of mutual internal linkages.

Now, we—and you—have discovered with this first law (the cyclical nature of child development) and the second law (the disproportionality or uneven development of individual facets) that the process of development possesses a very complex

⁸Vygotsky is making a distinction that is somewhat clearer in Russian than in English. Russian distinguishes between forms of oral speech (“речь”, *rech*) on the one hand and the whole system of the native language (“родной язык”, *rodnoy yazyk*) on the other. It is the former which is developed mainly, though not exclusively, in early childhood; the latter continues central development throughout childhood and even beyond (e.g. in learning literacy or a foreign language). Without this distinction, the English reader may wrongly assume that Vygotsky is saying that the whole system of language is innate or triggered in early childhood, as some researchers (Charlotte and Karl Bühler in Vygotsky’s time, and Carol and Noam Chomsky in our own) maintain. Neither speech nor language is simply “acquired” from the environment; both are long-term achievements. Not mastery of the whole of language, but certainly mastering the sounds of oral speech, occupies “the first plane” of development in early childhood. Interestingly, this coincides with the period of most rapid growth in the brain, a point that Vygotsky will return to in a later lecture.

⁹Vygotsky often employs theatrical metaphors. The words “first plane” here may be thought of as the proscenium of the stage contrasted with backdrop and of course the wings and backstage where functions are also getting ready to play their roles.

structure, a very complex organization, a very complex temporal course. So, are there regularities to this complex structure, this complex course? There must be. Is it important or not important to understand in a given individual case from the practical side how these laws apply? It is important. Consequently, there must exist a science which studies these laws of development and which can apply these laws to resolve a whole series of practical tasks.

I will try attempt to explain how science studies these laws and resolves these practical tasks, but first I will present two main features, two basic laws of child development.

One law of child development is that **we always observe not only processes that are progressive and proleptic but also some inverse development of those features and those properties intrinsic to the child at an earlier stage of his development.** Typically, this law is formulated thus: **each evolution in child development is at the same time an involution, i.e. an inverse development. Inverse processes of development are as if woven into the very evolution of the child.**

For example, a child who has learned to talk ceases babbling and not only does he cease babbling but, as research has shown, the talking child cannot, even if he so wishes, even if we request it, reproduce babbling, or those sounds that he had incessantly uttered in the form of babble. In the child who has developed school interests and those forms of thinking intrinsic to school age children, the interests of the preschooler die, alongside those thought patterns which were peculiar to him in preschool age. A reversal in development of those traits that prevailed earlier takes place. As an example, take the psychosexual development of the child. At each stage of development, the child has a certain organization, his own specific structure of psychosexuality. In the transition to the next stage of development, not only is there a new structure, a new organization in the sexuality of the child, but the main features that characterized the previous structure undergo inverse development.

Of course, this must not be understood in the mechanical sense that every step forward is always associated with a simple annihilation of that went before. **Between the processes of involution and evolution, there is a very close relationship, a very close dependence.** Much of what prevailed before does not just die off, but is transformed and becomes integrated into a new, higher organization, and much does die off in the straightforward sense of this word. There exists a whole series of irregularities in child development, child developmental disorders, called the **infantilisms**. An infantilism literally translated into Russian means a “childishness”. And when we study the essence of these developmental disorders, we see that **the essential consists in that the processes of involution are disturbed, that there is no timely withering away and that the child does not undergo an inverse development of a system that in the normal course of time should revert to a background plane. The child proceeds to the next age and acquires traits that are typical of adulthood, but in him there are some individual aspects that retain their earlier, more childly, organization, retaining properties of an earlier age, a childishness within the system of traits proper to an older age.**

Finally, the last of the laws of development—the laws upon which I wished to dwell in order to give you a more concrete, more meaningful idea of what the subject

matter of pedology is like—this last law is usually formulated **as the law of metamorphosis in child development**. You know that metamorphosis is what we call the qualitative transformation of one form into another. This law has in view a peculiarity of child development, namely that it is not confined exclusively to quantitative changes, or to simple quantitative incrementation, but is instead a chain of changes in quality, qualitative transformations. For example, when a child moves from crawling to walking, from babbling to speech, from forms of visual thinking to ones that are abstract and verbal, in all these cases, there is not simply growth and increase of the earlier, former functions of the child, but it is as though there were some qualitative transformation of one form, which manifests itself in this function, into a completely different one. If you understand the expression as a purely metaphorical convention, we might say that child development is full of examples that resemble an egg turning into a caterpillar, a caterpillar into a chrysalis and a chrysalis into a butterfly, i.e. that resemble the biological metamorphoses that we observe in the ontogeny of some animals, particularly insects.

We may now draw some general conclusions from the laws of development which we have encountered. It seems to me that these results might be formulated as follows. First, we have seen that **the process of child development is not simply a process of quantitative growth of individual traits; it is not a process that is limited to growth, to increase.**

Child development is a complex process, which includes in itself, thanks to rhythmical [cyclical—GSK]¹⁰ development, thanks to disproportionality, **a restructuring of relations between aspects of development, between the various parts of the organism and between the various functions of the personality, restructuring which leads eventually to a change of the whole personality of the child, the whole organism, at each new stage.**

Moreover, we may say that the process of child development is a process that is not exhausted by this restructuring but which also includes an entire chain of qualitative changes, qualitative transformations and metamorphoses, whenever we have before our eyes the development of a new form which was not there in the preceding stage of development, although its appearance was prepared for by the whole of the preceding course of development. Now we have a clear idea of what a long time ago, long before the existence of scientific pedology, was expressed by Rousseau in a famous formulation, one which is still repeated and still is essentially the same formula with which any study of pedology ought to commence. Rousseau said that **the child is not just a small adult, the child is a being that is different from an adult not only because less grown, less rational, less developed, let us say, in other respects; the child is a being which is qualitatively different from an adult by the very constitution of the body and the personality themselves.** And so the transformation of a child into a full-grown person is not simply the expansion of a

¹⁰Korotaeva's published version inserts the word цикличности *tsiklichnosti* ("cyclical") for ритмичности *ritmichnosti* ("rhythmic") in this paragraph. As we've seen, Vygotsky's view of development combines two graphical schemata: on the one hand linear progress and on the other cyclical or spiral development. If we want to combine this into a single "line of development", we would have to draw it as a sinusoidal curve, what Vygotsky calls a "wave form".

tiny adult given at the beginning, but a path of numerous qualitative changes that the child must pass through in order to reach the degree of mature status. The same thing that Rousseau says about a small child compared to an adult is applicable to children at different age levels. So just as a child is not a miniature adult, a preschooler is not simply a miniature schoolboy, an infant is not just a miniature preschooler, i.e. **the difference, once again, between the individual ages is not simply that the ones at lower stages develop features that heavily favour the development of those at the senior level; the difference lies in the fact that preschool, school age, etc., are all unique stages in the development of the child, and at each of these stages the child is a creature unique in quality that lives and develops according to the laws specific to the age and different for each of the different ages.**¹¹

We now look very briefly at some common theoretical, methodological questions linked to understanding child development. You can well understand that at times the process of child development is so complex and so delicately organized, revealing such complex structures and such complex patterns, that there can be no unity across differing branches of pedology concerning the theoretical understanding of this process. As you know, there is no unity of understanding of basic concepts such as life in biology either.

And so, just as the concept of life in biology has given the grounds for the dissolution of all bourgeois scientific thinking into two camps—the vitalist and mechanist camps—we find likewise that the concept of child development is one of the basic concepts which must be dealt with from a philosophical and general-theoretical point of view. And here we do not find any unanimity amongst researchers.

¹¹What Rousseau says is this: “The man must be considered in the man, and the child in the child. To assign each his place and settle him in it, to order the human passions according to man’s constitution is all that we can do for his well-being.” (Rousseau 1763/1979: 80). As Vygotsky says, this is very often cited, although rather more rarely quoted. When it is quoted, it is almost always quoted completely out of context, and so it sounds very much like Rousseau favours “child-centred education”. In fact, Rousseau is arguing against John Locke, who was the main proponent of what would be called child-centred education today. Locke famously believed that the child was a *tabula rasa*, a blank slate, and that educating the child was largely a matter of reasoning with the child, so that laws of reason would be written on that blank slate. Rousseau considers this folly: we only need reason when we are strong enough to fend for ourselves. But the child is, and should be, weak and dependent. Rousseau says: “Nature wants children to be children before being men. If we want to pervert this order, we shall produce precocious fruits which will be immature and insipid and will not be long in rotting. We shall have young doctorates and old children. Childhood has its ways of seeing, thinking and feeling which are proper to it. Nothing is less sensible than to want to substitute ours for theirs, and I would like as little to insist that a ten-year-old be five feet tall as that he possess judgement. Actually, what would reason do for him at that age? It is the bridle of strength, and the child does not need this bridle.” (Rousseau 1763/1979: 90). Rousseau says the child does not need authority—because authority is not a natural law. What the child needs is natural law: “Let him know only that he is weak and you are strong, that by his condition and yours he is necessarily at your mercy. Let him know it, learn it, feel it. Let his haughty head at an early date feel the harsh yoke which nature imposes on man, the heavy yoke of necessity under which every finite being must bend.” (p. 91). Rousseau’s point is that the child must understand the power of adults as a completely natural power and not as one based in social law or human reason. This is not what we would call child-centred education today!

What are the basic methodological responses to this question of the nature of child development that currently exist in science and what will you have to confront when you study those scientists who are constructing pedology or who have participated in its construction before you?

It seems to me that, for brevity, for clarity, we may divide all the theories extant concerning child development into three groups.

The first of these groups of theories are all linked in one way or another to what you probably know from embryology, or rather, from the history of embryology, to what is known as **preformism**. As you know, the theory known as preformist theory supposes that in the bud, in the seed from which embryonic development originates, lies the whole of the future shape of what should appear at the end of development, only that it is present in a miniaturized form, and that its development consists in the fact that this small, microscopic form increases and, developing itself, comes to correspond to the mature form. Preformation is translated into Russian as “the advance presence of the form”. You know that from this point of view, in the initial stages before scientific embryology, it was believed that the acorn contains the future oak tree with all its roots, branches, leaves, and that development consisted only of this: that this microscopic oak was turned into a vast oak tree.

It is likewise asserted (you understand, in a manner that is purely speculative, even though some proponents of this view do claim that it can be confirmed in an experimental manner) that the human embryo contains the future person in ready-made form, and that in development this microscopic person, contained in the form of a bud, will be transformed, in the course of embryonic development, into a newborn human. In embryology, these theories of yesterday have long since been abandoned and have only historical significance, but in pedology they still retain a contemporary significance. And there are not a few very serious and even great scholars who adhere to these points of view.

I think you’ll understand why these theories have found in pedology a more stable nest than in embryology; due to the depth of its absurdity and the height of facts that contradict it, with the development of experimental embryology it was easily demonstrated to be a fantasy not corresponding to any reality. But it is more difficult to show this in pedology, because the newborn baby really does impress us with the appearance of an almost finished person. Judging by the structure of his body, everything needed for completion seems to be present; it is only the size that is specific to a full-grown human. And consequently in the theory [non-T?]embryonic development¹² or post-embryonic development preformation has resisted for longer and still exists today.

How does it manifest itself? From where does this theory make an appearance in pedology? It proceeds from this: that everything, all that is to be found in a man, in a child, has its ultimate basis certain rudiments given by heredity. Each

¹²In the stenogramme, this is *виэмбрионального*, *viembrional’nogo*, which is not really Russian. It seems likely that Vygotsky meant “non-embryonic”. The idea Vygotsky is critiquing is preformism, the notion that the child’s psyche develops in embryo and post-embryonically in the same preformed way.

property, each feature, is, in one way or another, directly or indirectly, remotely or closely, connected with some rudiment laid down in the inherited endowments of the child. This theory maintains that these rudiments contain a predisposition to developing all of the properties that characterize human development and that development is, as one of the main representatives of this theory puts it, nothing more and nothing less than the implementation, modification, and combination of these rudiments, i.e. all is from the very beginning inherent in these rudiments, but whether it is realized or not depends on development. If one realizes itself but the next does not, the picture will be different than if both are realized or if the latter are realized but not the former. Following this, the rudiments in development, according to this researcher, are modified, i.e. mutate, depending on the conditions in which their implementation takes place, they are attenuated or enhanced, they become more flexible or, conversely, more robust and more resilient, depending on the circumstances in which they arise.

And finally, they may in the course of development be recombined. For example, we cannot assume a hereditary predisposition which determines which amongst newborn children in the future will turn out to be the best engineer or the most proficient on a typewriter; this depends on a combination of predispositions. For each activity must be the result of a certain combination of properties. But, depending on how these properties are combined in development, it appears that someone might make a better engineer and another—worse; one might be more suited to writing on a typewriter than some other. And so, from this point of view, everything is contained in initial inclinations, and what occurs in development is only repetition, implementation, modification and combination of these inclinations.

The untenability of this point of view is, I think, easy to demonstrate, once we take into account that it is essentially denying the developmental process in general, as with any theory that lashes itself to the idea of preformism. As soon as all is given in advance from the very outset, and all that can happen is the realization, modification and combination of what has been given from the beginning, then, I ask you, what distinguishes the developmental process from any life process at all? Let's say we take a mature person, such as each and every one of us here. Does the realization of our propensities depend on the conditions of our lives or not? Do the conditions of living modify and alter our features or not? As grown-up persons, do we or do we not combine inclinations in this activity or in that one? If development is reducible to this, then as a consequence development does not differ from non-developing or from any other state.

After all, what is most essential, the most basic, which allows us to identify the development as specific process from all the other processes taken together? I think you will agree with me when I say **that the one principal trait** that makes development, which gives it its basic quality, and without which development cannot be called development, **is the trait of newness.** If we have such a process in which there is not any kind of new quality, any new features, any new formation, then we certainly cannot talk about development in the proper sense of the word.

Take, for example, cosmological development, when nebulae form celestial bodies in whole systems, like the solar system. Why do we call this development? Because

there is the emergence of entire new worlds, new systems, new celestial bodies which did not exist before. Why do we speak of, say, tectonic development in geology? Because there is also the development of a number of new rocks, new formations, which did not exist before. Why do we speak in history of the historical development of mankind? Because there are new forms of human society, never seen before in history. We may say that we are at the greatest of all the historical ruptures that have faced humankind; we are on the threshold of a new social order, which has no precedent in human history. What does this mean? It suggests that the process of history is thus a developmental history, that it is a process of the continual emergence of the new. Only thus can we speak of development.

However, from the point of view of the theory which we are considering, in development there is only realization and modification of what was given from the very outset, i.e. from the viewpoint of this theory, in other words, there arises nothing in development that is new. And of course, once this is so, the theory leads, in effect, to saying that any and all development can be rejected, as I've said. For it, the child is a small adult, i.e. here is some being in which there has been embedded, to some miniscule extent, everything to be found in the adult, to be expanded to some much greater extent. And development merely consists in the fact that there was less of that fundamental deposit and now there is more. Consequently, this theory inevitably leads us to reject development itself.

Another developmental theory, counterposed to this and equally, it seems to me, incorrect, is that **development is seen as a process which is not due to its own internal laws but as a process that is entirely determined externally by the environment**. Such points of view have been developed in bourgeois science for a long time and have cropped up in Soviet pedology. **They have held that the child is a passive product** obtained by the action of the environment in a particular way; that development consists, in this way, of that which the child absorbs, incorporates into himself and acquires such features from other people which surround him in the environment. It is said, for example, that the development of the child's speech is because the child hears what is said around him; he begins to imitate it and thus also begins to speak; he merely acquires it and assimilates it. The question is, why does he acquire it from 1.5 to 5 years, and not earlier or later? Why does he acquire it in a way that goes through defined stages? Why does he not acquire it just as any lesson is memorized at school? None of these questions can be answered by this theory. Instead, it develops a point of view which considers the child, not as once he was considered, as a miniature adult (the theory of preformism) but instead as a "tabula rasa",¹³ an expression that you have probably heard. Old pedology, old philosophy

¹³Vygotsky uses the Latin words here. In Vygotsky's time, the central tendency in Soviet pedology—even in Vygotsky's own circle—was probably a form of social behaviourism. Soviet educators believed that children are born equal, and they become unequal only through an unjust and radically unfair social environment. Children can become equal again by providing them with a radically egalitarian, equal opportunity environment in which to develop. This view was given the status of an objective, physiologically based behavioural science by the work of the Soviet behaviourists Pavlov and Bekhterev, but also in the work of Marxist psychologists Kornilov and Zalkind under whom Vygotsky worked. But it is, as Vygotsky says mischievously, a bourgeois view. By this, Vygotsky

expressed the point of view that the child is a “*tabula rasa*”; a white sheet of paper, a blank slate, as they say (the Romans wrote on a clean slate) on which nothing is written and which will take whatever you write on it, i.e. the child is a purely passive product which does not bring with him at the outset any of the moments that will determine the course of his development. He is simply a receptive apparatus, a vessel that, during its development, is filled with the content of his experience. The child is simply imprinted by the environment, and in an external way, from of the environment, he acquires and assimilates to himself what he sees amongst the people in his own surroundings.

If the first theory leads to the denial of development because it teaches that all development is given from the outset, **the second theory also leads to the denial of development** because it substitutes for development, not a process of internal movement in the child, but simply the accumulation of experiences, the mere reflection of environmental influences.

Both of these theories, as we see, lead equally to the same result; essentially speaking, they do not solve the problem of development but destroy this problem; as was once said, they do not untie the knot, but cut and sever it. The result is that although one sees everything in the child and denies all influence of the environment on him and the other sees everything in the environment and denies any value for the child, both theories lead to the same thing—the denial of development: one substitutes for development the implementation of inclinations, and the other substitutes for development the accumulation of experience. But there and here we find ourselves, as I have said, without the most important thing, that thing without which there can be no development at all. Here and there, we have no suggestion that the basis for development is the emergence of the new.

Therefore, a third group of theories which still other authors in varying degrees have developed and which are not yet fully purified of these frequent misconceptions borrowed from the first and second group of theories—**this third group of theories stands on the basic path which sooner or later must create a truly correct pedology, a methodologically impeccable theory of development.**

What is most basic to this third group of theories is what I have spoken of several times while engaged in the critique of the first two groups. At the basis of this third group of theories lies the idea that child development is a process of **becoming or emerging into the human, into human personality, and that it is the path of the continual emergence of new features, new qualities, new properties and new formations that are being prepared for throughout all the forgoing course of development but which are not contained in a form which is finished but smaller and more modest in size in the previous stages of development.**

means above all that it is American: Watson and Thorndike are using it to argue that American education, by providing an equal opportunity environment in which (white) children can develop, can easily avoid the injustice of feudal aristocracy, monarchy and the general inequality of European societies. In our own day, the way in which the zone of proximal development has been interpreted as the internalization of the social environment—essentially the very process which Vygotsky criticizes in Piaget—shows how very strong this view remains, even in progressive education. But this view is not Vygotsky’s view, as he explains below and in subsequent chapters.

I have attempted to show that the first and second theories led to the denial of development, since they cannot and do not wish to explain how in development there is the emergence of something new. It is precisely this idea of the emergence of the new that constitutes the basic core of this third group of theories.

So, according to this third group of theories, development is the process of human formation, with all the human properties, a process that is performed by a path whose each step involves the appearance of new qualities, new features and new formations unique to humans, that all these new traits, new features, and new qualities arise not by falling from the sky but rather are prepared by the preceding period of development. In the course of history, the advent of socialism was prepared by all the prior history of development and the decomposition of capitalism; and it is so here too in precisely the same way. However, we cannot, at the same time, say that socialism is already contained in a capitalist form.¹⁴ So here we are dealing with the fact that these new properties arise at a certain age step, prepared for by the whole course of development, but not therein contained in their finished form.

So, from the point of view of the third group of theories, development is **a process of forming the person or the personality which is accomplished by a path along which at each step there is the emergence of new qualities**, new human-specific formations, each prepared by all of the previous development but not contained in a finished form in any earlier step.

It is important to bear in mind two thoughts, indispensable for the correct scientific definition of our understanding. The first thought is that **there emerges in development some new thing**. Development is not just some preformed process—it is this that distinguishes our understanding from that of the first theory, from the theory of preformed development. But it is important to say that what arises that is **new** does not fall from the sky, **but necessarily appears from the preceding course of development**, i.e. it is necessary to show the link of this new with the previous course of development. Therefore, while discarding the first theory, one cannot altogether abandon it, because in this theory there is some truth: that is, that the next stages of development **are linked with the past, and that it is precisely the past which has a proximal influence on the emergence of the present in the future**. Let us add here the thought that there arise in development new, human-specific properties and formations, that they arise under the laws of development, i.e. they are not introduced from the outside, not arbitrarily, not independently of the child, not tumbling from the heavens and not created by some vital force which at a particular date dictates their

¹⁴Perhaps today the thing Vygotsky is trying to explain is rather clearer than the analogy that Vygotsky is using to explain it! Infancy, for example, prepares the way for the child to become a toddler. Crawling builds the muscles in the arms and legs, and babbling brings control over the speech organs. But crawling does not “contain” walking in an embryonic form and babbling doesn’t contain grammar and vocabulary in embryonic form. On the contrary, it is the objective inadequacy of the child’s crawling and the limitations of the child’s babbling that lead the child to take the first steps towards the new formations of toddlerhood—walking and speech. Similarly, the child’s walking and talking are the child’s—they are not simply copies of what the child sees in the environment, although they are certainly formed in interaction with the more complete, finished and “ideal” forms that the child finds there, as Vygotsky explains in Lecture 4.

manifestations, but their appearance must be necessarily and historically prepared by preceding stages of development. This second thought must also be included and incorporated.

I have explained these features in a very abstract way, since I had only one aim: to construct a more substantive understanding of the subject matter of pedology. I wanted to show that child development is a complex process with a number of very complicated regularities, and that the study of these regularities is the subject matter of our science.

We shall discuss the practical tasks of pedology and its techniques during the clinical analysis of children, when we shall see how pedological data is applied in the analysis of the child's development. We shall be able take up the concrete analysis of theories and, in particular, the latter theory, with the next two of our lectures, when we shall talk about the methods of pedology, how pedology studies child development, and about the environment and heredity, i.e. what specific laws exist to determine the impact of hereditary predispositions upon development and what the real role of the environment in the development of the child is. Then I think all this will become clearer and more concrete.

References

- Bakhurst, D. (2011). *The formation of reason*. West Sussex: Wiley.
- Rousseau, J.-J. (1763/1979). *Emile, or: On education*. Translation and notes by Allan Bloom (ed.). New York: Basic Books.
- Выготский Л.С. (2001). *Лекции по педологии*. Ижевск: Издательский дом "Удмуртский университет".
- Vygotsky, L. S. (2018). *Vygotsky's notebooks: A selection*. R. van der Veer and E. Zavershneva (eds.) Singapore: Springer.

Chapter 2

The Characteristics of the Method of Pedology



Outline of Lecture 2

In the first lecture, Vygotsky gave definitions, listed four laws, and then discussed three groups of theories concerning the nature of development. In addition to lectures, students also had the opportunity to visit Vygotsky's clinical practice; the first lecture seems to have been followed by a short visit that offered students the opportunity to familiarize themselves first hand with the kinds of developmental disorders referred to in the first lecture (e.g. "infantilism"). In this lecture, Vygotsky begins again with definitions and then lists three distinctive features of pedological methods: holism, clinical practice, and the comparative-genetic method. Finally, he sums up the lecture.

Definitions: Vygotsky begins his new lecture by defining "methodology" as a "way" or a "path", translating literally from the Greek. He reminds students that every science has its own object of investigation, and that it is the nature of this object which necessarily determines the path that must lead to it.

Features of the pedological method: Vygotsky now introduces three fundamental features of the pedological method that follow: it is a holistic, clinical, and historical approach. All of these features flow from the very nature of development.

First, Vygotsky says that pedology implies a holistic method.

1. Vygotsky contrasts a holistic method (one which is not concerned with one specific aspect of the personality and body of the child but rather with all aspects generally) with a comprehensive method (one that simply exhausts one facet of the phenomenon under investigation after another). A comprehensive method can never cover all aspects of a field, is often preoccupied with narrowly practical problems (e.g. diet in nutrition and cleanliness in hygiene), and must draw on data from very different sciences.
2. Vygotsky also contrasts holism with a method that only generalizes and eschews analysis. Vygotsky says that there are different forms of analysis currently applied in science. One is analysis into pure elements which do not contain the properties one seeks to explain, and another is analysis into complex units which do. For example, analyzing water into hydrogen and oxygen yields elements

which cannot extinguish fire (because hydrogen burns and oxygen enables combustion), while analyzing water into molecules, molecular bonds, and molecular movement can (because water molecules are stable and relatively inert).

Vygotsky selects a very simple example—perhaps a little too simple. First of all, it is not actually Vygotsky's. Vygotsky might have had it from John Stuart Mill's work on political economy in 1848, but it is older, dating from the discovery of the oxyhydrogen explosion in the eighteenth century. Secondly, it does not describe any living developing system; it describes a relatively inert substance. If we must have example from political economy, we might take the example of the commodity from the first chapters of Marx's *Capital* (which certainly does use the method of analysis into units). A commodity, which does develop as part of the "living" system of capitalism, has both exchange value and use value. Without either one, the commodity disappears. Thirdly, units of analysis, and indeed analysis in general, are only appropriate to specific analytical tasks, and the task of explaining why water extinguishes fire is not a burning issue for pedologists. But Vygotsky doesn't limit himself to the simple example of water. He also explains that cells contain, in a maximally simple but minimally complex form, many of the same properties that we see in the body as a whole: metabolism, respiration, excretion, and even reproduction.

Vygotsky's favourite example is speech. When we reduce speech acquisition to elements, we are left with the respective contribution of the environment (culture) and of heredity (biology), but Vygotsky points out that these respective contributions are by no means limited to speech. In contrast, when we expand the child's speech into what Vygotsky calls "phonemes" (today we would call them morpho-phonemes), we obtain units that do contain, in a highly simplified form, the property of meaning. Since it is precisely this property of meaning which develops as the child changes in his relationship to the environment, it seems indispensable to any account of meaning. Finally, Vygotsky notes that when we analyze speech in this way, we discover that a unit is always a relation between moments of the environment and moments of heredity rather than elements of the one or the other.

Vygotsky says that pedology implies a clinical method. Not only are the methods of examining patients quite similar, pedology does not concern itself with phenotypical symptoms of development but rather with their underlying causes, their genotypes. For example, simply testing children cannot reveal the difference between a child who is undergoing accelerated development for one reason or another and a child who will genuinely be able to make original contributions in art and science in the future. Vygotsky remarks that the latter often does not actually have an unusually mature outlook on life but instead has the traits characteristic of his own age to an unusually rich and creative degree: a brilliant child is not simply a precocious one, any more than an adult genius is a prematurely aged old man. Vygotsky cites a child who at five discovered by himself—using the experiences available to any five-year-old—a method for subtracting fractions. Pedology, Vygotsky concludes, must study not the outward symptoms of development but rather their inward causes.

Vygotsky says that pedology implies a comparative-genetic method. Because development of the mind, or any single function like memory, or even the child's

physical growth cannot be directly observed, pedologists instead make observations at different moments of development. By comparing, they can infer the nature of the intervening processes. Vygotsky contrasts the synchronic comparison of different diseases in different patients with the diachronic observation of development in the same child; by comparing the child at one stage of development with the same child at another, we have much better understanding of what has developed. Once again, Vygotsky illustrates this with the example of speech. Finally, Vygotsky notes that in the previous section, when we compared a child with accelerated development with a child who had unusually rich and creative lived experiences but what otherwise quite typically developed, we used a form of synchronic observation of different children, rather than diachronic observation in the same child. This too is a pedological method, but unlike the diachronic observation of the same child, it is not specific to pedology.

Summary. Vygotsky now sums up his lecture: pedological methods are holistic, in that they use units that preserve the properties which inhere in the whole and which are the object of investigation; they are clinical, in that they study genotypical processes rather than phenotypical processes and they are comparative developmental, in that they study the child at different age stages.

Lecture 2

On a previous occasion, we spoke of the subject matter of pedology; we discovered that pedology is concerned with the study of the development of the child and that the development of the child is a complex process which reveals a series of very basic laws.

On the second occasion,¹ we had the opportunity, in practice, to observe how in each individual case, in particular in cases of developmental disorders, these regularities are manifested and how pedological diagnosis seeks to recognize the laws of child development in these cases: how they go out of tune, how they are violated, and how they are distorted.

At this time, I should like to speak of the pedological method. “Method” is translated from the Greek word meaning “path.” **In this figurative sense, we understand a method to be a means of researching or studying any branch of reality; this is a path of knowing which leads us to an understanding of scientific regularities in this or that area.** But, it stands to reason, since every science has its own particular subject matter, in order to study that subject matter, a specific method is required.

That method is the path, the means. The path, as a consequence, depends upon the goal towards which science is striving in this area. And if every science has its own tasks, its own goals, it is clear that every science develops its own peculiar methods

¹Vygotsky is referring to the tutorial or practicum which accompanies the main lectures. These were apparently clinical sessions where Vygotsky could bring in patients and allow the students through observation to confirm what they had learnt. In this case he appears to have brought in some instances of “infantilism” or arrested development. There is no record of the clinical examination in the transcript, however; we only have transcripts for the main lectures.

of investigation, its own paths of investigation. And in this sense, we may say that, just as there is no science without its own subject matter, so too there is no science without its own method. The character of this method is always determined by the character of the subject matter of the science. Therefore, if we have, even just by a few words, become acquainted with that which characterizes the development of the child, we may now turn to discovering what distinguishes the method of pedology, what the most important and substantial distinction might be.

The first distinctive feature of the pedological method, it seems to me, lies in the fact that, as has been often said, it is a **holistic method of studying development**; it does not encompass just one side of the organism or of the child's personality but rather embraces all aspects of the personality and organism as a whole. It has, therefore, been maintained for some time that the pedological method is a holistic one.

But what such a holistic method might be in pedology has very often appeared unclear. And it seems to me that if we discover clearly for ourselves what is meant by a holistic method in pedology, we may understand all the basic techniques in both scientific and in practical research in each different case.

First of all, it must be said **that a holistic method does not mean a comprehensive method**. Say we single out one thing for study. Then, we do the same for another, and then a third, until we have all the aspects, studying all the features. This would still not be a holistic method; it would only be a comprehensive one. In addition, such a comprehensive study would usually not cover one single scientific area but a whole series of scientific domains. Besides, the requirements of such comprehensive studies are usually not for the purpose of theoretical goals but only for purely practical and technical ones. For this, we must combine data from different sciences. But it stands to reason that pedology would not be a proper science if its only method was to collect and systematize data from other sciences.

The second thing to say is that **a holistic approach is not a method which excludes analysis**. There is not one single science which can take the path of never resorting to analyzing, taking apart a complex whole into its individual parts and into the moments,² in which it was formed. So, when we speak of a holistic method, again—we necessarily do not have in mind the method of summarizing and generalizing while ruling out the possibility of analytical consideration.

²Vygotsky uses the term *МОМЕНТ moment* ("moment") in a holistic way that may be unfamiliar to many readers, and it is sometimes translated as "factor" or "aspect," to avoid confusion with some indefinite segment of time longer than a second and shorter than a minute. Yet the two meanings of "moment", temporal and holistic, are related, and the relationship is lost if we translate it that way.

Suppose development is a continuous process, in which simpler wholes are differentiated into more complex ones. Imagine that this continuous process is divided into "frames", by a film or a motion picture. Within each frame, we have a functioning whole and not simply a set of parts. Each frame portrays a complete moment of development in the sense that it depicts a functioning whole and not just one aspect or factor of development. Because development is uneven and heterogeneous, each complete moment foregrounds some aspects or factors of development and backgrounds others. The word "moment" was used in an analogous way in mathematics, physics, and philosophy in Vygotsky's time.

As for a positive definition,³ it seems to me that the easiest is to find out what a holistic method of pedological study would be if we take and counterpose to each other the two main modes of analysis which are applied in science in general and in the study of child development in particular.

The first of these modes of analysis we may call division into elements. This is when a complex whole is, by the process of analysis, divided into the elements which form it, into what we call its elemental parts. A typical example of such a method might be to take chemical analysis, where we divide some complex body into its component elements. But the same means of analysis can be seen in any scientific domain, and especially in the study of child development. If we take an interest in the development in children of some complex formation such as, let us say for example, speech—it too has its physiological aspect and its psychological aspect—right here, if we take as our task studying the physiology of speech or the anatomy of the speech organs per se, or the psychology of speech per se, we would proceed very much like a chemist who breaks water down into its constituent elements. We would take each aspect of speech as a separate element and examine it as such.

Another approach to analysis—which we may also call a method of division or a method of analysis—consists of integrating units into a complex whole. What does this mean? What characterizes an element as compared with the whole to which it belongs? I think that an element may be characterized in comparison to that whole which is constructed from its elements in this: that in the element there are no properties which are inherent to the whole. If, for example, I wish to explain why water puts out fire or why one body floats in water but another will sink, I cannot

³G. S. Korotaeva, the Вьготский (2001) Russian editor of the transcripts, precedes this paragraph with: *Это все определения отрицательны*, or “All of the foregoing is only a negative definition,” and she notes that this dismisses the foregoing negative definitions as inadequate. Korotaeva is correct to point out that this is all part of Vygotsky’s method, but we prefer to put commentary in the footnotes rather than insert them in the text. This is not simply to keep the text itself “clean”; it also permits more expansive explanations (which may of course be ignored by readers who find them unnecessary).

For example: Vygotsky is always historical. In the last chapter, Vygotsky recognized that environmentalist explanations of development emerged in opposition to innatist ones. In this one, he recognizes that an idea like holism emerges in opposition to another idea like comprehensiveness. Vygotsky does not believe in simply splitting the difference, finding a compromise, or trying to combine them eclectically. Opposed ideas are opposed for good, historical reasons, and in human history differences in thinking like these are not set aside, papered over, or stitched up, but instead fought out.

Historical struggles like these, however, are not simply one negation after another. Historically, no idea gives way until there is a positive alternative, and positive alternatives can and do emerge from the clash and fragmentation of ideas. So, in the last chapter, we saw that Vygotsky recognized that there was positive content in innatism—the idea that the present is prepared for in some way by the past. Similarly, there was positive content in environmentalism: the idea that development involves the emergence of some new structure that was not internal to the developing organism before. In this chapter, Vygotsky recognizes that we cannot derive a positive definition of holism simply by negating comprehensiveness and negating analysis: on the contrary, a workable, positive definition of holism must include various facets of the subject matter and it must also include analysis. Which facets must be included, and what kind of analysis is holistic analysis? That is what Vygotsky explains next. But he does begin with a negation, by explaining what kind is not!

offer in reply that this is because water is composed of oxygen and hydrogen and that its chemical formula is H_2O because as soon as I have divided my water into hydrogen and into oxygen, all of those properties that once inhered in my water in these elements will have disappeared. They were inherent in water only so long as it was water, but this oxygen supports combustion, while hydrogen is flammable, while the fire-extinguishing property of water is gone and is unaccounted for, even when summing up all the properties of oxygen and hydrogen. This means that **in an analysis that uses division into elements, what is most characteristic is that it raises the division of the whole to parts which do not contain the properties inherent to the whole, and it is for this reason that this analysis excludes the possibility of explaining those complex properties which inhere in the whole from the properties of the separate parts.** I cannot explain why water extinguishes fire by relating fire to those elements which make up water. Therefore, we can say that strictly speaking, from the point of view of the properties of the whole, this analysis is not an analysis in the proper sense of the word but rather the very opposite of one because it cannot divide the complex whole into its different integrative elements, but instead attributes all properties of this complex whole to some single common reason.⁴

When I say that water is made up of hydrogen and oxygen, does this only apply to the fire-extinguishing property of water or to all the other properties of water as well? Of course, this applies without exception to all the properties of water. This applies to the ocean; it applies to a drop of rain, i.e., it applies to all water generally. This means that analysis which is dividing into elements can only give such knowledge as applies to all properties of the whole overall. The nature of water in general may be revealed to us by using such an analysis, but it cannot reveal to us what we demand from the analysis, i.e., the distinguishing of its properties, the explanation for each of them, and the connections between these distinct properties. This means that, in essence, from the point of view of studying the properties of water, this analysis is not analysis in the proper sense of the word.

⁴Note that the word “element” in the last sentence should probably be “unit”. It is not clear if the mistake is Vygotsky’s or that of the transcriber. In any case, Vygotsky’s idea is clear. It is in fact the same point that he made when discussing how each science must have a method proper to its object of study; to avoid reductionism, each method must have a unit of analysis proper to the properties it wishes to explain.

Vygotsky’s reasoning here is both chemical and mathematical, and the Russian word he uses, *разложения* (“breaking down”, “division”, or “expansion”) can be understood in both ways. We can understand his distinction between elements and units chemically, by thinking of “breaking down” or “dividing up” a water molecule into hydrogen and oxygen. We can understand the distinction mathematically, by thinking of a process of division that is “raised” (*возводит*) or “expanded” to the structural elements rather than the functional units. As Vygotsky points out, with water this will account for some universal properties such as molecular structure, chemical inertness, and electrical properties, but not particular properties such as putting out fire or floating ships. With numbers, it will treat all numbers as if they were primes, and cannot even account for the distinction between even and odd numbers, much less factors higher than two. To take Vygotsky’s example in the previous paragraph, once a child is producing grammatical sentences, we cannot simply study them as strings of phonemes, nor can a book be understood as a long list of semantically unrelated sentences.

If this is clear, it will be easy for me to explain **what an analysis that breaks a complex whole down into units is, for it is characterized by two features that are precisely the opposite. Analysis into elements is characterized by the fact that elements do not contain the properties that are inherent to the whole, but a unit is characterized by the fact that it is a part of the whole that contains, albeit in a rudimentary form, all of the basic properties inhering in the whole.**

For the chemist, let us say, water is made up of hydrogen and oxygen, but the physicist has to deal with molecules of water, and with molecular motion in water, i.e., to deal with the smallest particles which are still water particles but not the elements out of which water is made. Therefore, the physicist explains the molecular properties of water by analyzing and distinguishing a whole series of different traits that describe water as a physical entity and a whole series of changes which this physical entity undergoes and learns the links between these different traits and properties.

If we take the biochemical formula of some organic matter, this would be an analysis that divides into elements. But if we study the life, the physiology of a living cell in a body, this will be a unit because the living cell maintains the basic properties inherent in the whole organism; it is, after all, a cell that lives, i.e., it is born; it is nourished; it has intrinsic metabolism; it dies; it changes; it may become diseased, etc. In other words, with the cell we are dealing not with an element but with a unit.

The first feature of a unit is that the analysis identifies parts of the whole such that they have not lost the properties that are inherent to the whole. Imagine that I take a complex body and partition it up into separate parts—whether real or abstract does not matter—by way of analysis. I will then get to a certain limit in my partitioning where I get a part that still contains the basic properties which are inherent to the whole. For example, a water molecule contains some basic properties of water; a living cell contains some basic properties of all living matter and any organism. The analysis which leads us to understanding the cell and its life, the constitution of tissues by these cells, and the construction of organs from these tissues, or the analysis which leads to the study of water molecules, of molecular tension, and of molecular motion in water—this method of analysis yields as a result those parts of water (*sic*—T)⁵ which have not lost the properties which are inherent to the whole, which contain all the basic properties that are intrinsic to the whole but which contain them in a highly simplified form. Let us say that nutrition in cells is not comparable to nutrition in the human organism; still, with nutrition in cells, we have a basic element of life. This is the first and basic difference between the one analysis and the other.

I will provide concrete examples of facts from the field of pedology which will allow you to see the stark contrast between the one and the other.

⁵Since water is only one of Vygotsky's examples, this would read a bit better without "of water". But our goal is to reproduce what Vygotsky actually said in his lecture and in the transcript accurately, and Vygotsky, like any busy lecturer, sometimes "rises to the concrete" and stays there a bit too long.

The second feature of this analysis is that the analysis using the method of division into units does not represent itself as a generalization, as does a chemical analysis; it does not relate to the entire nature of the phenomenon as a whole, and it can be an analysis, a decomposition to explain the various properties of the different aspects of a complex whole. So, here is an analysis in the proper sense of the word. Say, for example, what I wish to know is not the entire life of the human organism as a whole but, let us say, some specific function of the human organism, say, nutrition. For this, what should I rely upon—an analysis of the whole organism or of different aspects of organismic activity? Specific organs: specific systems. Now, if I wish to explain other aspects of life activity, I must resort to the analysis of other aspects. But analysis does not lead me to anything like the chemical formula for water, which applies equally to the Pacific Ocean and to a raindrop—analysis leads to facts that explain digestion in one case and blood circulation in another; why water puts out fire in one case, why a body in water floats or sinks in another, and so on. So, this analysis is really an analysis, i.e., it permits the study of the simplest form that has the basic properties that are inherent to the whole. We'll move on to some concrete examples, and this will become clear.⁶

In pedology, the decree that development depends on two factors—heredity and environment—has reigned for a very long time. With this, no one can argue. **The chemical formula of any development, so to speak, will be heredity plus environment.** Is this correct? It seems to me **it is undoubtedly correct.** Does it apply to all development in general? Yes, just as the chemical formula refers to water as a whole. When trying to carry out an analysis which sets out from the division of development and of each individual moment of development into its elements of heredity and its elements of the environment, we stumble into exactly the same position into which we would have fallen had we wanted the concrete property of water—that it puts out a fire—explained from the fact that it consists of hydrogen and oxygen because we would come up with elements that do not contain properties inherent in the development as a whole. Let's take, for example, the child's speech: how to explain it? With respect to speech, there have always existed two views:

⁶In the fourth paragraph above, Vygotsky seemed to be saying that studying one facet at a time is not the same as a holistic analysis. But here he appears to argue exactly the opposite: in order to perform a holistic analysis, it is necessary to study one aspect of a phenomenon at a time.

Yet there is no contradiction. Analyses can have different purposes: structural, functional, and genetic (i.e. developmental). If I take apart a complexly differentiated structure such as an organism into its different organs and tissues, I will find that no single organ has the functional properties of the whole organism; it is only when we take apart tissues into cells that we can find a unit that has functional properties that are analogous to the whole. But if I look at a function such as digestion, I will find that I can indeed examine specific and separate organs such as teeth, tongue, esophagus, stomach and bowels quite meaningfully. For example, studying the function of digestion requires a good knowledge of the digestive system but knowledge of the reproductive system is largely beside the point. A genetic analysis, on the other hand, has to be holistic in order to be genetic, because structures and functions are not differentiated at the beginning of development.

Pedology is, as Vygotsky established in the first lecture, not a structural analysis of the child *per se*, or even of child learning *per se*. It is not even a functional analysis: it is a genetic one, which can include both structural and functional analysis as part of a historical analysis of development.

nativism and empiricism. Nativism has said that this is an innate function, genetically grounded. Empiricism has said that speech is born of experience. The nativists have said: you just take a baby with an immature speech zone of the brain, put it in the best conditions amongst speakers, and it will not even begin to speak. Thus, speech develops from hereditary inclinations. But the empiricists have said: take a child with a developed speech zone and place it with deaf-mutes, and it will never speak; this means that speech is developed from the environment; it develops out of experience. In the same way, there has been a dispute regarding spatial perception and in relation to almost all aspects of development. At the outset, science saw nothing but these counterpositions.

When science has, in this way, come to an impasse, new currents appear which attempt to reconcile nativism and empiricism, and then people begin to say: the child's speech develops, on the one hand, from hereditary fundamentals, and on the other, under the influence of the environment. Is this correct? Doubtless correct. But this is true with regard to speech, and just as decisively true as well with regard to development as a whole. For this reason, at least until now, whenever we spoke in a general way of development, this principle of understanding, that development is determined by heredity and by the environment, has been indispensable, and up until now, we have been amply satisfied by it.

But as soon as we wish to explain any concrete aspect of development, for example speech, the hereditary inclinations plus the impact of the environment can never be divided up, for in themselves the hereditary inclinations do not have within themselves the necessity for the emergence of speech, just as within itself the environment, external in relation to the child, does not have in itself the necessary prerequisites for speech.

With this, it began to be envisioned that the child's speech developed from convergence, i.e., from a confluence, a merging of both influences. Once again, it was envisioned that each phenomenon in the development of the child could be explained with the help of two converging factors: heredity, on the one hand, and environment, on the other. But in fact, the study of these questions has led to the necessary abandonment of all such approaches to analysis that would divide into elements. Why and how?

First of all, the barrenness of this research method: speech develops from the influence (“interaction”—GSK)⁷ of heredity and of the environment. But the same applies to all the other properties of the child. Growth also depends on the influence of the environment and heredity, the child's weight also depends on this; the child's

⁷Korotaeva says that *влияния* (“influence”) was in the original stenogramme, and she replaced this with the word *взаимодействия* (“interaction”). Léopoldoff-Martin has put back the original word “influence” in her French translation. For English as well, “influence” seems better than “interaction”, on negative and positive grounds. Negatively, Vygotsky is emphasizing the barrenness of analyzing speech development into hereditary factors and environmental ones, but if the analysis can show how heredity and environment do interact, the analysis is hardly barren. More positively, “influence” suggests fluid in English, and the previous paragraph used aqueous metaphors like “confluence” and “merging” to describe the idea of convergence (usually, in Vygotsky, associated with the work of William Stern).

games and play activity also depend upon this. And whatever aspect of the child's development we take, it will always turn out to depend on heredity and on the environment. This means that all questions concerning development have only one answer: that this depends on heredity and on the environment. And we can say that, here it is mostly the environment and less heredity but there it is more heredity and less environment. And we will not be able to say anything more worthwhile, using this analysis.

How else can we approach an analysis in studying, say, speech development? We might put it this way: **speech is a very complex whole, one which depends on the environment and upon heredity, but this is not the distinguishing property of speech; it is something that is intrinsic to all aspects of child development.**

How ought we to analyze child speech development? I think we ought first to assume that the child's speech has different moments—not elements but units, that is, moments that still retain in some primordial form the properties intrinsic to speech itself, just as the cell maintains in some primordial form the properties intrinsic to the organism itself.

Let us take a concrete example: the sound aspect of speech. You know, very probably, how the old linguistics studied the sound aspect, that from which speech was formed. Let us suppose that each word consists of individual sounds, which make up speech. Is this true or false? Of course, it's true. But if it is true that speech is made from the separate sounds of different letters, a number of questions appear which are hard to answer. The first question is if speech is built up from individual sounds, then as a consequence, in order to learn how this sound aspect of speech in a child develops, we must divide it up into its separate sounds and trace when the separate sounds appear in the child's speech: а, б, в, г, (that is, "a, b, v, g", the first four letters of the Russian alphabet—Т), etc. But the sound of "а," the sound "б", etc., as sounds do not contain any of the properties that are intrinsic to the sounds of human speech; these are sounds that can be made by a parrot and by a baby who is as yet not able to speak. We are, then, only examining the properties of sounds: acoustic, physical, and physiological phenomena, which depend on articulation and upon the articulatory movements by which these sounds are pronounced.

So, what is it that distinguishes the sounds of human speech from other sounds that are found in nature? The sounds of human speech differ from all the other sounds found in nature in that they are sounds through which we convey a kind of sense, in so far as the unit of speech is not a sound in itself, but a **meaningful sound**, i.e., a sound which has the property of conveying meaning. How is the sound of a word that we might utter separated out from any other sound existing in nature which has the same number of oscillations per second, the same duration, in a word, the same physical properties? The sounds of human speech differ in that they are used to convey a precise sense. For this reason, modern research has recognized that the unit of speech is not just a sound but **a meaningful sound**. This signifying sound in the contemporary study of speech is what is called the phoneme, i.e., **it is some combination of sounds which cannot be broken down further, sometimes**

one sound, sometimes a combination of sounds, that have not lost their basic property that is intrinsic to human speech, which is to be a human sound.⁸

Allow me to give you a simple example. Take these two words: “уm” (*um*, or “spirit”, “mind”—T) and the word “отцу” (“otstu”, or “(to) Father”, in the Russian dative case, e.g. “my father” in “I gave it (to) my father”—T). At the beginning of one word and the end of the other, we are dealing with one and the same sound, “y” (/u/—T). In their physical properties, in their articulatory and physiological properties, the sounds are completely identical; they are one and the same sound. But one sound is a phoneme, a unit of speech. Why? I ask you: Is the sound “y” at the end of the word “отцу” signifying something? Does not “отцу” mean something? But does the “y” sound in the word “уm” signify anything by itself? No. This means that in the former, we are dealing with a phoneme, while in the latter, we just have a sound. If we spread out the word into separate sounds like “y” and “m”, then to me the whole word is just an arbitrary combination of different sounds. But if I spread this out into parts like this with the letter “y” here (i.e. отц-y—T), I can see that this sound contains the basic property of human speech, the function of meaning, albeit in a very embryonic form since the sound in itself does not mean an object or an attitude towards an object, but only a rather unclear function that lies, not in individual characteristics, but rather in differentiating the meaning “отцу” (dative case, e.g. “(to) Father”—T) in comparison to “отца” (genitive case, e.g. “Father’s”—T) or “отцом” (instrumental case or “by means of Father”—T) or “об отце” (prepositional case, e.g. “of Father”—T), etc. In this case, the unit is a phoneme, and as our analysis has shown, **human speech on the one hand develops, and on the other hand, the construction of this developed form is not on the basis of sounds but on the basis of phonemes**, that is, sounds that are performing the basic function, namely, the function of meaning.⁹

⁸As Vygotsky implies in this passage, the values of words can change according to their specific situation, and some of the words that Vygotsky uses in this passage have changed since he used them.

Vygotsky uses the term *значение* (*znacheniya*, “meaning”) to mean roughly what Saussure (1916/1972) meant by *valeur* (“value”) in his *Course in General Linguistics*, Chapter Four: on the one hand, the relationship between language and something that isn’t language (e.g. between a name and a person), and on the other the relationship between one particular meaning and other meanings (e.g. the difference between a pronoun, a nickname, a given name, a family name). These two variables determine the *valeur* of a word in a specific situation of use.

Vygotsky uses the term *фонема* (*fonema*, “phoneme”) to refer to what we today call a “morpho-phoneme”. A phoneme is simply a sound difference, and modern phonetics treats phonemes as independent of meaning (e.g. the difference between /h/ and /m/, neither of which can be used on their own). But a morpho-phoneme is a sound difference that coincides with a difference in meaning in actual use (e.g. the difference between “he” and “me”). It is clear, from the example of Russian cases that follows, that it is this morpho-phoneme that Vygotsky has in mind.

⁹Russian has cases. So does English, with pronouns like “he”, “him” and “his”. But Russian has a lot more, and these cases apply to all pronouns, proper nouns, and common nouns. Perhaps we can make this paragraph a bit more familiar to the English reader if we rewrite it using tense and number instead of case, like this:

‘Let me give you a simple example. Take these two words, the word “day” and the word “played”. At the beginning of one word and the end of the other we are dealing with one and the same sound /d/. In their physical properties, in their articulatory and physiological properties, the sounds are

How does this analysis of speech differ from the other one? It seems to me that with the other one, we had a division into elements to the point where each element had lost the properties that were intrinsic to the whole. **But here we have a division into units which still retain some first form of the properties which inhere in the whole.** Does the history of the development of human speech show that so long as we study the development of speech from its purely sonic aspect we can understand how the child's speech develops? Research shows that we will never understand in this way why it is that the child utters one word and does not utter another, why he utters some letters and some sounds early and begins other sounds much later. And, most importantly, we will never be able to understand the way in which a child learns in two or three years the basic phonetic resources of the mother tongue, if all of these words are constituted as arbitrary combinations of individual sounds. But the child does learn them, and without instruction or special repetitions; he learns them, so to speak, structurally.¹⁰

completely identical; they are one and the same sound. But one sound is a morpho-phoneme, a unit of speech. Why? I ask you: Is the sound /d/ at the end of "played" signifying something? The "-ed" in "played" means something, does it not? Does the /d/ sound in the word "day" signify anything by itself? No. This means that here we are dealing with a morpho-phoneme while there we just have a sound. If we spread out the word into separate letters like "d" and "a" and "y" or even into separate sounds like /d/ and /e/ and /h/ then to me the whole word is just an arbitrary combination of different letters and sounds. But if I spread this word out into parts like these, "play" and "-ed" I see that the sound contains the basic property of human speech, the function of meaning, albeit in a very embryonic form since the sound in itself does not mean an object or an attitude of intension, of meaning in relation to an object, but merely two grammatical functions, tense and number, that distinguish the meaning "played" in comparison to "plays" or "play" or "will play". Still, here the unit is a morpho-phoneme, and as our analysis has shown, *human speech on the one hand, self-develops (or, develops itself) and on the other hand, the construction of the developed form is not on the basis of sounds but on the basis of morpho-phonemes*, that is, sounds that are performing the basic function, namely, the function of meaning.⁷

¹⁰Vygotsky is using the term "structurally" to mean almost the opposite of what it means today. In the late nineteenth and early twentieth century, the international phonetic alphabet made it possible to compare minute distinctions in speech sound across languages, and the "science of speech" became synonymous with the study of minimal phonetic units which do not by themselves convey sense (e.g. /d/ vs. /t/). This approach to language, as units which mutually define and refer to each other rather than refer to conditions of understanding that lie outside themselves, in the social environment, eventually became structuralism, post-structuralism, and ultimately deconstruction, the idea that meanings are nothing but textual oppositions.

But Vygotsky was already impatient with the analysis of structure "in itself". Here, Vygotsky points out that this approach cannot explain development. On the contrary, it leads us to an unsolvable version of "Plato problem". If sounds mean nothing without words, and words mean nothing without sentences, then the child cannot learn anything until the child learns everything. When Vygotsky says that the child learns "structurally", he means that what the child learns is not sounds without words, or words without sentences, but whole *Gestalten*, structural units that include sounding, wording, and meaning together.

With this, Vygotsky predicts the systemic-functional analysis of early child language which M. A. K. Halliday was able to do in the late twentieth and early twenty-first centuries. Halliday (2004) showed that although there may be very big differences between the sound system of child protolanguage and mother tongue, there is a semantic continuity—the child's basic systems of

Let us take a concrete example. As you probably know, the sound /r/ appears very early in infant babble. Stern believes that the formation of /er/ and /rr/ in babbling are amongst the first to appear in infant proto-speech. But you know that, at the same time, the sound /r/ appears in child speech much later. Thus, it happens that the child masters the sound /r/ very early in babble, but when he begins to talk, he cannot articulate it until age three, four, or even five. It happens that the sound /r/ has long since been mastered, but that it comes linked with some phonemes (morpho-phonemes—T) which are difficult for a child not because of their sound but because of the semantic function of the sound. It also happens that a child who says “y” (/u—T) and “a” (/a—T) is still unable to distinguish “отцу” (“to Father”) from “отца” (“Father’s”). Why is he unable to say correctly “я дам отцу” (“I give to Father”—T)? It is not because he cannot say the sound “y” (/u—T) but rather because the function of the sound is still inaccessible. The same thing holds with regard to the sound /r/. The sound /r/ is available to the child very early, but because it performs very complex functions as part of the Russian language, it appears in proto-speech first and only appears later in the speech sounds of the child. I have taken by way of example only one aspect of a child’s development—that is, speech—and have taken as an example in speech one moment alone—the vocal aspect of developing the ability to speak. And in this we see, of course, that I resorted to analysis. I singled out the development of speech, and of speech—its vocal aspect and then in its vocal aspect I tried to expand it into given units. Such is analysis. But this analysis brings us just to the limit where we retain the property which inheres in the sounds of human speech in general, i.e., the property of being meaningful.¹¹

What does this mean? Let us take a second example. This is the study of the environment, I think you will agree with me that the significance of a given element of the environment is dependent on how, and in what relationship, this element stands out for the child. For example, the adults around the child speak equally often and equally much when the child is six months and when the child is one year and six months, and the same utterances have not changed. But do they have the same meaning at six months and at one year and six months? Different. This means that **the impact of each element of the environment will depend not on what is contained in a given element, but rather in what relation this element stands out for the child. And the significance of the same element of the environment**

meaning are established first interpersonally and then intra-personally even before the child learns adult words and wordings. In a sense, the child’s mother tongue is actually a second language: old meanings in new wordings and soundings.

¹¹The Sterns do say that /r/ is among the first sounds that they observe in their children’s babble. See: Stern and Stern (1928) *Die Kindersprache: Eine Psychologische Und Sprachtheoretische Untersuchung*. Leipzig: Verlag von Johann Ambrosius Barth, p. 183. The Sterns do not, of course, discuss the acquisition of Russian; their three children are learning German.

How to explain Vygotsky’s observations on children learning Russian? When Vygotsky says that the sound /r/ is associated with complex semantic functions that the child has not yet learned, he may be thinking of prefixes such as при (“pri~”) пре (“pre~”), and пере (“pere~”), part of complex morphology in Russian. But note that these are not simple acts of articulating /r/ but combinations of the voiced liquid semi-vowel sound /r/ with the unvoiced plosive stop /p/; there may indeed be articulatory problems which delay their deployment.

will be different depending on how this element relates to the child. The speech of others will not change; it will be the same in the first year of the child's life as at three years of age, but its significance for development will change.

Now just suppose that I want to seize on this and study, as has often been done, what speech is determined by. Speech in children develops differently. Some start early and speak well, while others begin to speak later and do less well; some lag behind in their development while others march forward. If one wishes an explanation for why this is so, it is said that the speech development of the child depends, first of all, on the environment. If the environment is rich in speech, if the child is spoken to a great deal, that the child will have a chance to develop quickly with regard to speech. And if the environment is poor in speech, with little said to the child, the child will develop poorly; i.e., in other words, **first of all, it depends upon the speech environment and secondly upon the child's own mind**; if the child is clever, quick-witted, and retentive, he will assimilate better, and if he is obtuse, backward, and limited, he will assimilate less well. And so people attempted to explain speech development by these two factors, both of which were divided into elements, and the number of words that strike the child's ear in one day or in one hour was calculated, in an attempt to find out if this would really explain the differences in speech development of children. And it turned out that the answer was completely negative because the decisive moment consists neither of the environment itself nor the mind itself, but **rather the relation of speech, of the speech environment, to the speech of the child himself**. If, for example, the child speaks willingly, and is glad to communicate with others, and has a need for speech—that is one thing. If the child is hostile towards others, reserved, and each word brings him trouble, that is quite another. **Therefore, what is crucial turns out to be once again, not an element but a unit, i.e., the relations between the moments of the environment and the features of the child himself. If we can find such a unit, it will retain in itself what is inherent in the development of speech in general, i.e., the relationship between the moments of the environment and the moments of the personality, the moments that are rooted in the features of the child himself.**

That is why research which uses the method of units leads us to the fact that we are studying relations, we are studying those units which are not divided up into elements and which maintain, in their simplest form, the relationship between elements, i.e., that which in a given case of development is the most important.

I think that the difficulties that you have had with the presentation in this part of my lecture are due to the fact that I have presented this method in the abstract, and you will become more clear about the terms of the analysis inherent to pedology when we next consider the problem of environment and heredity and discover the difference between the study of heredity in pedology and the study of heredity in genetics or in biology, and how the pedological study of the environment differs from the study of the environment in hygiene. We shall learn that since here and there the tasks of studying differ, each science employs different methods for studying heredity and for studying the environment, but **pedology, in studying heredity and in studying the environment, applies the method of which I am speaking, i.e., the method of**

division into units. For example, hygiene and genetics, in the study of heredity and of the environment, employ the analytical method of division into elements. This meets the objectives of these sciences. So, I think that next time, when we will concretely approach studies of the environment and of heredity, these primary features of our method, which we have had to deal with in the abstract at first, will become clear to us.

And now, I want to dwell on the second feature characterizing the pedological method. As it is much simpler and is linked with the method of other disciplines already familiar to you, it will be much easier and more understandable.

The second feature of pedological method of research is that this method is, in the broadest sense of the word, a clinical one. If we are to explain what we mean when we say that pedology uses the clinical method of study, the easiest way would be if, on the one hand, we compared a method in pedology with a corresponding method in the clinic—they are quite similar—and if, on the other hand, we contrasted the clinical method of research to the symptomatic method.¹²

You know that medicine prior to the development of the clinical method was dominated by the symptomatic medical method, i.e., what was studied was not the disease but its symptoms, its signs, its outward manifestations. Diseases were grouped and classified according to these symptoms. Patients with a single symptom, such as a cough, were treated as having the same group of diseases, and other symptoms—a headache—belonged to some other group of diseases. So to with every science, before it has begun to be worked out in a truly scientific way, purely empirical methods, which are based on the study of symptoms, prevail. In this way, all the sciences pass through a stage of symptomatic study, the empirical study of the external manifestations. For example, in botany and in zoology before Darwin, plants and animals were classified by their appearance, by the form of their leaves, and by the colour of their flowers, but after Darwin, they were classified on the basis of genetic traits because the process which led to the formation of these traits became known.

Similarly, the prevalence in medicine of clinical medicine, which has replaced symptomatic medicine, is manifest in this: it has now become the study not of the outward signs themselves but rather a study of the processes which give rise to these symptoms; it has become the study of the processes which lie behind these symptoms. And it has become clear that patients with identical symptoms may undergo different processes, and patients undergoing identical processes may have different symptoms, i.e., the possibility has opened up of moving from a study of the external manifestations to a study of the processes behind these external manifestations and responsible for their presence, their emergence.

So too in pedology. **At first, pedology was also a symptomatic science. It studied the external traits of the child's development, the child's mental development, and the development of the child's speech, and it stated that in a certain year, certain traits will appear in the child. It was, like any other symptomatic science,**

¹²It may be useful to remember that Vygotsky considers Piaget's method of one-on-one work with individual children, using questions that "liberate" answers but do not suggest them, to be a clinical method *par excellence* (Piaget 1926/2007, but see also Vygotsky 1934/1987, Chap. 2).

predominantly descriptive; it could not explain why something appears. There were even researchers in Soviet pedology who defined pedology itself as the science of age symptom-complexes, i.e., of the collections of traits which distinguish a given age. But you know perfectly well that studying traits or symptoms makes up only one part of a more general task in science. Science studies traits in order to learn and to recognize what stands behind these traits, in cases of, let us say, **clinical practice—the study of pathological processes; in cases of pedology—the study of developmental processes.** This means that when applying a pedological method, all of the traits that we uncover in our studies and observations of child development, we take as mere symptoms of development, and by interpreting these symptoms, in comparing these symptoms, we should arrive at the processes of development which are the cause of these symptoms.

In this way, when I speak of how **pedology** uses the clinical method on the study of child development, **what I wish to say is this: it approaches all of the external manifestations which can be observed in child development only as traits of that which it is seeking, how the developmental process itself, that which led to the emergence of these symptoms, flowed forth and ran its course.**

For example, you already familiarized yourself last time with the way in which we define the mental development of the child. We know that a child whose passport age is six years old is nine or twelve years in mental development. We know that he is four years in advance in mental development. So, then, is this the pedological diagnosis? Does this conclude the task of pedological research? No. We have only stated what happened and we shall only know why it happens when we find out what has transpired in the process of development of the child and what has brought about the manifestation of these traits which are features of the mind of a twelve-year-old but not of a three-year-old. It may stem from various causes.¹³

We often work with children who are gifted above their ages. I would like to show you some of these children at one of our conferences. The child, you may say, develops in advance of his years. The question is what causes this. It transpires that in some children, this may be caused by what is known as accelerated development, i.e., these children follow the path of their development at a very much accelerated

¹³Some readers will find this annoyingly imprecise: Vygotsky says that the difference between six and “nine or twelve” is four, and then he speaks vaguely of features in the mind of a six-year-old that are typical of a twelve-year-old rather than a three-year-old. But there are (at least) three reasons for Vygotsky’s vagueness (in addition to the reason he gives here, which is our inability to predict underlying causes from overlying symptoms). First of all, as Vygotsky said earlier, intelligence and “mental development” is only one aspect of general child development. Secondly, these years are not “passport” years; they are most likely years measured by the Binet-Simon tests, and this is (according to Vygotsky in Chapter Fourteen of the *History of the Development of Higher Mental Functions* 1997: 231–239) a purely symptomatic measurement whose relationship to underlying mental development is unclear. Thirdly, Vygotsky knows that even children who have the same mental age on the Binet-Simon tests will perform very differently when offered leading questions, started solutions, or demonstrations (this is the now well-known method for diagnosing a zone of proximal development). Therefore, Vygotsky’s vagueness is entirely appropriate; it serves to indicate the many methodological problems that remain to be solved in the young science of pedology.

tempo. What this child attains at age eight, another child has mastered already and attained at age six. But this accelerated development may be accompanied by a subsequent deceleration, or it may not, and even if it is not followed by a subsequent deceleration, by itself it may not imply that we have a truly gifted child before us.¹⁴

Extreme examples typical of such accelerated child development are the *wunderkinder* of which you, very likely, have heard: the *wunderkind* is a child who at a very early age impresses you with some exceptional ability: musical, artistic, or mathematical.

But a *wunderkind* is just an ordinary child with accelerated development. We are amazed by him when he is five years old because although only five, he displays, for example, knowledge of mathematics which is usually found in a nineteen- or twenty-year-old youth or in an adult. What surprises here? What surprises us is not the mathematical ability *per se*; only that it is found in such a small child. For this reason, most *wunderkinder* end up as average people or even people who are below average. A large number of *wunderkinder* who as children promised to become outstanding musicians, outstanding mathematicians, or outstanding artists, not only merely become average musicians, average mathematicians, and average draftsmen, they are often people who are even below average, because in itself this accelerated development is an expression of a pathological form of development, an abnormal development, which does not come out well. The German composer Liszt put this feature of the *wunderkind* in a very witty aphorism when he said that a *wunderkind* is a child whose future lies entirely in his past, i.e., who very early on ran along in line with his or her own future but who has no future in the present sense of the word.¹⁵

¹⁴A central theme of these pedological lectures is that the child is not a small adult. What Vygotsky means is that a child does not simply have the traits of adulthood in miniature; the child has his or her own traits, and these are qualitatively different from adult traits; they prepare the way for adult traits, but they often do so negatively. For example, crawling, autonomous speech and complexes prepare the way for walking, talking and true concepts not directly but by their inadequacy, by their overthrow and by their revolutionary reconstruction.

Here, however, Vygotsky discusses what is really an instance of pathological development: a child who is, in some ways, precisely a small adult, namely the *wunderkind*. In doing this he is careful to distinguish between rapid development and advanced development. We can think of this as a distinction between relatively rapid development on the ontogenetic scale and relatively advanced development on a sociogenetic scale.

For example, it is one thing to begin the study of music or painting at an early age, like Willy Ferrero, who was a precocious child but a mediocre adult musician. Willy Ferrero performed widely and was well known in Russia in Vygotsky's time (see *Imagination and Creativity in Childhood* 2004). It is quite another thing to be at the forefront of development in art or science. Shakespeare did not produce any significant work until he was nearly thirty, and Franz Liszt, who Vygotsky discusses next, was a rather poor *wunderkind* but nevertheless turned out to be at the forefront of an important cultural innovation in how music was listened to.

¹⁵Some inaccuracies here. Franz Liszt (1811–1886) was Hungarian and not German. He didn't begin to play the piano until he was seven or eight, and his best work comes from much later in his life: he taught and composed music well into his seventies, and his influence on music continued well after his death, since he was a highly gifted teacher (who did not charge for lessons, since he considered it a contribution to future generations). Nevertheless, and in fact for precisely these reasons, Liszt is an extremely good example of how to distinguish a *wunderkind* from the kind of genuinely transformative talent which enables the next stage in cultural-historical development.

But there are also children who show at an early age mental development that is typical of a much older age. These differ from others in that they are true future talents, true future geniuses.

And so, although the symptoms of the one form of development and the other are identical, it appears indispensable to be able to distinguish the child who is a future *wunderkind*, i.e., an early bloomer with a sterile future. How can this be done? The symptoms are identical. One child is brought to you with an IQ (i.e. the ratio of mental age to passport age) of 1.9; he is ten years old, but he performs as though nineteen. And the other has the same IQ. But one is a future *wunderkind* and the other a future genius. How to tell the difference? In the same way that we proceed when we need to distinguish any picture of symptoms from another. We look for the differentiating symptoms. We say this by these traits the two children are alike. We need to look for traits according to which they are unlike, those that will allow us to distinguish them.

In particular, with regard to these children there is some general trait such that the child with an extreme case of accelerated development, the *wunderkind*, impresses us with the presence of symptoms typical of an older age. However, the child who is truly gifted, talented, and endowed with genius impresses you with symptoms that are typical of his own age, only brought to a comprehensive, rich, full-blooded, and complete development. If I may say so, **a wunderkind is characterized by this: the symptoms in development are in advance of his age; but a true, talented, and gifted child is characterized by the fact that development is dominated by traits that are characteristic of his given age, but this age is unusually richly and creatively experienced by the child.**

I will give you a concrete example. We have, in our studies, encountered by chance a young mathematical genius. This boy is eight years and ten months old. He has now mastered a variety of areas of higher mathematics. If you examine this child, you may see that he does not impress you that he has the mind of a twenty-year-old student, or a twenty-five-year-old tutor, or a thirty-year-old docent of mathematics. What impresses us is that what is related to higher mathematics are just such features in his mind that are features of every nine-year-old, and that these are just features of a nine-year-old mind but brought to the threshold of genius. This is the way that an adult genius differs from us in his particular *experience*, not the way that a ninety-year-old man differs from a thirty-year-old man. It is the way that the typical features of a thirty-year-old are advanced to the frontiers of genius.¹⁶

Liszt made classical music popular in an age before recording possible by transcribing a vast body of orchestral work so that it could be played on a single instrument, namely the piano. This made it a form of home entertainment available to middle class families. On tour, he was the object of one of the first real personality cults in music, a trend that persists to this day. He also invented the symphonic poem, a romantic genre that forms a bridge between classical and modern music.

¹⁶Consider, for example, a story about the eight-year-old Carl Friedrich Gauss. His schoolmaster asked the boys to add all the numbers from one to a hundred in order to keep them busy until recess. Gauss immediately provided the answer, realizing that it was bound to be $(1 + 100) + (2 + 99) + (3 + 98) \dots (50 + 51) = 50 \times 01 = 5050$. According to the story, however, little Carl completed the task quickly in order to be allowed to go out and play.

For example, one boy about five or four years old discovered a way to reduce fractions to a common denominator. He heard his mother ask his father how much remains if we take one-third from three-fourths. The boy figured it out and answered, even though no one had taught him how to subtract fractions. When questioned, it appeared that he himself had discovered a way to reduce to a common denominator; his own mind allowed him to go this far. If you ask me whether this is possible for every child at this age, if the child is asked to explain an operation on subtracting fractions, the experiments of (Lehmann?–GSK) have shown that it is possible. But this child discovered the method of calculation by himself. And when we become acquainted with such symptoms, we may be quite sure that we have an actual genius child, i.e., development which is of a completely different type than the child with accelerated development.¹⁷

I bring up these cases to demonstrate that **pedology studies not just symptom in themselves, but use the study of symptoms to approach the study of developmental processes behind the symptoms**. Therefore, it classifies the processes of development into their separate stages and down to their individual aspects. In this sense, the method of pedology can be and should be considered a clinical method, i.e., a method which goes from the specific manifestations of the developmental processes to the study of the nature of the processes themselves, their essence and nature.

The third feature which characterizes the pedological method is one which might be called the **comparative-genetic character of the pedological method**.

Not every clinical discipline necessarily employs a genetic way of examining its subject matter. On the contrary, many clinical disciplines make use of other means. But pedology, which studies development, by its very essence cannot fail to use comparative-genetic means.

What does this mean? When we examine any developmental process, how can we proceed? Can we directly observe, let us say, the path of embryological development? Can we directly trace from the moment of conception until the moment of birth what path is taken by the embryo in the maternal womb? Surely not. So what can we do to study this path? We can take the foetus and study, using the comparative method, samples from the first week, the second, the third, the fourth, and so on; i.e., we take different points of development, we compare them to each other, and we see what has

¹⁷Vygotsky doesn't explain how the child did it. But suppose a child can add or subtract on his or her fingers like other children. One-five-year old, watching her mother cut an apple into sixths and then into twelfths, decides that if a finger can be an apple, a finger can also be a twelfth of an apple. This allows the child to figure out, on her fingers, that $3/4 - 2/3 = 9/12 - 8/12 = 1/12$. This is, of course, not the way that an adult would do the problem. It is something the child invented—as a child, and not as a little adult.

Korotaeva has a note here that says: ‘В стенограмме “Левана”’ which means ‘In the stenogramme, “Levan”’. But Korotaeva has replaced “Levan” with “Lehmann”. If she is right, Vygotsky is referring to: Lehmann (1891) Ein Wunderkind: Erzählung aus der Neuzeit. (A Child Prodigy: A story of modern times). But that doesn't explain the references to experiments. It seems possible that Vygotsky is referring to experiments by (Kurt) Lewin or by (Rosa) Levina. There is also a Czech educator of the deaf in Vygotsky's time called G. Lehmann (see Volume 2 of the English translation of Vygotsky's *Collected Works* 1993: 325).

been and what it has become, and we put together for ourselves some representation of whence the child has come, for what reasons, and in what time period, by what path he has arrived at one point of development from another, and what events have transpired in between. Precisely this same method of comparative age samples is employed in pedology.

Can we observe in vivo the development of the child's mind, the development of the child's memory, or the growth of the child? No, we can only compare the development of his mind now and in half a year, and then half a year later, and then another half year later, and we can then see that at eight years the child has such particularities and at twelve years such and such. It is clear that this was a child of 1.5 (*sic*—T)¹⁸ years, 9, 9.5 years. So, I see the path the child takes from eight years old to 12 years. In other words, **I compare the picture of development at different age stages. This comparison is the fundamental method by which we get our knowledge of the character and the path of child development.**

But since in making comparisons, I do not conduct them in random order, but only in a genetic order, I am working with a comparative-genetic method. For instance, in the clinic, we use a comparative method in comparing, say, one disease to another. Is this a comparative-genetic method? No, because there are different kinds of disease processes being compared to each other; but here, I compare not just different forms of child development to each other—I may do this as well, but I mostly **compare the child with himself at different stages of development.** Hence, the subject of my comparison is **the different stages of child development.** In this sense of speaking, we say that pedology employs a comparative-genetic method in its study; **it presents comparative cross-sections of development at different age stages** and, comparing them with each other, uses the means of comparison to represent the path of development of the child.

Let me explain this with a concrete example. I know, for instance, that at the moment of birth, when the passport age of the child is equal to zero, the child has no speech, the child is a non-verbal being. By six years, the child has developed speech, and has accurately acquired the basics of his mother tongue. I now wish to study the path of development of this speech. In order to do this, I examine what will occur at three months, five months, one year, at 1.2 years, at two, and at 2.5 years. And with this, I come to know that, for instance, at about three months, the child manifests a pointing gesture, which is linked to speaking. Moreover, at around six months or a little earlier, there is disarticulated babble and then the first words. He starts to speak by separate words. At about two years, we have two-word sentences, and so on. What does this clarify? By comparing what is new and what disappears from the old, I obtain a whole picture of development. I do not simply state how the child comes from a wordless existence to the development of speech; I know by what path he came to cry, and then to babble, and when this babble disappeared, and what came after, what followed in sequence, with one dependent on the other, and in this way, by what regularities he came to speech. By comparing the child's speech at various

¹⁸There appears to be a misprint in the stenogramme: Vygotsky appears to mean 8.5 years and not 1.5 years.

age levels, I see what has disappeared, what has appeared anew, and how what has appeared anew is dependent on what went before. And, going by the method of these cross-sections, by taking the path of genetic comparisons, I obtain the opportunity of representing the path of development of the child.

The comparative method used in pedology has yet another aspect, in the sense in which it is used in any clinical discipline, that is, when I do not compare the child with himself but rather compare children with different types of development to each other. This too will be a comparative method. For example, today, when I took an example of the clinical method, I attempted to show that the child who is gifted or a genius is developing differently from a child with accelerated development; I did not compare the child with himself but compared the child with another child. This is another technique, but it does not involve anything of the typical for pedology: it is inherent in any science using a clinical method. Any science that avails itself of the clinical method studies certain processes which are not observable directly standing right behind the symptoms, and must, willingly or unwillingly, distinguish different forms of flow in these processes. So, this kind of comparison, this kind of use of the comparative method is not specific to pedology or exceptional. But the application of comparative-genetic method to ages is, as I said, peculiar to pedology.¹⁹

Now, let me just summarize what I have said. I have already told you that every science, including pedology, should have its own particular subject matter and, therefore, should have its own method or path for studying this object, and that this path is determined by the features of the object that is studied by the given science. Due to the nature of its subject, pedology has developed its own specialized method which is characterized, as I have attempted to lay out for you, **by three basic moments. First, this method is a holistic study of the child**, a holistic study that should not be understood as a comprehensive study, nor as a study which excludes analysis,

¹⁹Vygotsky says that any clinical science which uses observable processes to try to understand unobservable ones involves the comparative method. For example, if I try to understand observable loss of speech in a patient with Alzheimer's, I cannot observe the plaques and protein tangles in the brain directly (until the patient dies and an autopsy is performed). But I can compare that patient with a normal person. I can also compare that patient's speech with the same patient's speech a month, a year, or a decade earlier. Both of these methods are comparative, but only the latter is a comparative-genetic method.

If we take a case of "accelerated development" such as Willy Ferrero and compare that accelerated development with the development of a genuine musical genius such as Franz Liszt we are certainly doing comparative research. The same thing is true if we compare a case of musical genius with normal musical ability, or even a case of "accelerated development" (e.g. an "experimental group" with a particular educational environment, say, immersion in a foreign language) with "normal development" (a "control group" without that educational environment). All of these are comparative types of research.

But they are not comparative-genetic. We cannot call them holistic, because the comparison between an experimental group and a control group is designed to focus on a single trait and not on the whole of individual (that is the whole purpose of using groups and using controls). We cannot call them developmental, because all of the children are supposed to be at the same level of development. So Vygotsky would not consider this research pedology, and in fact this research is often quite explicitly aimed at the kind of "accelerated development" that Vygotsky considered pathological.

but rather as a **particular type of analysis, one that does not use the method of division into elements but rather that of division into units**. This has been the most difficult part of today's lecture, and I hope it will become more understandable after our next colloquy, more concrete, when we consider the study of heredity and on environment in pedology, which concretizes this method of expansion into units. And just as in other sciences where the same subject matter may be studied by different methods, the difference between these two types of analysis will become clearer to you.

The second peculiarity of the pedological method lies in its clinical character, in the sense that it studies the development process that lies behind the symptoms of different ages.

And the third feature lies in the fact that it is a comparative-genetic method which studies the features of development of the child at different age stages, comparing these different age stages at time intervals that are as close to each other as possible and which may provide us with a way to clarify the path by which the child passes in development from one stage to another.

These three main features characterize the method of pedological research. In seminars and in our practical sessions, we will explore a variety of separate methodological techniques for study. They are very numerous: research techniques of physical and mental development of the child development, and individual functions and aspects of mental development, and the speech of the child and the child's research methods, etc. But these are not yet a method, but only a methodics, i.e., a certain system of techniques that implement one type of method or another. However, these techniques can only be understood if the principles of the method of which I spoke today are correctly applied, for a methodics in pedology would result in this: that we learn only the symptoms, whereas only in interpreting these symptoms can we arrive at the diagnosis of development in the true sense of the word.²⁰

References

- Halliday, M. A. K. (2004). *The language of early childhood*. London: Continuum.
 Lehmann, J. (1891). *Ein Wunderkind: Erzählung aus der Neuzeit*. Dusseldorf: Bagel.
 Piaget, J. (1926/2007). *The child's conception of the world*. London: Rowan and Littlefield.
 Saussure, F. (1916/1972). *Course in general linguistics*. Peru, IL: Open Court.
 Stern, C., & Stern, W. (1928). *Die Kindersprache* [The speech of children. (4th Ed.)]. Oxford, England: Barth.

²⁰In Anglophone scientific literature, "methodology" is often used as a rough synonym for what Vygotsky is calling "method" here. But for Russians, "methodology" is a kind of meta-science: it is literally the study of different methods and theoretical approaches. Clearly, Vygotsky would call the topic of this chapter "method" and not "methodology", and that is how we have translated it. But then we need a term for the "system of techniques" borrowed from diverse disciplines which does not rise to the level of method and which must be subordinated to the pedological method. For this, we have chosen to borrow the term Vygotsky himself uses, "methodics", even though this term doesn't really exist in English. Perhaps it should.

- Vygotsky, L. S. (1987). Thinking and speech. In *Collected works* (Vol. 1). London and New York: Plenum.
- Vygotsky, L. S. (1993). *Collected works* (Vol. 2). London and New York: Plenum.
- Vygotsky, L. S. (1997). History of the development of the higher mental functions. In *Collected works*, (Vol. 4). London and New York: Plenum.
- Выготский Л. С. (2001). *Лекции по педологии*. Ижевск: Издательский дом “Удмуртский университет”.
- Vygotsky, L. S. (2004). Imagination and creativity in childhood. *Journal of Russian and East European Psychology*, 42, 7–97.

Chapter 3

The Study of Heredity and the Environment in Pedology



Outline of Lecture 3

Throughout these lectures, Vygotsky starts out with an introduction of basic principles, sets out a method, and seeks to formulate the results of his enquiry as laws. In this lecture, he starts out by saying that the study of heredity, which is not to be dissociated from the environment even in a chapter ostensibly devoted to genetics in a narrow sense, will help students materialize the basic principles introduced in the last lecture as abstract statements that can even be applied to molecular water and apply them to pedological problems. He then discusses data from mass studies on monozygotic and dizygotic twins. Finally, he sets us the task of generalizing these results into general laws or propositions.

Introduction: Vygotsky begins by saying that this lecture will provide concrete examples of the holistic, clinical, and comparative-genetic method that he outlined last time: Vygotsky means that it will study heredity in connection with the environment, it will study it clinically rather than symptomatically, and it will use a comparative method. This will distinguish the pedological approach to heredity from a general biological one in four ways.

The geneticist is interested in simple, univariate traits (e.g. height in bean-stalks, or colour in flower blossoms) since these are most likely to reflect in a pure form the laws of heredity (e.g. the Mendelian laws of dominance). The pedologist, in contrast,

The title of this lecture in the Korotaeva version used as the basis for this translation is *Учение о наследственности и среде в педологии* (literally, “the teaching concerning/about heredity and the environment in pedology”). The word *учение*, or “the teaching” is usually translated as “doctrine”, but in English “doctrinaire” has a rather negative (dogmatic political or religious) connotation, particularly when applied to Soviet writings. For this reason, we have avoided “doctrine” and use the slightly inaccurate term “study” instead. This chapter is concerned with what pedology has to tell us (or teach us) about heredity and the environment—how they can be studied using the pedological method described in the previous lecture. The title was not, apparently, given by Vygotsky (see “Setting the Scene”).

is most interested in complex traits where the mechanisms of heredity must interact with other mechanisms.

The geneticist is interested in traits that are maximally dependent on heredity (e.g. eye colour). The pedologist, in contrast, is most interested in mixed traits where the interaction of heredity with environmental factors can be observed (e.g. vision).

The geneticist is interested in traits which clearly distinguish children, rather than in those traits which different children have in common (e.g. eye colour as opposed to eye structure). The pedologist, in contrast, is most interested in the shared traits which contribute to development in all children.

The geneticist is interested in traits that by and large do not change over time. In contrast, the pedologist is most interested in traits such as school marks or juvenile delinquency, which vary from generation to generation.

Mass Studies on Twins. In this section, Vygotsky lays out the method of comparing monozygotic and dizygotic twins and applies it to a simple example: determining whether speech acquisition or musicality is more dependent upon heredity.

Vygotsky suggests that a pair of monozygotic twins and a pair of dizygotic twins could be given tests of speech ability and tests of musical ability (the tests are, unfortunately, not described). Correlation coefficients could be calculated for the different pairs of twins. The difference between the correlation coefficient of the monozygotic twins and that of the dizygotic twins on tests of speech ability (0.96 vs. 0.89) could then be compared to the difference between the correlation coefficient of monozygotic twins and that of dizygotic twins on tests of musical ability (0.93 vs. 0.67). Using this method, it is found that the difference is greater in the case of musical ability.

This means that heredity makes less difference in the case of speech than in the case of musical ability. If heredity were a more important essential component of speech, then the difference between hereditarily identical twins and hereditarily non-identical twins would be large. But in fact, the difference is smaller than with the trait of musical ability, and Vygotsky thus assumes that musical ability is more dependent upon heredity.

The problem of non-hereditary influence within families which marred the interpretation of German studies by Peters and by Bühler has now apparently been taken into account because monozygotic twins will have no hereditary variation and only non-hereditary variation while dizygotic twins will have both types of variation. But Vygotsky notes that it is still necessary to take many pairs to study because in fact twins are sometimes treated quite differently and this may cause variations that can be confused for hereditary variations.

Results. The first result Vygotsky draws from the twin studies is that more elementary, lower functions tend to show larger differences in the coefficients of similarity between monozygotic and dizygotic twins while higher, cultural functions tend to show smaller differences. Vygotsky concludes that the lower functions form, historically, a foundation for the development of higher functions, which arise relatively late in sociogenesis.

The second result is that if we examine many functions synchronically and then attempt to array the functions in order of their dependence upon heredity, we find that

an equal-interval scale is impossible. We will find that difference between twin-type correlation coefficients is quite large in one group of functions (the lower, elementary ones) and quite small in another (the higher, cultural-historical ones). Vygotsky then draws two conclusions from this result:

1. Lower-level functions (like involuntary attention) tend to be unmediated, and they have a very short path of development. This does not allow much time or scope for their modification by the environment. Higher-level functions (e.g. reading ability), in contrast, require mediation (the acquisition of literacy) and thus offer a great deal of time and scope for modification and for the emergence of something new.
2. Heredity itself has a different relationship to life in the case of the lower-level functions than it does in the case of the higher-level ones. In the relationship of heredity to lower-level functions, it is a more or less direct cause of development. But in the case of the higher functions, it is merely a precondition.

The third result is that if we examine the same function diachronically, at different moments of the child's life, we find that the degree of heritability appears to change over time. This apparently nonsensical conclusion is not simply due to the increase in the influence of the environment because the influence of the environment may actually decrease. There are some functions, e.g. psychosexuality, where hereditary inclinations may actually become more compelling over time.

This leads Vygotsky to his fourth result: there can be no general law defining the role of heredity for all traits and at all times. Variation in the role of heredity takes place not only synchronically, between traits, but also diachronically, in a single trait, as the influence of the environment waxes or wanes. Vygotsky concludes with two corollaries drawn from the last two results (i.e. from synchronic and diachronic variation in heritability).

The method of comparative study of twins applies only to traits which vary, and not to the traits which all children have in common. We may easily observe that there is a difference in the coefficient of similarity in eye colour between monozygotic twins (where eye colour is identical) and dizygotic ones (where it may vary) and we surmise correctly that this large difference means that the trait is hereditary. But we also observe that there is no difference at all in non-varying traits such as eye structure, and we cannot draw the conclusion that this is not hereditary. Similarly, we may note strong similarities in body type in both monozygotic twins and dizygotic twins that are not based on varying traits, and we cannot thereby conclude that they are not hereditary.

Because pedology is interested in varying traits, we find that it is never the case that a trait is entirely heritable, with no environmental component, or that a trait is entirely environmental, with no hereditary component at all. Nor is it the case that development can be calculated according to a mechanical formula which suggests an unvarying relationship between heredity and the environment. Like other aspects of growth, differentiation makes this quite impossible.

Lecture 3

Today I wish to present to you what pedology teaches concerning the environment and heredity, and I hope that here I will manage to be more concrete than the last time, that I can show you where the originality of the pedologic method lies.

That the development of the child is most immediately the work of heredity and of the environment is already, most likely, well known to you and quite clearly does not require any further proof. But it is of the greatest interest to shed light upon **what pedology studies in heredity, what pedology studies in the environment, and how it studies them.**

We commence with heredity. As I mentioned last time, pedology does not study the laws of heredity as such **but studies the role of heredity in development**, as, let us say, a clinician does—he too does not study the laws of heredity as such but studies how these laws are involved in, say, the hereditary transmission of certain illnesses. Likewise, the pedagogue¹ examines in what way the propensities that are laid down and transmitted according to the laws of heredity influence development itself while the laws of transmission of hereditary traits are studied by genetics and by general biology.

And, this leads us to very important implications. **The problem of heredity in pedology is posed differently from the way it is posed in general biology or in genetics.**

I wish to draw your attention to four moments which are transformed when the problem of heredity is brought from genetics into pedology.

First of all, in genetics, whenever and wherever we wish to investigate the laws of heredity as such, we take an interest predominantly in the transmission of individual, simple traits, and we attempt to take such traits in which hereditary conditionality is maximal—e.g. the colour of the eyes. Thus, in genetics, we are predominantly dealing with the study of these simple traits.

Are they important in themselves, these traits, from the point of view of child development? Can we, let us say, expect that blue-eyed children with light eye colouring will develop differently and their fate will turn out quite differently from that of dark-eyed children with dark eye colouring? Of course not. Of course, in themselves, these signs are insubstantial and unimportant. They may be important from one point of view, in so far as they are symptoms of heredity, and in studying how, let us say, dark- and light-coloured eyes are genetically transmitted, the geneticist may determine by what laws this simple trait is inherited. But from these traits, we learn very little about what interests the pedologist; they teach us little about how

¹The original has “pedagogue”, i.e. teacher, educator, instructor. Léopoldoff-Martin assumes this is a transcription error, and that what Vygotsky means to say is that the pedologist is interested in heredity as it impacts development, just as the clinician is interested in how it impacts development and the geneticist and the biologist are interested in the laws themselves. But since Vygotsky is speaking a group of preservice and in-service teachers, it might be that he really does mean that the teacher is interested in how certain “predispositions” or “inclinations” might influence the child’s development (e.g. musical talent, which as Vygotsky points out later, is relatively inborn, at least in comparison with speech). In that case, “pedagogue” would be correct here.

inheritance affects development. For this reason, **the pedologist does not, in the main, deal with simple features like, say, the colouring of the eyes or of the hair, and instead deals with complex traits that vary in development and emerge in development, for it is only in relation to these traits that we can establish the role that heredity plays in development.**

In the second place, what varies when the problem of heredity is transferred from general genetics into pedology is that genetics is preoccupied with the study of those traits that are purely hereditary, traits such as this same colour of the eyes. It is interested in traits that are minimally dependent on the environment, and the more a trait is caused in large part by heredity and the less it is mingled with non-hereditary, environmental, influences determining the trait, the more a pure genetics can obtain the conclusions in which it is interested.

The pedologist, conversely, **is not interested in purely hereditary traits that are independent of the environment, but in those traits the development of which is affected by the combined influence of the environment and heredity**, because these are where we confront how the definition of a given trait can involve both hereditary propensities and the involvement of environmental influences; these are where we can hope to find what role, what significance, and what specific weight hereditary influences have in comparison with others. In this way, the pedologist, studying the problem of heredity, does not deal purely with heredity but mostly with traits of mixed origin. That is in the second place.

Next,² genetics must, willingly or unwillingly, study traits that are not generally purely hereditary but differential, variants existing within the human species. For example, genetics studies differently coloured eyes because this varies in people. But here heredity conditions not only those traits which distinguish me from other people but also traits that I have in common with other people. For example, I am dark-eyed—this is a differentiating trait, a variant of eye colouration that distinguishes me from light-eyed persons. But the eye's structure itself—this is also a structure conditioned by heredity. And that is why genetics, precisely because it must study the laws of transmission of hereditary traits in a pure form, studies mainly these differentiating traits, these divergent traits, and those commonly shared hereditary traits are comparatively less studied.

The pedologist is not only interested in those variable traits which distinguish one child from another but also takes an interest in how those hereditary propensities in human predispositions lead all children to a given type of development.

For example, how does genetics study speech development? Its interest is in those individual particularities, those variations that distinguish the speech of one child from the speech of another child. But for pedology, the first and foremost problem

²What Vygotsky actually says here is наконец, or “finally”. We have translated this, somewhat liberally, as “next” instead, because earlier he said that there would be four “moments” (points) and this is really only point number three. Sure enough, he adds another point “finally and lastly” two paragraphs later. Vygotsky losing track of his numbered moments like this is not that rare, and, along with his frequent questions, this does suggest that a good deal of his lecture is *ex tempore*, done with minimal notes.

consists in figuring out what common hereditary propensities with respect to speech development exist in all children, and what role these propensities play alongside the environmental moments in the speech development of the child. This means that **pedology is interested not so much in the differentiating individual distinctions as in the traits of heredity held in common.**

And finally, and lastly, genetics in the study of heredity deals with traits that are usually preformed, i.e. shaped from the very beginning of development, static, less changeable and less subject to sudden reconstructions during the process of their own development. Why is this so? It is so because genetics wishes to investigate those traits and symptoms in which the laws of heredity are manifest, and for this, it must take traits that are stable and permanent, which do not change in the course of a life. If it were to take those traits that are mutable, those which themselves depend on development, then it would, of course, be very difficult to discern laws of heredity in their pure form.

The pedologist is interested in the influence of heredity on the development of child, but **interested first and foremost in dynamic traits, in those traits that emerge in the course of child development and not those traits which are established independently of this development.**

And all of these four differences in the way in which the problem of heredity is stated in pedology and in genetics are derivable from the different tasks of these two sciences. Genetics studies the laws of heredity as such, and so it requires pure traits, in their pure forms, and it needs traits that are maximally stable and unchanging. **Pedology studies the role of heredity in development, so it needs mixed traits that are not stable and are themselves subject to change in the process of child development.**

Here is one point of departure and one approach to defining the role or the influence of heredity on the course of development. In genetics, the formula of Pearson states that heredity is a correlation between the degree of kinship and the degree of resemblance: given some trait, the more closely related and the more similar we find two individuals under study, the more this trait is due to heredity. But for pedology, this formula turns out to be wrong. Can we say that in a child's development heredity is a correlation between the degree of kinship and the degree of resemblance? For example, a child may be very similar to his father in the matter of the qualities of his character, in the matter of his beliefs, in the matter of his tastes and his predilections. Let us assume that this resemblance is 90%. Complete coincidence would be 100%. Let us assume that the similarity is 90%. We assume that the degree of kinship is of the closest—100%. Can we say, therefore, that in this resemblance between father and son the similarities are *necessarily* caused by hereditary factors? It seems to me that the answer is no. After all, it could be because the father influenced his son not by genetic factors but by environmental factors.

Let me give a simple study which has led to a number of misunderstandings. In Germany, Peters studied the marks of school-age children for four generations in folk schools and discovered that there was a very high correlation between the good marks of a great-grandfather, a grandfather, a father, and a son, and between the poor marks of a great-grandfather, a grandfather, a father and a son. He concluded from this that

the ability to do well in school and get good grades is, according to the formula of Pearson, hereditarily conditioned. Why? Because the correlation between good and bad marks that we find between close relatives turns out to be closer than that which we find between other school children in the study. But we need only approach this study from a pedological point of view to see that this conclusion is wrong. Why? What does it take to get good marks in school? A series of conditions are needed. Say, if you just take wealthy farmers—and Peters studied mostly German farmers, the rural population—don't wealthy farmers with good incomes, other conditions being equal, have a better chance to have their children do well in school than non-wealthy, poor peasants? Of course, they do. Doesn't the very fact that the great-grandfather, grandfather, and father were literate create the conditions for the fact that the grandson is literate? Of course, it does. It seems that when it comes to the development of traits that are very complex and not laid down at the outset, to traits which involve both hereditary and environmental moments, the fact that there are similarities and that these coincide with the degree of relationship can tell us nothing about their hereditary or non-hereditary nature.³

Consider a second study. Bühler, in Germany, studying juvenile delinquency, found a significant and high correlation between delinquency in parents and delinquency in children. For parents who had at one time been themselves offenders, i.e. both parents had at some time been imprisoned or one of the parents had been imprisoned, for these parents, there was a much larger proportion of offenders amongst

³Vygotsky is giving these lectures at a dark moment in the development of psychology; in Germany, a new racial psychology has been announced by psychologists that Vygotsky once admired (e.g. Narziss Ach, Felix Krueger, Erik Jaensch, and Eduard Spranger). Perhaps this is why Vygotsky insists upon the importance of the common human endowment in pedology, why he stresses the genetic features which unite human races rather than those that divide them, why he uses his own dark Jewish eyes as an example of the kinds of traits that do not pose problems of interest to the pedologist. And perhaps this is also why he dwells here on confusions raised by the work of Pearson, Peters and Bühler.

Karl Pearson (1857–1936) was the British mathematician who developed modern statistical analysis (the Pearson correlation is named after him). Because, he said, acquired characteristics could not be transmitted to children, and only genetic characteristics were stable, it was a waste of time to try to educate “inferior stock”, because the task would have to be repeated with every generation. Anyway, Pearson argued, “Nordic” white people had become a superior race (by living in a more difficult northern climate than other races) and so they would eventually purify the world of other races by killing them all off. (The inferiority of Jews, according to Pearson, stemmed from their southern ancestry.)

Wilhelm Peters (1880–1963) completed his doctorate on colour perception under Wilhelm Wundt in 1904. He then joined the Würzburg school, where in 1915 he published the work on the correlation of school grades to which Vygotsky refers. Like many other German intellectuals (including Marx and Mendelssohn), Peters was from a Jewish family that had converted to Christianity; this meant that he lost his job during the Nazi years. He went to London and then Istanbul, and returned to Würzburg after the war, where he worked for learning-disadvantaged school children.

Today we know that Vygotsky and the pedologists were being far more scientific to emphasize the lack of variability in genetics. Work by Lewontin and others has demonstrated—using Pearson's own statistical techniques—that “race” has no real biological basis: for the vast majority of traits, the physical genetic variability within a race is greater than the variability we assume between races (see, for example, Lewontin et al. 1984).

their children than for a group of parents of whom none had ever been imprisoned. With this Bühler once again makes inferences according to the formula of Pearson: once there is a resemblance between parents and children in delinquency and the resemblance is closely related to the degree of kinship, there is the inference that the inclinations that lead a person to jail are transmitted by heredity, determined by heredity. Once again, we see the incorrectness of this inference applied to complex, dynamic, and mixed traits. Why is this? Yes, it is because the fact of parents being in prison can impel the child to commit offences as well. He may become homeless and hungry, and the very example of the parents may act in a corrupting manner. Finally, causes of a social character which impelled the father and mother to commit offences—these may do likewise for the child. This means that in all of these cases where the formula of Pearson is invoked, it leads to an erroneous conclusion.⁴

As a conclusion, we may say **that the problem of heredity stands in such a different light in genetics than it does in pedology that the general formula, which defines heredity for Pearson, turns out to be incorrect when applied to the inheritance of the complex traits studied by pedology.**

I wish to tell you of the basic methods with the aid of which **contemporary pedology studies heredity and its role in the development of the child: the method of the comparative study of twins.** You know that sometimes twins are born. And these twins are of two kinds, as you have probably also heard. One type of twin is called monozygotic, and the others are called dizygotic twins. The difference between them lies in this, that sometimes two children are born emerging from the same fertilized ovum, and other times two children are born as a result of two different fertilized ova. I think that you understand what a substantial difference there is between these two kinds of children. Monozygotic twins have identical heredity; these are the only beings extant in the world with a heredity that is absolutely the same—as expressed by one of the researchers, their heredity is as identical as the heredity in the right and left half of our bodies. Why is this? Yes, it is because they develop from a single fertilized ovum; that is, from the same paternal and maternal cell. This means **the hereditary propensities of monozygotic twins are absolutely the same.**

With respect to dizygotic twins, those which develop from two fertilized ova, their heredity is not identical, and they differ the one from the other just as brothers and sisters differ, or just as two brothers or two sisters do.

Now imagine to yourselves that we are studying these twins, mono- and heterozygotic, and that we compare them with each other in the following way. I study some other property, let us say, the development of speech. I study both, let us say, in monozygotic twins. Imagine that I have four children, one a pair of monozygotic

⁴This refers to the work of Karl Bühler, which Vygotsky also criticized in his “Preface to Bühler” (1997a: 163–173). Bühler is today best known as a semiotician, but in Vygotsky’s time, he was known as a founder member of the Würzburg School, psychologists led by Max Wertheimer who believed in imageless thinking and resisted Wundt’s ban on introspective data. The Würzburgers later gave rise to the Gestalt, or structuralist, school of psychology. This particular research, as well as Bühler’s account of the work of Peters, is from his 1918 book *Die geistige Entwicklung des Kindes*.

twins and the other a pair of dizygotic twins. I study their musical abilities and I study their speech. How do I establish similarity within each pair? I will research how musical abilities develop in one twin and then in the other. If their development is exactly the same, I will say that the correspondence is 100%. If they are developed in such a way that the match is only half-way, I will say that the correspondence is only 50%.

I have studied musical ability in twins and established that for monozygotic twins the similarity coefficient can be given as the figure 0.93 while in dizygotic twins the similarity coefficient can be given as the figure 0.67. If between monozygotic twins there were a complete coincidence, it would be 1; if there was no match at all, it would be 0. And if I researched 100 children and in 93 cases obtained a perfect match, the similarity coefficient would be given as 0.93 while that of the dizygotics would be only 0.67.⁵

I have compared speech within one pair with speech inside another pair. It turns out that speech in monozygous twins yields a similarity coefficient of 0.96 while with dizygotic twins there is a similarity of 0.89.

Now let us examine what this means. I want to ask you, on the basis of these data, which of the two properties I have studied—speech and musical ability—is more due to heredity and which is less so? I reason thus: in what do monozygous and dizygotic twins differ? In the fact that in the monozygous there is an identical heredity. As for the environmental conditions of development in monozygotic and dizygotic twins, their development in utero was the same: both were developed in their mother at one and the same time, meaning that there was the same physical and psychic maternal state in relation to both: one single pregnancy. They were born into and have lived under the same conditions. Usually, except in a few cases of which I will speak later, the conditions of development of the twins are as identical as the lives of two brothers

⁵Vygotsky is referring to a set of tests on monozygotic and dizygotic twins organized by the Medico-Genetic Institute in Moscow in the early 1930s, based on similar work by K.J. Holzinger and Cyril Burt. These are described in greater detail by Luria (1979: 81–103). Three linked problems (at least) arise.

In a previous paragraph, Vygotsky suggested that partial resemblance in musical aptitude and musical ability could be assessed in two pairs of twins; it's not clear how this can be done, nor how this partial resemblance would be made comparable to (presumably less partial) resemblances in language ability; assessing how well twins play piano is very different from assessing how well they speak their mother tongue. Secondly, Vygotsky seems to suggest that when we work with large numbers (e.g. fifty pairs, or perhaps—since he speaks of “93 cases”—one hundred pairs) we can simply score identity as one and dissimilarity as zero—not a very nuanced way to score. Thirdly, Vygotsky seems to equate the assessment of partial resemblance in two pairs of twins in the previous paragraph with the all-or-nothing resemblance in fifty or a hundred pairs in this paragraph. These are two very different kinds of resemblance.

Note, however, that the general method Vygotsky introduces here is still very much in use. So for example, the same method has been used in dizygotic and monozygotic pairs of twins to determine the degree to which sexual orientation is hereditary: the “trait” of gayness correlated 65.8% in monozygotics but only 30.4% in dizygotics (Whitam and Martin 1993). Similarly, the extent of “agreement” for the so-called “big five” character traits: “neuroticism”, “extroversion”, “agreeableness”, “conscientiousness” and “openness” was between 0.48 and 0.51 for monozygotic twins and between 0.24 and 0.28 for dizygotics (Loehlin 1992).

in one family, and more: since they are twins, because they were born at the same time and lived, usually, together. And therefore I think: in relation to the fact that the dizygotic are similar with respect to their environment and the monozygous are similar with respect to their environment, in what do the monozygous and dizygotic differ? In the fact that one has an identical heredity and the other has heredity that is not identical.

I reason thus: If my trait depends on heredity this means that between monozygotic and dizygotic twins there should be a very large discrepancy in similarity. Because if the trait depends on heredity and here the heredity is identical while there it differs, then the similarity in identical heredity should be very much greater than the similarity of the other. **In monozygotic and in dizygotic twins the environmental conditions within each pair is more or less the same, but in monozygotic twins the heredity is identical while in dizygotic twins it is not identical.**

Two children are born from a single fertilized ovum. If I study a trait which depends maximally upon heredity, then the degree of similarity of this trait should be more with monozygosis than with dizygosis, because there is one and the same heredity. The trait that I study depends upon heredity, so here there must be a great similarity, while in dizygosis there is non-identical heredity, which means that the similarity must be less. This means that **the degree of hereditary conditionality of any trait may be determined by the differences in the coefficients of similarity between monozygotic and dizygotic twins. The more the similarity coefficient diverges, that is, the more similarities among the monozygotic than among dizygotic twins, the more the trait is conditioned by hereditary.**

Let us look at some examples. Just imagine that a certain Trait A yields a degree of similarity in monozygotics of 0.30 and in dizygotics of 0.30. What does this mean? Does the fact that some have identical heredity and others have non-identical heredity have any impact? What impact does this fact have on the coefficient of similarity? None. Here and there, it's 0.30. Hence, heredity played no role. If there are no differences between them, then the trait is not hereditarily determined. But just imagine that in another Trait B monozygotic twins yield a similarity 0.93 while dizygotics have 0.13. This, for example, refers to the timbre of the voice. Surely, this is a trait that is genetically conditional. Why? Because the environmental conditions are the same here and there, and the similarity is minimal here and maximal there. Why might it be that there is this similarity here? Because the heredity is identical. So, the more difference between the coefficients of similarity of MT (monozygotic twins—T) and DT (dizygotic twins—T), the more a trait is due to heredity.⁶

Now, if we return to our examples, we will see which is more due to heredity—musical ability or speech development? Musical giftedness. Because here the difference is one between 0.67 and 0.93, and there it is 0.96 and 0.89. So, what is important is not the absolute coefficient of similarity but how these coefficients of similarity diverge here. For example, I could take a trait which would have given

⁶“The text uses “ОБ” (Однойяйцевыми Близнецами; that is, Monozygotic Twins) and “ДБ” (Двужяйцевыми Близнецами; that is, “Dizygotic Twins”). We will use “MT” for the former and “DT” for the latter henceforth.

MT 0.17 and DT 0.20 and this trait depends more upon heredity than does the trait of speech, which has an MT of 0.96. What is important is the divergence.⁷

If this is understood, you can picture the basis and the very character of the method which is used in pedology as a basis for the study of heredity and its role in development. Monozygotic twins and dizygotic twins are taken. For simplicity, I took a single pair, but with statistics I may test not two pairs but a hundred or several hundred pairs of both.

Why do I need so many pairs? To eliminate the accidental traits. There are twins who, in terms of their environment, are still not treated equitably. One of these cases in a study of twins was published in Moscow, where the mother claimed that the twins from the age of infancy had lived in exactly the same conditions, had been fed the same, had been bathed the same, and had received the same care. But upon questioning, it transpired that she always fed one first and then the other, that she bathed first one and then the other in the dirty water. So, the hygienic conditions and the nutritional conditions did not turn out to be the same. And so discrepancies occur, such that one twin feels somehow more successful, more loved, and one simply comes out worst in external conditions, and in order to compensate for these circumstances, we take a mass of material on both MTs and DTs.

This mass of material allows us to obtain more robust and statistically verified conclusions. When this material is gathered, taking any complex trait, say the development of speech, or the development of musical abilities, or the child's mental

⁷It is not clear if the stenographer understands the point Vygotsky is making here. The difference between 0.17 and 0.20 is only 0.03. This is actually less, in absolute terms, than the differences Vygotsky gave earlier for speech and musical ability.

Type of twin	Similarity of speech (coefficient)	Similarity of musical ability (coefficient)
Monozygotic	0.96	0.93
Dizygotic	0.89	0.67
Difference	0.07	0.26

As you can see, the difference between monozygotic and dizygotic twins in speech development is actually 0.07. So why is the imaginary trait that Vygotsky chooses, which has a difference between monozygotic twins and dizygotic twins of only 0.03, considered to be MORE heritable?

Notice that the correlations for the imaginary trait are, in absolute terms, very small—only about one fifth or less of the total variance. But in the case of speech, the correlations are very large—more than four-fifths of the total variance. So with speech, the difference only a small proportion of the assessed similarity. But in the case of the imaginary trait, the difference is a much larger proportion of the assessed similarity. This is, as Vygotsky says, “an important difference”.

Of course, we cannot assume that any complex cultural ability is precisely measurable with a single variable. If I want to measure swimming ability, I cannot simply rely on speed; I must also consider duration. It is easy to imagine that speed might be more dependent on practice and thus environment while duration might be more dependent on lung capacity and thus heredity. Vygotsky discusses these problems in some detail below.

development, the coefficients of similarity for MTs and DTs are revealed, and it appears which traits have more divergences and which traits have less. The trait which diverges less from here to there (i.e. from MTs to DTs—T) is, other conditions being equal, less due to heredity. The more divergent trait is, all other things being equal, more due to heredity. **This way of studying complex traits in monozygotic and dizygotic twins offers the possibility of studying the influence of heredity on the formation and development of complex dynamic traits which are determined not only by heredity but also by the environment.**

I now wish to present to you in brief the results of research on the role of heredity in development, when the method of the comparative study of monozygotic and dizygotic twins is used.

First, if we consider the traits of development associated with the psychology of the child, those complex traits which arise in development and which are conditioned by hereditary and environmental factors and those traits that are associated with the development of a conscious human personality in man, it turns out that in the elementary functions, the simplest, most primitive, the difference is more than in the higher functions. These would be the first and main results. For example, if we take the motor skills of the child and we investigate the development of the motor apparatus and the motoric functions in monozygotic and dizygotic twins, the more elementary motor functions that we take, those which stand closer in nature to the most elementary motor act, will show a higher difference between monozygotic and dizygotic twins, and when the discrepancy is higher, then this function is more conditional on heredity. If you take what are usually called the psycho-motoric actions, i.e., the higher forms of movement, such as the volitional forms of motion, those movements which are in one way or another linked to the psyche, to human consciousness, which are related to higher brain centers, there will be less difference, i.e. these functions will be less conditional upon heredity.

Thus, the first law, which is derived based on these studies shows that other conditions being equal (i.e. if homogeneous functions are selected) **the more elementary the function, the larger the discrepancy in similarity coefficients between MT and DT. The higher the function—once again with other things being equal (if homogeneous functions are selected)—the less the difference.** So, it might be said, putting it in the form of a special law, that elementary functions which stand, as it were, at the very beginning of development, constituting the necessary preconditions to subsequent development are, other things being equal, more due to heredity than higher functions, which arise relatively late in development.

The second law explains this a bit. Imagine that we have a number of functions, a number of traits: *A, B, C, D, H*, etc. Here I no longer take note of the monozygotics and dizygotics separately; I only note the differences between them. The greater the difference, the more conditional upon heredity.⁸

⁸Just as he did earlier (when he spoke of “Trait A” and “Trait B”), Vygotsky is using the Roman alphabet, not the Russian one (i.e. he uses “*A, B, C, D*” instead of “*A, Б, В, Г, Д*”). So the use of “*H*” (equivalent to “*n*” in English) is somewhat puzzling—it’s not the letter that follows in either alphabet. Nor is this likely to be a transcription error; in the next paragraph, Vygotsky does exactly the same

Suppose that we begin here, with the maximal difference. The maximal difference is equal to 0.60. If we take a series of functions, we will never find a uniform decline in the difference: Function *A*: 0.60, *B*: 0.55, *C*: 0.50, *D*: 0.45, *H*: 0.40, *K*: 0.35, *L*: 0.30, etc. For a long time, researchers have sought such a step-ladder, which would have at the top the most hereditarily conditioned functions, on the bottom those that are least due to hereditary causes, and between them, the functions regularly arranged in descending order of their hereditary conditionality.

It was once believed that this could be found. But it has turned out impossible to ever obtain such a series. If we take a series of functions, more or less completely covering the human manifestations of a child's development, there will always be some sharp fault line that divides one group of functions from the others, so that between the two groups of functions, there is no uniform transition such as might be found within the same group of functions but instead more of a leap. If differences within one group are given in tens, e.g. the difference between 60 and 45, then the other group will be found to have differences expressed in units of less than ten. There does not exist, therefore, any kind of uniform, gradual decline in conditioning through a whole series of functions. When we study all of these functions together, we find a fault line that divides the entire range of functions into two parts.⁹

When we ask ourselves what these two groups of functions are, it transpires that with one group, where the difference is expressed in dramatically large, impressive

thing and also omits "I" and "J". But in the next paragraph, he does point out that there must be a huge leap from a simple, non-dynamic function (such as perfect pitch, which appears to homogenous, unchanging and not teachable) to a complex, dynamic function such as musicality (which is an interaction of many abilities, constantly changing, and very teachable). Perhaps Vygotsky is having a little joke here—the missing letters represent the "gap" in the inheritability of functions as we go from lower functions to higher functions!

⁹When Vygotsky says that $A = 0.60$, he does not mean that this is the coefficient of similarity between twins, monozygotic or dizygotic. He means, as he explained earlier, for a given trait *A*, $MT - DT = 0.60$, i.e., the difference between the coefficient of similarity between monozygotic twins and the coefficient of similarity between dizygotic twins is 0.60. So, for example, if dizygotic twins agreed 30 per cent of the time but monozygotics agreed 90 per cent of the time, the difference between the coefficients of similarity would be 0.60, and the trait would be therefore largely hereditary, like eye colour or voice timbre and not like speech, where the difference is (as we saw) only 0.07.

Vygotsky then imagines a whole series, like a mathematical series:

Let $f(X) = MT(X) - DT(X)$. Then: $f(A) = 0.60, f(B) = 0.55, f(C) = 0.50, f(D) = 0.45$, etc.

As we can see, the difference between functions is getting smaller, and therefore the reliance upon heredity is gradually declining. But Vygotsky says that no such gradual continuum is possible: the "break" between simple, univariate, preformed functions and those that are complex, multivariate and dynamic is qualitative and catastrophic, not quantitative and incremental. On one side, the differences are large (in the tens). On the other, they are small (as we saw with speech). The "rupture" between the two marks the moment where phylogenesis gives way to sociogenesis as the main principle of human progress, the explosive increase of culture we see with human civilizations and their ability to provide food, hygiene and education for their children.

Parents can observe this nonlinearity of human progress with their own eyes and ears. The infant depends a great deal on voice timbre for communication with parents. The toddler depends very little upon it, and instead employs vocabulary and grammar. The transition between the former (which we know is largely hereditary) and the latter (which we know is hardly hereditary at all) is not a gradual one: it is a matter of perhaps two years or eighteen months.

numbers, we are dealing with the lower elementary functions, which, it may be supposed, are mainly the product of the biological evolution which took place in the course of the formation of the human race. With the second group, which is located already on the other side of the fault line and which features a discrepancy that is not given in impressively large figures but rather numbers that are considerably smaller, we are talking about the higher functions that are specific to humans and, as can be assumed on the basis of existing studies, which are the product of the historical development of man, i.e. the accomplishments which man made in the historical period of the developmental process.

Consequently, this fault line, this sharp demarcation, shows us that the various functions in their ontogenetic development not only have quantitatively different relationships to heredity, some with more and some with less, but that there is a group of higher functions that stand qualitatively in a totally different relation to heredity than the group of lower functions. This is reflected in the fact that there is no gradual, stepwise transition, but rather a sharp turning point, so **the very scale of discrepancy differs for the different groups of functions**. Each group has its own differences within, some more, some less, but between these two groups of functions, there is no gradual transition but **a breaking point**. This shows that **the higher functions, which are the product of historical development of man, stand in another relation to heredity than functions that are mostly evolutionary products of the development process**.

From the two laws that I have expounded to you thus far we can and should draw conclusions that are of great theoretical and practical value.

What conclusion can we draw from the first law? If you remember, the first law that I set out for you was that the difference in higher functions is smaller, all other things being equal, than that in elementary ones. This leads to the conclusion that **the longer the path of development of a given function is, the less directly influenced by heredity it will be, the more indirect its influence shall be** (for what does "higher" function mean? It means: appearing later in development, accomplished over a longer path of development). **The shorter the path of development in any function, the more it is directly affected by the influence of heredity**.

If you take the colour of eyes, does this trait require a lengthy path of development in humans? A trivial one. Therefore, it is maximally conditioned by heredity. And if you take such higher functions in a human as, say, his character, his ethical beliefs, his world view, etc., the longer path there is in accomplishing a function, the less it is, other conditions being equal, directly conditioned by heredity. This means that **development does not simply realize, modify, or combine hereditary propensities; rather, development brings to those propensities something new. It mediates, as has been said, the realization of these hereditary propensities and in the process of development, something new arises, through which this or that hereditary influence is refracted**.

From the second law, which says that the functions are sharply divided into two parts, that there is no gradualness or incremental continuum between all functions in terms of their hereditary dependence, we must draw a conclusion which may be formulated thus: hereditary propensities stand in relation to the lower and to the

higher functions in ways that differ in principle. If hereditary propensities in the lower functions stand in a direct relation to the causes of their development, then in relation to the higher functions they play, rather, the role of prerequisites, but they do not play the role of moments that determine this development. The second law states that there is no gradual transition. We may draw the conclusion that some functions are not simply less conditional than others. It may be said about every lower function that it stands in a different relation to heredity; that **hereditary predispositions stand in different relations to life and in different relations to the higher functions**. So—in what other relations? They stand, with regard to lower functions, in a relation of **more or less direct influence on their character, but with regard to higher functions, they are no more than a precondition, the presence of which is necessary for the higher functions to develop, but the propensity itself does not contain anything more than a precondition**.¹⁰

But the most complex, difficult, important and interesting law...this is our third one. If we can only grasp it, our foundations will be complete. I will explicate it using a concrete example, and then take a general view. Let us take a simple example. Imagine I have researched a trait in monozygotic and dizygotic twins and discovered that the difference between the coefficients of similarity is given by the number 0.37. This means that the trait is largely conditioned by heredity—there is a large difference. But how is it that if I study it in children of three years old, something happens when these children are studied again at 7 or 13 years? It turns out that the difference is not the same. At seven years, it will be 0.29, and at 13, it will be 0.27. It transpires that this difference is not constant, stable, or unchanging over age; that it changes with age. Such are the facts.

Now, let us ask what this might mean. At first glance, it seems incomprehensible. We agreed: the difference is a measure of hereditary conditionality. Here the difference is greater and there is it smaller with respect to the same trait. So, the hereditary conditionality of the trait has changed. But can the heredity of the child change from three to thirteen years of age? Of course not. No heredity varies from three to thirteen years of age. But what could have happened? The role of heredity in development may change; the specific weight of the hereditary influence may change.

If this is clear, we may formulate the law which interests us in a general form. We may put it this way: **the coefficient of similarity between MT and DT in relation to one and the same trait does not remain constant or stable** throughout the ages of child development but changes in the transition from age to age, and

¹⁰Vygotsky (1997b: 20, 38) attributes this to Jennings, who argued that activity is essentially a function of anatomy, and we cannot do things for which we have not yet inherited physical organs. The infusorian can swim because it has cilia. We cannot fly, because we do not have wings. But the Jennings principle does not apply to higher functions, for reasons that are both negative and positive. Negatively, organs are necessary but not sufficient for the development of higher functions. Take, for example, the vocal tract. The shape of the vocal tract is undoubtedly hereditary in nature—that is why women have higher voices than men. But a vocal tract is not enough for the development of speech. Positively, because higher functions are not directly dependent upon the inheritance of organs, functions that are entirely new and quite independent of hereditary tendencies can arise. After all, we do fly, even though we do not have wings.

so does the discrepancy between the coefficients of MT and DT. How can this discrepancy change? This discrepancy is a difference. A difference can change only if the subtrahend or the minuend is changed. So, if you change the subtrahend or the minuend, you change the difference. What conclusion can we draw from this law? **That heredity does not change during the development throughout the ages, but that the specific weight of hereditary influence may change during development if, as we said at the outset, development is really the rise of something new that is not contained in its finished form in inheritable propensities.**¹¹

So, let us say that in a period of development when there is just such an occurrence of the new, the role of hereditary influence may become proportionately less, may diminish. Consequently, the specific weight, the relative importance of genetic influence in development, is constantly changing. The colouration of eyes is due to heredity. Let us say that I, owing to some law of heredity, inherited from such and such an ancestor, a darker eye colouration. Does this change with age development? No. But it turns out that hereditary propensities which are unchanging in themselves may change their weight in relation to the higher functions in the course of development. Wherever traits develop, there we find that something which is indubitably new arises in the given trait, and, **as the new develops, the specific weight of hereditary influence, may be amplified and brought to the first plane, or it may be weakened and pushed into the rear plane.**

What I said now (when I took the example of diminishing hereditary influence) was the difference in development of one aspect of speech.¹² But do not think what always happens is that the discrepancy is maximal in early years, is less in the middle years, and in senior years is at the minimum. Sometimes, we have to deal with the opposite phenomenon, when the difference is very small in early childhood and is very great in the 1 <?> years.¹³ For example, with respect to certain features of psychosexual make up, it may be said that the difference between MT and DT

¹¹Let the influence of the environment be $f(E)$ and the influence of heredity be $f(H)$. We can express the ratio of environmental influence to hereditary influence as $f(E)/f(H)$.

Now, Vygotsky says that this ratio, $f(E)/f(H)$, is not a constant. It changes. But this is not simply because the influence of the environment increases (say, as when sunlight produces melanin which darkens the colour of a person's eyes). As we shall see, it sometimes happens that the influence of heredity increases in development (Vygotsky's example is sexuality, but susceptibility to cancer is another example).

As Vygotsky says, there is something else—something that is neither given at birth nor given by the environment, some new psychological formation which enters development: $x[f(E)/f(H)]$. Not only that, this new formation “ x ” changes with each age level. For the moment, Vygotsky just mysteriously refers to it as “something new”.

¹²For example, intonation and stress are more obviously influenced by voice timbre, which is more susceptible to hereditary influences. Articulation of vowels and consonants is more environmentally influenced (by which mother tongue you are learning). Intonation and stress are more important in infant proto-language while the articulation of vowels and consonants is more important in grammatical speech and in literacy. Thus, the diminution of hereditary influence is, as Vygotsky says here, an aspect of speech development.

¹³Korotaeva notes: Так в стенограмме; that is, “thus in the transcript”, meaning that there is only a number “1” whose meaning in this context is unclear. However, it seems fairly obvious that Vygotsky means the years of adolescence.

is precisely minimal in the early years, and when the reproductive system and the entirety of human psychosexuality is fully deployed during puberty and reaches maturity, then hereditary influence in these features is particularly strong. So, it may happen that the proportion of hereditary effects decreases with age, but it may happen that it increases with age, and it may happen that it falls and then increases, or vice versa. Consequently, there is no single rule for all functions that indicates that with age the proportion must necessarily increase or decrease.

Finally, there **is a fourth proposition**, or a fourth result, that has been obtained in the study of twins and which also characterizes the role of heredity in the development of the child. These studies found that **there cannot be a summative definition of hereditary influences on the whole course of development which sums up and applies equally to all the facets of development for all ages**. We have seen that some traits have one specific weight from the point of view of their hereditary conditionality, and others have another. Some aspects of development are more related to heredity and others less so. In one age, heredity may influence the same trait more directly, and in another, it may be less directly affected. Therefore, there is no general formula, there is no general rule that can sum up, express, and define the effect of heredity on the course of development. These hereditary influences are strongly differentiated by individual aspects and by individual developments or by the individual developmental ages of these aspects.

That is why, **when dealing with complex, shifting, dynamic, traits which change in the course of development, the pedologist cannot separate out the various aspects of the development into genetically caused and environmentally conditioned. The problem is much more complicated than this; it requires differentiated study of the hereditary influences on development, separately for each aspect and separately for the same aspect of development at various age levels.**

I still must say something very brief concerning the last two propositions which have been derived from the study of twins which, alongside those I have outlined this far, will exhaust the fundamentals, in the main, of the content of the general study of the role of heredity in the development of the child.

The first of these propositions shows that the difference in the coefficients of similarity between MT and DT is smaller in the inheritance of universal properties than the inheritance of variant properties, of course, other conditions being equal, i.e. if we take homogenous or comparable features. For example, take the properties of my eye. I think that you will easily understand that if all of the traits of my eye are listed, there will be some variant traits in which my traits may differ from those of other people and there will be common traits, which are common to all human eyes. **This is precisely why, other conditions being equal, if we take analogous traits, it appears that the difference is smaller in the study of the development of universal human traits and the difference is larger in the study of variant characteristics, i.e., in those that change when from one person to another.** As we shall see subsequently, this law has a very broad application in the teachings concerning the physical development of the child, in the study of the general laws

of growth and the constitutional peculiarities of the patterns that characterize the growth of children who belong to different constitutional types.

And **finally, the last proposition** which is frequently set forth is essentially a summary of what we have said earlier. **The difference in the coefficients we consider as a sign of the hereditary conditionality of a given trait.** It turns out that for traits of development this difference is never equal to 0 and is never equal to one hundred. What does this mean? If a difference is equal to 0, this would mean that in the development of this trait, heredity plays no role. If it is 100, this would mean that this alone has any value at all. If we take the simple traits with which genetics operates, say, the colour of eyes, we find that the coefficient of variation **is equal to zero or the coefficient of variation is equal to 100. But if we take the traits with which pedology operates, traits which are associated with development, which have a history of development, it appears that the difference is never equal to zero nor to 100.** This means that there is always a difference, and once there is a difference, though small, at the top, which would be the highest function we studied, this means; **that heredity is involved in the development, although it has a relatively small weight in this particular case.** Never is the role of this component reduced to absolutely zero. And conversely—never is this difference equal to 100, **i.e. never is a trait of development purely conditioned by heredity, a purely hereditary trait; i.e. the environment is always also involved in development. Consequently, development always has both hereditary and environmental aspects in unity.** True, this unity differs. We have seen that role or the weight of hereditary influences may be more in relation to one function than to others, in relation to one age less than to others. Consequently, **this unity is an uneven unity.** Still, no matter how small the proportion of heredity, it can never fall to zero, and also whatever specific weight the environment has in the development of the child it also never falls to zero, so that the difference equals 100. Therefore, **always, in all developing traits, there are components of hereditary influence and components of environmental influences certainly involved, i.e. development always presents itself as a dynamic process, and the unity of hereditary and environmental influences, but this unity is not constant, not stable, not given once and for all or summarily defined, but a changing unity, differentiated, variably constructed and in need of a concrete study each time.** And nobody has at any time ever observed aspects of development which proceed according to a purely hereditary or to a purely environmental manner, **i.e. never has there been development composed of the mechanical combination of two factors—two external forces—environment and heredity, which by combining the one with the other, push this development forward.**

Next time, we shall discuss and clarify the study of the environment, and as we discovered today with the difference between the study of heredity in pedology and the study of heredity in genetics, we will discover the difference between the study of the environment in pedology and the study of the environment in, for example, hygiene, and then we will be able to draw some specific conclusions concerning our past conversation about the nature of the method of pedological research.

References

- Bühler, K. (1918). *Die geistige Entwicklung des Kindes*. Jena: Fischer.
- Lewontin, R., Rose, S., & Kamin, L. J. (1984). *Not in our genes: Biology ideology and human nature*. New York: Pantheon.
- Loehlin, J. C. (1992). *Genes and environment in personality development*. Thousand Oaks, CA: Sage.
- Luria, A. (1979). *The making of mind: A personal account of Soviet psychology*. (M. Cole and S. Cole eds.) London and Cambridge: Harvard.
- Выготский, Л. С. (2001). *Лекции по педологии*. Ижевск: Издательский дом “Удмуртский университет”.
- Vygotsky, L. S. (1997a). *Collected works* (Vol. 3). London and New York: Plenum.
- Vygotsky, L. S. (1997b). History of the development of the higher mental functions. In L. S. Vygotsky, *Collected works* (Vol. 4). London and New York: Plenum.
- Vygotskij, L. S. (2018). *La science du développement de l'enfant: Texts pédologiques (1930–1934)*. Traduits par I. Léopoldoff-Martin. Berne: Collection Exploration Peter Lang.
- Whitam, F. L., & Martin, D. M. (1993). Homosexual orientation in twins: A report on 61 pairs and three triplet sets. *Archives of Sexual Behavior*, 22(3), 187–206.

Chapter 4

The Problem of the Environment in Pedology



Outline of Lecture 4

Vygotsky begins by saying that just as pedology does not undertake the study of heredity for its own sake, pedology takes the environment of the child only in relation to the child's development. He suggests that relational indicators are the way to accomplish this. He then offers examples of what these relational indicators might look like: one for consciousness and one for speech. He concludes by asserting that ontogenesis is unlike other forms of development because of the presence of a final, ideal form as a guide from the very outset of development and drawing two important conclusions from this for all child development. First, higher functions always come to us from our social situation of development. Second, where the ideal form is not represented in the social situation, development will suffer.

Introduction: Relational Indicators. Vygotsky argues that the "indicators" of development are relative; that is, they do not have the kind of objective value that a purely environmentally oriented indicator (e.g. socio-economic status) would have. Vygotsky offers two arguments in support of this idea.

1. Even the same environmental factor, e.g. speech of people surrounding the child, may have a very different values at different moments of development. So, for example, although the adult speech in a child's environment may not change much between infancy and adolescence, the child's ability to participate in discourse has changed altogether, and his or her ability to influence the world around and be influenced by it has changed correspondingly. Thus, the radius of child action changes with development.
2. Different factors become important at different moments of development. For example, classroom instruction is an entirely new factor when the child begins school. Even within speech, the moment of importance may shift decisively from graphic-visual images to the more abstract thinking that we find in the use of concepts. Thus, the child herself or himself, as actor, changes with development.

Clinical Examples and Units of Analysis. In this section, Vygotsky offers several examples of what these relative indicators might look like using observations of children confronting various psychological problems at various ages. Note that the unit of analysis itself develops, by becoming differentiated in the course of functioning as part of a larger, more complex structure. So, for example, the *perezhivanie* of the infant develops into that of the toddler, and the *perezhivanie* of the toddler into that of the school child and ultimately that of the adolescent. In the same way, word meaning develops, from something that is mostly immediate sense to something that has abstract meaning.

Vygotsky takes a clinical cross section of three children from the same environment, namely an alcoholic mother who beats the children. In this way, Vygotsky demonstrates that *perezhivanie* functions as a prism which reflects different spectra of light on the same environment. Vygotsky now lays out several units of analysis for psychological research that retain the properties of the psychological phenomenon as a whole, albeit in a highly simplified form.

The first unit of analysis is *perezhivanie* itself. A *perezhivanie* is always an experience of something external to the experiencer, but it must always include the personality features of the experiencer as well. For this reason, Vygotsky considers it a unity of environment and personality. Vygotsky gives several examples when the child's understanding and conscious grasp of the situation is different from those in the surrounding social environment. First of all, the "sense" or the "significance" of an illness is not understood by the child: a mother's deathbed, where the child is given sweets and kept amused. Secondly, a deformed child who is also mentally retarded and therefore unable to generalize the experience of being taunted by other children or to attribute it to his deformity and thus develop feelings of inferiority.

Vygotsky, by highlighting these examples, makes two points clear which are not immediately obvious in the better known example of the alcoholic mother and her three children. First of all, *perezhivanie* is not necessarily an emotional attitude any more than it is necessarily an intellectual realization: emotion and intellect are different elements of a larger unit. What *perezhivanie* does, necessarily, include is conscious awareness (осознание) of some kind. Secondly, *perezhivanie* is not simply a product of the environment, it also inheres in the child himself or herself; it is the failure to internalize *perezhivanie* that protects the retarded child from generalizing across experiences of abuse and developing a sense of inferiority. This refusal to internalize the *perezhivanie* of abuse can, presumably, also be volitional and learned by non-retarded children.

The second unit of analysis is word meaning. Here especially we can see how one and the same speech event is reflected very differently in minds at different stages of development. Vygotsky remarks that a young child will think of meanings such as "street", "person" or "weather" as referring to images of a highly concrete character, or factual and quite heterogeneous relationships rather than to abstract and general concepts based on a single, homogenous, logical relationship equally applicable to all streets, all persons and all weather. The child appears to think in "families", where each member may have quite a different relationship to others.

Much of what has been said up to this point concerns what the role of the environment is not: it is not homogenous, not uniform and not stable from age to age. That parallels what was said previously about heredity. Vygotsky now wishes to characterize the role of the environment in positive terms and to talk about what is unique and specific to the environment. For this reason, he proposes to take traits which are maximally dependent upon the environment (just as geneticists take traits which are maximally dependent upon heredity in order to study genetic laws in a pure form). And just as we found in the earlier chapter that it was lower psychological functions which had a more direct relationship to heredity, Vygotsky proposes that it is the higher psychological functions in general and the development of personality and consciousness in particular which should be investigated in order to reveal the role of the environment in a relatively pure form.

Conclusion: The Uniqueness of Ontogenesis and the General Genetic Law:

In order to define the role of the environment in positive terms, Vygotsky turns his attention to the development of the personality and especially to speech.

What sets the ontogenesis of cultural behaviour apart from its phylogenesis (i.e. the origins of cultural behaviour in prehuman evolution) and even its sociogenesis (i.e. the origins of cultural behaviour in human history) is the presence and participation of a final form from the very onset of development. He gives the example of speech development: even an infant's speech develops in a direct dialogue with the complete, albeit simplified, speech of the infant's caretakers. Such a situation does not occur in phylogenesis; the earliest hominids were never confronted with fully developed humans. Nor does such a situation obtain in sociogenesis; hunter-gatherer and subsistence-agriculture societies do not take industrial or post-industrial societies as models, even when the latter seek to impose themselves by force. But precisely, this situation does obtain in the ontogenesis of cultural behaviour.

Vygotsky draws two important conclusions from this.

1. The environment is not the site but rather the source of development from all of the higher cultural functions, and they cannot develop normally unless the final form is present in some way in the environment.
2. Where children do develop without the appropriate final form in their environment, development is slow, idiosyncratic and arrested.

Vygotsky concludes the lecture by leaving the realm of pedology altogether. He declares that man is a social being, and that all of the qualities which divide him from other animals have developed in social interaction. For example, he says, speech is not invented individually; it cannot develop separately from social interaction. From speech, we develop self-directed speech and ultimately verbal thinking. This is merely one specific instance of a much more general law, the general genetic law that stipulates the higher functions must develop between people before they can develop within them.

Lecture 4

Today the topic of our lecture is the problem of the environment in pedology. When we talked of the problem of heredity, we saw that pedology studies heredity from its own special point of view and is not interested in the laws of heredity as such, but rather in the role played by heredity in the development of the child. So too with the environment. Pedology does not study the environment as such; this is the subject of other sciences. Of those sciences which are closest to pedology, we might mention, say, hygiene as the science that studies the environment primarily in terms of its relationship to disease and to the preservation of health.

Just as with the problem of heredity, the pedologist studies, not the environment and not the laws of its construction, but rather the role and the meaning of the environment for, the participation of the environment in, and the influence of the environment on, the development of the child. Just as with the problem of heredity, therefore, we must first of all here and now clarify a few basic laws, some concepts that characterize the significance or the role of the environment in the development of the child.

In the first place, I would like to set out something we have already briefly mentioned, namely, that for a correct understanding of the role of the environment in the development of the child we should always approach the environment, if we may put it thus, not with an absolute yardstick but rather with a relative one. The environment should not be considered in this instance as a setting for development which, due to the fact that it includes certain qualities or certain properties, can thus objectively determine the development of the child. Instead, the environment should always be approached from the point of view of what relationship exists between the child and the environment at a given stage of development. This may be stated as a general rule, now often repeated in pedology, that it is necessary to move from absolute to relative indicators, i.e. the same indicators, but taken up in relation to the child.

Two considerations lead us to defend this idea. The first is that the role of all sorts of environmental moments differ at different age levels. For example, the speech of the surrounding people may be one and the same when the child is six months old as when he is a year and six months, or when he is 3 years and six months old, i.e. the number of words that the child hears, the character of the speech, in the sense of its culture, its vocabulary, its correctness, its literary style may remain completely the same. But everybody will understand that while these in themselves do not change throughout development, each factor will have a different significance when the child understands speech, when he understands nothing at all and when he is in transition and just beginning to understand. This means that the role of the environment in the development of the child may only be clarified when we know the relationship between the child and his environment.

First of all, the environment in the most direct sense of the word varies for each child according to age level. Some authors say that the child's development consists in the gradual expansion of the environment. The unborn child has as environment the mother's womb, and the child who has emerged into the light of day also has as

an immediate environment a very small space. As is known, at first for the newborn the world at a distance does not exist. For the newborn, there is only the world immediately related to him, i.e. united around a narrow space associated with his bodily phenomena and with objects. Gradually, for the child, the world at a distance begins to develop, but in the beginning it is also a very small world, the world of the room, and the world of the nearest yard or street. With walking, the child expands his surroundings, making possible newer and ever newer relations between the child and surrounding people. And then the environment changes due to the fact that enculturation creates a specific environment for the child at each age stage: toddlers in nursery school, preschoolers in kindergarten and pupils in schools.¹ Each age has its own environment, its own defined form, organized for the child, and thus the environment, in the purely literal sense of the word, changes for the child in the transition from one age to another.

But this is too little. Even when the environment remains little changed, the very fact that **the child is changing in the process of development** leads to the circumstance that the role and the significance of these environmental moments, remaining as if unchanging, are changing, and the same environmental moment that plays one role at a given age will two years later begin to have a different significance and play a different role, due to the circumstance that the child has changed, and that this means that the a child's attitude to this environmental moment has changed.

Concerning those examples that we saw with various children, we may say, more precisely and more exactly, that the substantial moments for identifying the influence of the environment on the psychological development of the child, on the development of his conscious personality, are those of *perezhivanie*.² The *perezhivanie* of any situation, the *perezhivanie* of any part of the environment, defines what will be

¹We have translated the word *воспитание* *vospitanie* as “enculturation” rather than “education” or “upbringing”, because it is more general than both: “enculturation” involves the teacher’s work as well as that of the parent. Note that “enculturation” is somewhat unusual and formal in English, while the corresponding Russian word is in general use.

²We have chosen to romanize the term *переживание* but leave it untranslated: “*perezhivanie*”. There is no obvious equivalent for it in the English language, and there is now some precedent using the term as is in some rather specialized books and papers (just as many untranslatable terms from English and other languages must be widely used in Russian). However, we urge the reader to bear three peculiarities in mind when they encounter the term.

First of all, it is *not* a technical term in Russian—it means, literally, “over-living” or “living over”, and it is commonly used to refer to an experience which has been undergone, thought about, and reflected over or narrativized in some way. A *perezhivanie* is opposed to a raw, unmediated, unsemanticized experience which has not been generalized, abstracted or transformed.

Secondly, it *is* a technical term in Vygotsky; he is using it in a system of thought, just as he uses terms like “concept” and “everyday” in “everyday concepts” as opposed to “scientific concepts” in *Thinking and Speech* Chapter Six (1987). It is a theoretical unit of analysis for the construction of the child’s consciousness (as a cell is a unit of analysis for understanding the construction of the child’s body tissues).

Thirdly, the term *perezhivanie* is somewhat algebraic—the value of *perezhivanie* changes as the child ages, so that for the infant Vygotsky uses the term to mean the sensation of satiety achieved while drinking milk, but for the adolescent he uses the term to mean the complex of thoughts and feelings towards an alcoholic mother from whom younger siblings must be protected. Note that it

the effect of this situation or this environment on the child. In this way, it is not in itself this moment or that moment, taken without regard to the child, but that moment, refracted through the *perezhivanie* of the child, which is able to define how that moment will affect the course of future development.

Let us consider a simple example from the cases in our clinic. We are faced with three children brought to us from one and the same family. The external environment of this family has been identical for all three children. The substance of this situation is simple. The mother drinks and, apparently, suffers several nervous and psychological disorders as a result. There arises an extremely serious situation for the children. When intoxicated, the mother once tried to throw a child from the window, and she often beats them or throws them to the floor. In a word, the children live in a situation of terror and fear in connection with these conditions.

The three children are brought to us. Each of these children presents a completely different picture of developmental disorder due to the same situation. One and the same setting presents to these three children completely different pictures.

With the youngest child, we find the picture that is most frequent for young children in this case. He reacts to it with a series of neurotic symptoms, i.e. symptoms of defence. He is overwhelmed by the horror of what is happening to him. As a result, he develops terrors; enuresis develops; a stammer develops; sometimes he is simply silent, and he loses his voice. In other words, the child reacts as though completely overwhelmed and helpless in this situation.

With the second child, a state of acute torment developed (an example of which we saw when we examined one of our children),³ a state which can be called inner conflict. This is frequently encountered in such cases, whenever a child has opposing affective relations with the mother or—you remember that we spoke of it—an ambivalent relationship. On one side, the mother of the child—the object of great affection; on the other hand, the mother of the child—the source of every fear, of the most difficult impressions that the child undergoes. German authors call such an affective complex that a child undergoes the “Mutter-Hexkomplex”, i.e. the “mother-witch complex”, where the love of the mother and the horror of the witch are united. The second child was brought to us with this very pronounced conflict, a sharp contradiction in the form of a positive and a negative relation to the mother, dire attachment to her and desperate hatred for her, along with acutely contradictory behaviour. He wanted to be sent home immediately, and yet expressed horror whenever being sent home was spoken of.

Finally, the third and eldest child at first sight gave us a completely unanticipated impression. He appeared a dull, unintelligent child, rather timid, but nevertheless displaying some traits of early maturity, early seriousness, early considerateness. He already understood the situation. He understood that his mother was ill and pitied her. He had seen the younger children at risk when the mother was raging. And this

is a verb as well as a noun, and where it appears as a verb, we have translated as “to experience”, since the verb form is not used in specialized books and papers.

³This seems to refer to one of the clinical visits between Vygotsky’s lectures, when Vygotsky allowed his students to examine patients in the clinic.

accounts for his special role. He had to calm the mother and to watch over her so that no harm was done to the younger ones, and to console the younger ones. He was, after all, the elder of the family, the one who had to take care of the rest. As a result, the entire course of his development had changed drastically. This was not a lively child with normal, lively, simple interests and lively activities corresponding to his age. This was a child who had changed drastically in development into a child of a different type. And when you take such an example into account—and any research which deals with concrete material is replete with such examples—we can easily see that the same environmental situation, the same events for different people at different age levels, can have different influences upon their development.

What determines the fact that the same environmental conditions have three different effects on three different children? This is due to the fact that the attitude of each of these children to an event is different. Or, as we might say, each of these children has undergone the experience of this situation differently. One of them underwent the experience as a meaningless, incomprehensible horror which plunged him into a state of helplessness. Another underwent the experience as meaningful, as a clash of acute affection with a no less acute sense of fear, hatred and anger. And the third underwent the experience, to the extent which it is possible for a boy of ten or eleven to surmount such experience, as a misfortune befalling his family which required him to put everything aside and somehow try to alleviate the unhappiness, to help the sick mother and children. And so, depending on the three different *perezhivaniya* of one and the same situation, the impact that the situation has upon their development turns out to be different.

With the aid of this example, I only wish to underline the thought that **pedology**, unlike other sciences, does not study the environment as such, without regard to the child, but instead studies the role and influence of the environment on the course of development. So, it should always be able to find a prism that refracts the influence of the environment on the child, i.e. it should always be able to find the relationship that exists between the child and the environment, the child's *perezhivanie*, how the child is aware of, interprets and affectively relates to a certain event. This constitutes the prism which defines the role and influence of the environment on the development of, say, the child's character, on the psychological development of the child, and so on.

I would like to draw your attention, in connection with this example, to one additional moment. If you remember, when we spoke of the method of our science, I was attempting to defend the idea that the analysis of decomposition into elements in science should be replaced by an analysis which brings units together into a complex whole. Moreover, we said that units represent, in contrast to elements, products of analysis which do not lose the properties which inhere in the whole but which retain in a simplest form those properties which inhere in the whole.

I wish today as a concrete example of the teaching on the environment to show you a few of these units with which psychological research operates. An example of such a unit which might serve is *perezhivanie*. ***Perezhivanie* is a unit where in a non-decomposable form is presented, on the one hand, the environment that is experienced**—*perezhivanie* always refers to something that is external to the

person—**and, on the other hand, what is presented is how I experience it**, i.e. all the features of the personality and all the features of the environment presented in the *perezhivanie*, what was selected from the environment, all the moments which are related to a given personality and selected in the personality, all of the features of character, all of the constitutional features related to this event. Thus, **in *perezhivanie* we are always dealing with a non-decomposable unity of the features of the personality and features of the situation that is presented in the *perezhivanie*.** For this reason, it is methodologically advantageous to carry out our analysis, when we study the role of the environment in the development of the child, from the point of view of the *perezhivanie* of the child, because the *perezhivanie* of the child, as I have said, takes in all of the personality characteristics of the child which participate in the definition of his attitude to a given situation. Do, for example, all of the constitutional features of my personality of every type participate fully and on an equal footing? Of course not. In one situation, one of my constitutional features plays the first role, and in another, another plays the first role, whereas in the first case it may not appear at all. To us, it is not important to know the constitutional features of the child in themselves; rather, **to us it is important to know which of these constitutional features plays the decisive role in defining the child's attitude to a given situation, where in other situations other constitutional features may have played that role.**

Thus, *perezhivanie* helps us to identify those features that have played a role in determining the attitude to a given situation. Imagine that I possess certain constitutional features; clearly, I will experience it in one way. If I have other features, clearly, I will experience it in another way. In this way, we distinguish in talking about constitutional features of people between those who are excitable, sociable, lively and active and those who are more emotionally languid, inhibited and dull. Clearly, if we have two people with opposing constitutional properties, the same event will cause each of these people to have a different *perezhivanie*. As a consequence, the constitutional features of humans, the general personality features of the child, are as if mobilized by *perezhivanie*, they are those which are laid down and crystalized in this *perezhivanie*. At the same time, this *perezhivanie* is not simply a combination of the personality features of the child which determine how the child has experienced the event: in addition, different events may be differently experienced by the same child. An alcoholic mother or a mentally disturbed mother—this may be the same thing as a mentally ill nanny but not the same thing as an alcoholic father or an alcoholic neighbour. This means that the environment, which always impinges as a concrete situation, is also always presenting itself in a given *perezhivanie*. It is for this reason that we consider *perezhivanie* as a unity of environmental and personality moments. And it is for this reason that that *perezhivanie* is a concept that allows us to study the role and influence of the environment upon the psychological development of the child in the analysis of the laws of the development.⁴

⁴Notice the metaphorical use of мобилизуются mobilizuyutsiya, quite literally, “mobilized” as in mobilizing an army. But in this case, the child is “mobilizing” the relevant psychological functions,

Let us take another example which will similarly help us to explain to ourselves how pedology concretely studies the role of the environment in the development of the child, studying those relations which exist between the child and his environment. I think that you will agree with me that a given event occurring in the environment or a given situation happening may influence the child in different ways, depending on whether or not the child understands its sense and meaning. For example, imagine a person dies in a family. It is clear that a child who understands what death is may react differently from a child who does not understand what has happened here at all. Or in a family there is a divorce of the parents. We often come across this as a moment that is associated with difficulty upbringing in a family. Again, a child who understands what is happening will react differently from a child who does not understand it.

Succinctly and simply, I could put it this way: **the influence of the environment on the child's development must be measured according to, amongst other points, the influence of the degree of understanding of, awareness of, sensibility to what is happening in the environment.** If different children are differentially aware, this means that one and the same event will have completely different senses. We know that unfortunate events often have a merry significance for the child, because he does not grasp the significance of the event itself, but he is allowed to do things he is not supposed to do. In order to keep him silent and out of trouble, he may be given sweets, and the grave illness of the mother will be perceived by the child as an event which is for him joyful, glad, in which he appears something like a birthday boy. The whole point is that in this or that situation, the influence depends not only on the content of the situation itself, but also upon how the child understands or makes sense of the situation.

When we are dealing with mentally retarded children, and especially with severely retarded children, we often observe that they do not have sufficient understanding, and that this often protects them from such situations in which the normal child would suffer. You know, amongst children such a situation occurs: a child is deformed. Not long ago, such a case occurred in our clinic: a very deformed child. Children teased the child, and the child knew that he was highly deformed and spoke of it. With a child of normal intellect, such a situation could become an infinite source of childhood trauma, because he is constantly coming across in every place his own malformation,

the relevant memory, attention, perception, etc. These functions are "mobilized" according to their battle experience and talents.

Vygotsky offers the example of children whose parents are divorcing. The five-year-old may be relieved because it means that there will be less fighting in the house. He is "mobilizing" his dislike of trouble. A seven-year-old, on the other hand, may be more conscious of the implications and understands it will mean giving up one parent or the other—and perhaps even giving up a sibling (if the parents choose to separate the children).

Each child is "mobilizing" different traits of the personality, the one somewhat more optimistic and the other more tragic. Such traits may be self-reinforcing (i.e. the optimistic child may consistently select things which reinforce the optimistic view of affairs and the pessimistic one may do the opposite). But it is no more true that these traits are "mobilized" independently of the events in the environment than that they are "mobilized" from some army of characteristics that lies outside the child's command.

the fact that he is not like the children who laugh at him, tease him, put him down, refuse to play with him, and the constant humiliation that the child encounters usually leads to some grave feelings in the child, to neurosis, to functional disorders or to some psychogenic disorders, i.e. to those arising from *perezhivanie*. However, with the child of which I speak nothing of the sort happened. Such a child is teased, and humiliated, and, in fact, he finds himself in an extremely difficult position, but it is like water on a goose's back, because he is not able to generalize it. Each time, when he is teased today, it is unpleasant to him, but the generalization which comes to any normal child, from which the child feels inferior, feels humiliated, feels wounded in his self-esteem—this does not happen, because the child does not understand the sense and significance of what is happening.

Here is a very striking example of how the non-understanding of the sense of a given event or a given situation that we find in mentally retarded children seems to protect these children from illness, from pathological reactions, or from developmental disorders that may afflict other children.

So what does happen? In the environment, there is a situation which would, in a normal child, lead to trauma and lead to a disorder. But in our child, it does not. Why not? Yes, this is because the child does not fully understand. And the fact that I have as an example of pathology actually takes place in every age. One and the same situation, if it is played out when the child is one-year-old or when the child is three, or when the child is seven years old or when the child is thirteen, may be different in significance. **One and the same event, befalling children of different ages will be reflected quite differently in their minds, and for the children will have completely different significance.**

In this regard, there is one concept of great interest which is rather complex but very important in understanding the influence of the environment on development. The concept is associated with the meanings that our words represent. You know, of course, that we communicate with those around us chiefly with the aid of speech. This is the basic means by the aid of which the child maintains psychological communication with the people in his surroundings. Research into speech has shown that the meaning of words in the child does not coincide with the meanings of our words, i.e. the meaning of words in the child at different age steps has a different structure. This I will now attempt to explain with the aid of examples.

Ask yourselves first what the meaning of a word is. I think you will agree with me if I say that the meaning of a word is always from a psychological point of view a generalization. Take any word. Take a word such as “street”, “person” and “weather”. These words do not refer to one object but to a known class and a known group of objects. Meaning always, from a psychological point of view, is a generalization. This is clear to us. This is the first proposition.⁵

⁵In all languages, there are proper nouns (like “L. S. Vygotsky”) and there are common nouns (“a teacher”, “a Russian”, “a man”). But there are no languages that have “proper verbs”—that is, verbs that refer to one unique action, event or happenstance which will never ever be repeated. This is strange, when you think about it, because all actions really are unique and no actions are ever exactly repeated: as Heraclitus says, we never step in the same river twice. Yet, every verb is a common verb: every verb is a generalization.

These generalizations are constructed differently in children than us. After all, the child did not himself invent his own language, but found ready-made words assigned to ready-made things, learning our language and the meanings that the words have in our language. Thus, the child refers with these words to the objects to which we refer. When a child says “weather” or “man”, he is referring to the same things, the same objects that you and I have in mind, but he generalizes these things in a different way than we do, with another act of thought. **He has no such higher generalizations that we call concepts and in him the generalizations are of a more concrete, sensory-graphic character.**

And it can be said that these generalizations of the child in the early stage of development are reminiscent of generalizations which we represent in our family names. Family names for us also represent not single persons but groups of people. But how is this group of people generalized under one family name? They are generalized based on their factual relations of kinship, not on the basis of logical relations as with a given category, but on the basis of the factual relationship between these people. For each person, I cannot say if he is a Petrov or an Ivanov. If I come to know that he is the son of a Petrov or an Ivanov, i.e. if I come to know his factual relationship with other people, I come to know his affiliation to this or that family name. In the same way that we construct generalizations in family names, the research shows that a child of the preschool years constructs generalizations of all kinds of objects, i.e. the child indicates with his words the same objects that we do, but he generalizes these objects differently, **in a more concrete, more sensory-graphic, more factual way.**⁶

In this generalization, the child differs from our generalization, and this leads to the well-known fact that the child does not interpret reality or understand events occurring around him in exactly the same way as we do. The adult cannot always transmit to a child the full significance of a given event. The child understands partially, but not to the very end; the child understands one side of the affair but does not understand the other; the child comprehends but understands in his own

But, as Heraclitus also says, constant change is just as true of nouns as it is of verbs. This is especially so in Russian, which lacks “a” and “the” and which tends to treat all nouns as nonspecific unless there is a compelling reason to do otherwise (e.g. *этот стул*, “this chair”). The idea that a person should have the same name in infancy, childhood, youth and adulthood is a gross generalization; no person has exactly the same personality throughout life. The simple fact that human *perezhivanie* is so much richer than human vocabulary tells us that every word must be a generalization.

⁶We have translated the Russian word *наглядного* as “sensory-graphic” to try to bring out a dialectical contradiction that the Russian term expresses somewhat more exactly: the child’s “sensory-graphic” or “sensuous-illustrative” generalization is both more concrete and more intuitive than the adult’s semantic generalization. It is concrete, because it is based on perception, but it is intuitive because it is affective rather than simply adaptive in its response. As we’ll see in the next lecture, affective perception is a very important function in early childhood; the child’s attention and even his or her memory is strongly oriented to feelings about sights and feelings about sounds, and this orientation necessarily affects the child’s first generalizations. We know that children—and also people in a foreign language environment—are tend to rely a lot on perception, while adults and native speakers will not notice nuances of facial expression or voice quality because they are relying much more on word meanings.

way, reprocessing, reshaping in his own way, taking away from the facts that have been explained only a portion. And the result is, therefore, that **the child at different stages of development cannot completely bring his thinking into compliance with that of adult.** And this means that the child at different stages of his development does not generalize to the same extent and consequently interprets and imagines his surrounding reality, his surrounding environment in a different way. Consequently, the development of children's thinking as such and the development of children's generalizations as such are also linked to the influence of the environment upon the child.

Thus, over several years, the child begins to understand better. That which was previously not understood is now understood. Has the influence of certain events in the family now changed? Yes. Before, they might have been neutral; now they play the role of basic moments in the child's development. This means that in itself, the development of the child's thinking, the signification of child words defines a new relationship that can exist between the environment and single processes of development.

If we wished to summarize what has been said up to now, we might formulate it thus: pedology studies, as we've already said, not the environment only as such, in its absolute measure, but rather the role and the influence of the environment on child development, for in studying the role of the environment in development what is paramount in importance is the relationship of a given environmental situation to the child, a relationship which can be revealed with the aid of a variety of specific examples. One and the same situation in a family, as I told you, may have three different influences on the development of the children. The environment has some influence on child development that differs in different ages because the child is changing and his attitude to the situation is changing. The environment has this influence, as we said, through the *perezhivanie* of the child, i.e. depending upon how the child develops his own inner attitude towards this or that moment with this or that situation in the environment. The environment determines this or that development depending upon the degree of child's understanding of this environment. We could bring whole series of moments which reveal that absolutely all aspects in development will define in what way the environment influences this development; i.e. always at the centre is the relationship of the environment to the child rather than the environment itself or the child himself.

We have come to the conclusion that the environment in relation to child development cannot be regarded as unchanging and external circumstances, but must be understood by us as volatile and dynamic. Thus, the environment, the situation—it influences the child in some way, it directs his development. But the child, in development, changes and becomes different. But it is not only the child who changes but also the relationship between him and the environment, and this very environment begins to influence the child in a new way. **This dynamic and relational understanding of the environment**—this is the most important fact that we must draw when we speak of the environment in pedology. But in itself this is far from sufficiently concrete. Well, then—we agree that it is important to study the relations with the environment, that if there are different relations, the environment will have

different influences. But all this does not yet speak to what is most important: what is the basic role of the environment in the relation to the development of the child. It is to this question that I now wish to respond.

First and foremost, we once again encounter with the study of the environment the same thing which we encountered with heredity. If you remember, we said that there is not and can be no total summation of the influence of heredity on all facets of development and that if we wish to study not just the laws of heredity in themselves, which are basically uniform, but the influence of heredity on development, then we must differentiate heredity into different relationships within different aspects of development. Remember that I attempted to show how the results of the study of twins showed that heredity does not play the role in the higher psychological functions that it plays in relation to the elementary psychological functions. Therefore, heredity should be taken differentially with respect to different aspects of development.

The same applies in full to the environment; say, the influence of the environment on such processes of development as growth, or the influence of the environment on such processes of development as logical thinking in the child. Evidently, it would be hard to expect that, besides the general law which remains in force, the environment has the same influence and exhibits this influence in the same way in relation to all aspects of development. Not so. With a dynamic understanding of the environment, we begin to understand that the influence of different aspects of development differs. And for this reason, we must differentiate the study of the influence of the environment, say, on child growth, the influence of the environment on the growth of individual parts and organismic systems, the influence of the environment, say, on the development of the sensory and the motor functions of the child, the influence of the environment on the development of the psychological functions, and so on and so forth.⁷

It is most convenient, when one wishes to present a general teaching concerning the environment to take not some narrow aspect of development but rather a more or less central one, essential to development, and on the other hand, some aspect with respect to which the influence of the environment is manifested in a maximally full way.

Let us take the development of the personality of the child, the development of the consciousness of the child, the development of his relations to the reality which surrounds him; let us see what constitutes the specific role of the environment in the development of the child's personality, his consciousness and his relation to reality.

If we take all the traits that are specific to the human personality, those which evolved during the historical period of human development, we may draw a very clear conclusion, that is, that there exist between the environment and the development of

⁷Vygotsky is apparently speaking of the "general genetic law"—the idea that functions appear twice, first as interpsychological categories and then, restructured, as intrapsychological ones. So speech appears before verbal thinking, and communication before generalization. Vygotsky recognizes that the general law remains in force (even, and even especially, when the child tries to "turn the tables" on the environment). But the concrete ways in which aspects of development occur must differ. Walking, for example, depends on the environment in one way, while talking depends on it in a very different one.

the child certain relationships that are specific to child development and to no other form of development.

What are these specific relations between the environment and development, when it comes to the development of the child's personality, to specifically human qualities? It seems to me that the specificity lies in this. **In the development of the child, what should exist at the culmination of development, as the result of development, is already present in the environment from the very beginning.** And not only is it present in the environment from the very beginning, but it influences the very first footsteps of child development. I shall clarify this by an example.

Here is a child who has just begun to speak, saying single words, as children habitually do when they begin to master speech. But, in the environment of the child, does not developed speech, which should appear in the child only at the very end of development, already exist? It does. The child speaks in single-word sentences, but his mother speaks to the child in fully grammatical and syntactically formed speech. The diction, of course, is limited with respect to the child, but nevertheless, we may say that she speaks already using the fully developed form of speech. Let us agree to call this developed form, which should appear at the end of child development—let us agree to call it, as is the custom in contemporary pedology, a final or ideal form—ideal in the sense that it is a representation of what should emerge at the end of development, and final in the sense that it is what must emerge at the end of child development. And we'll call the form of speech of the child—the primary form, or the beginning form. The greatest peculiarity of child development is that this development takes place under conditions of interaction with the environment when the ideal form, the final form, that which should emerge at the end of development not only exists in the environment and comes into contact with the child from the very beginning but has a real interaction, a real influence, on that primary form, on the first footsteps of the child's development; that is, **something which should emerge at the very end of development somehow influences the very first footsteps of that development.**

The same occurs elsewhere. How, for example, does the notion of quantity, the child's arithmetical thinking, develop in the child? As is well known, the child in the beginning, let us say, in the years of preschool, is still very restricted and vague in his idea of quantities. But these first forms of child arithmetical thinking come into contact with the already developed arithmetical thinking of adult people, i.e. once again the final form that should appear as a result of the whole of child development is present already at the very beginning of child development and not only is it present, but it is factually defining and directing the first steps of the child onto the path of developing this form.

To make it clear to you to what degree this creates unique, inimitable and unparalleled conditions for child development, let me ask you this: Can you imagine this, for example, in biological evolution? Can we possibly imagine that it could be accomplished in such a way that the ideal form, the highest form of which has only emerged in development, already existed in some way in the beginning period when only the lower, most primary, forms existed, and that these primary forms developed under the direct influence of this final one? Of course, nothing like that is imaginable.

Can we even imagine, in the area of the historical development of a society, that when there exists the primary form of human economy and human society, there is already in existence the higher forms, say, a communist economy and society, and that this form actually leads the first footsteps of historical development of humans? Such a thing cannot even be imagined.⁸

Can one even imagine, with regard to human development, that when the most primal human being had only just appeared on the face of the earth, there existed at the same time as this beginning form, a higher man of the future, that this ideal form somehow directly influenced the first footsteps that this first person took? Such a thing cannot be imagined. In this way, none of the known types of development has ever proceeded in such a way that at the moment when the beginning form was composed, at this very moment, the highest, most ideal form, that which appears at the end of development, had already taken shape and was able to interact directly with the development of the beginning or primary form, such as those first footsteps which a child takes on the path of development of this primary, beginning form. In this lies the supreme uniqueness of child development in contrast to other types of development, amongst which such a state of affairs we cannot and do not find.

What does this mean? It seems to me that from this we may draw a conclusion of great importance, which may explain directly the unique role of the environment in the development of the child. How does the child form an ideal, or completed form of, let us say, speech? We saw that the child at the very beginning of development acquires only the primary form, i.e. let us say in the field of speech the child utters only single words. But these single words are part of a dialogue between the child and the mother, who has already acquired the ideal form, that which should appear in the child at the end of development. Can the child in a year or a year and a half of life acquire this ideal form, i.e. simply assimilate it, just by imitation? He cannot. Can the child of this age nevertheless, by moving from the first step to the very last, more and more come to adjust this primary form to the final form? Yes, research shows that this is exactly what actually happens.

This, consequently, signifies that the environment serves in the development of the child in the sense of the child's development of a personality and of specifically human characteristics, that it serves as a powerhouse of development, i.e. it plays a role not as the setting, but rather as the source, of development.

What does this mean? First of all, it means something very simple: that if the environment does not have the appropriate ideal form and the development of the child for some reason proceeds outside these specific conditions—those which I have spoken—i.e. without interaction with the final form, the appropriate form will be underdeveloped in the child.

⁸Vygotsky is arguing against the idea that “ontogeny recapitulates phylogeny” (i.e. child development is simply fast-forward biological evolution). But as with his earlier remarks nuancing the “general law”, Vygotsky is also arguing against the notion that “ontogenesis recapitulates socio-genesis”. This, along with the methodological criticisms Vygotsky made of doing psychological experiments in the field (1997: 33) does suggest that Vygotsky might not have been completely in agreement with Luria on the question of cross-cultural research and the effects of Soviet education on less developed areas of the USSR.

Imagine a child who is growing up amongst deaf-and-dumb people, surrounded by deaf-and-dumb parents and deaf-and-dumb relatives. Will speech develop in him? No. Will babble develop? Yes. Even in deaf-and-dumb children babble develops. This means that babble belongs to those functions which are more or less directly attributable to hereditary proclivities. But speech in such a child will not develop at all. In order to develop speech, it is necessary that in the environment there is this ideal form, which interacts with the beginning form of the child and leads to the development of speech.

First of all, this means that the environment is in this sense the source of all of the specifically human properties of the child, and that if the environment does not hold the appropriate ideal form, then the child will not develop the appropriate activities, the appropriate properties and the appropriate qualities.

Second. Imagine a child in this environment where there is no ideal form, i.e. that the development of the child is not subject to the law of which I just spoke, namely, that the final form is absent and does not interact with the beginning form, but that the child develops in an environment with other children, i.e. there is an environment of his peers and the lower, beginning form. Will the child develop appropriate activities, appropriate properties? Studies show that he will, but it in a very peculiar way, i.e. they will always develop very slowly, very peculiarly and at no moment will they reach the level which they achieve when there is in the environment the appropriate ideal form.

Let us take two examples. The first example is this. If we take a deaf-and-dumb child, it transpires that the development of speech in the deaf-and-dumb child can proceed along two different lines, depending on whether there is only one deaf-and-dumb child in the family or the child will develop with other deaf-and-dumb children. Research indicates that deaf-and-dumb children will develop their own original speech; mime and mimetism are richly developed. In the child, another language proper to the child develops. Children together, in cooperation, share in the creation of this language. But can we compare the development of this mimetic language with the development of speech in a child who develops in interaction with the ideal form? Of course, we cannot. This means that if we are dealing with the fact that in the environment there is no ideal form and the beginning forms interact with each other, the development is usually of a very limited, impoverished and reduced character.⁹

⁹It is true, as Vygotsky says, two deaf children raised by hearing parents who do not know sign language will create their own language, and it is also true, as Vygotsky says, that this language will not be a true sign language (see the work of Susan Goldin-Meadow 2003: 215–228). Actually, only about a third of deaf people are able to learn sign language at home with their parents, and these are mostly deaf children born to deaf parents who already sign. Deaf people whose parents do not sign have to learn sign language at school.

Vygotsky distinguishes very carefully between the physical disability of the child and the social consequences of that disability. But in a sense, the word “disabled” is wrong—Vygotsky would say that the child is not disabled but only “preabled”, first of all, because we don’t have the technical means to overcome the child’s defect and secondly because our cultural tools and signs have been developed ONLY for normal psychophysiology. It is not always easy to overcome physical

Now, let's look at the other example. You have heard, most likely, that children in a nursery school have numerous advantages in the sense of enculturation over those with family enculturation—already at an early age they are accustomed to independence, to self-management and to discipline. But at the same time, there are a number of disadvantageous aspects associated with education in a nursery school rather than at home, and one of these disadvantageous aspects, which is the object of serious concern for all who work with this age, is the late development of speech. As a rule, in a child of nursery age who is developing at home, speech develops earlier, more richly and better than in a child who receives appropriate enculturation in a nursery. Why? Note the simple reason, that a child at home, having a mother or some surrogate person, such as a nanny, is listening all the time, has things said to him, and at all times is in the process of interacting with the ideal speech form.¹⁰

In a nursery, where there are not a few children and there is only one caretaker, there are far fewer opportunities for direct exposure to this ideal form. But these children can speak to each other. When they do, however, they do not say enough, they speak poorly and their own conversation does not constitute a rich source of development for them. In order to develop higher, specifically human properties to be performed satisfactorily and well it is obviously necessary for this ideal, final form to lead child development, as we may put it, if possible from the very outset.

This is why, when a child grows up in a circle of other children, say, in a nursery, his speech develops more poorly. And if we compare a mass of material on three-year-olds physically healthy and growing under favourable conditions, comparing nurseries and homes, you shall see that the average home environment child in the sense of speech development will be higher than children from a nursery, while at the same time the nursery children will be much higher than those raised at home in a number of relations in terms of independence, discipline, self-management, etc.

Another simple example—an invented one. Let us imagine that a child develops his understanding of quantities, his own arithmetical thinking not in school and not in a kindergarten, i.e. without interaction with the ideal form of adults, but in an

defects with medicine. But it is always easy to develop cultural tools and signs for non-normal psychophysiology—e.g. Braille, sign language.

Similarly, it is easy for a progressive society to overcome the stigma that is attached to non-normal psychophysiology. Actually, what is difficult, at least from a technical point of view, is to create a society where people actually dislike their natural, normal features and figures, and will go to great lengths to wear shoes and alter their faces in accordance with commercially enforced standards of beauty. This too is a distinction between sociogenesis and ontogenesis that shows the relatively more designed and directed quality of the latter.

¹⁰The “nursery schools” referred to here are not simply day care centres for working mothers. They are orphanages, institutions for homeless children, treatment centres for children with chronic and fatal diseases like tuberculosis, and centres for the treatment of juvenile delinquents. When Vygotsky speaks of his clinical work, he is often speaking of his work with these “nursery schools”. That is why Vygotsky compares the upbringing of children in nursery schools to the upbringing of children in families.

When Vygotsky speaks of the “mass of material” that they have collected from nursery schools, he is referring to the measurements taken (height, weight, speech ability, practical skills) in institutions like these.

environment in which there does not already exist the developed forms of arithmetical thinking. What do you think? Will the children be able to go far with developing their own arithmetical thinking? No, not even if there are amongst them children who are highly gifted in mental relations. Their development will still be very restricted and very narrow.

In this way, with all of these examples, we can draw a conclusion that consists in this: that in those cases where due to the effect of some external or internal causes, the interaction between the final form that exists in the environment and the beginning forms which the child possesses is disrupted, then in these cases, the development of the child becomes very limited and there occurs a more or less complete underdevelopment of the appropriate forms of activity and the appropriate properties in the child.

This interaction may be disrupted for different reasons. They may be external—the child hears, but he lives with deaf and non-speaking parents; or they may be internal—the child lives with parents who can speak, but he is deaf. In both cases, the result is the one and the same—the child is excluded from the interaction between the beginning and the ideal form of development and all of development is disturbed.

I think that this proposition concerning the interaction between the ideal and the beginning forms and these examples that I have cited explain the thought that I told you of at the outset, namely, that **the environment acts in relation to the development of the higher specifically human properties and the forms of activity as a source of development**, i.e. interaction with the environment is the source of what the child assimilates of these properties. And if this interaction with the environment becomes disrupted, then the appropriate properties can never emerge simply from the force which is contained in the child's inclinations by themselves.

I wish now to end with a few words assessing the theoretical significance of this and explain a proposition which should appear compelling and clear to you when it is expressed not in terms of pedology but from the point of view of all that we know generally of the development and the nature of humans.

What is the significance of this law, which I have just outlined for you? It signifies something very simple, **that man is a social being, that without interaction with society he can never develop by himself those qualities, those properties that have developed as a result of the methodical development of the whole of humanity.**

How did speech develop in me and you? We did not make this speech up by ourselves. Mankind created it in the whole course of its historical development. My development is such that in the course of my overall development I mastered this speech, following the historical laws of my own proper development and in the process of interaction with its ideal form. But imagine what would have happened if I had been raised in such an environment as a deaf child finds, if I had to create a language for myself—I would not be able to avail myself of the form which has been established by the development of humanity. I would not have gotten very far. I would have created a speech of a most primitive, elementary and restricted range. This means in fact that humans are social by nature, that their development constitutes, amongst other things, the mastery of forms of activity and consciousness which have been worked out by mankind in the process of historical development,

this is, strictly speaking, the underlying foundation for this interaction between the ideal and the beginning form.

The environment is the source of development of these specifically human properties and qualities, first of all in the sense that the environment is where we find the historically developed properties and characteristics of man, those which inhere in people because of their hereditary, their organic organization. But they exist in each person because each person is a member of a given social grouping, where there is a given historical unit, living in a particular historical epoch and under particular historical conditions. And in consequence, the development in the child of some of these specifically human properties and qualities occurs in somewhat different ways than other properties and qualities which are more or less immediately conditioned by the previous course of human historical development. In the environment, there exist these ideal, developed forms worked out by mankind, those which emerge at the end of development. These ideal forms influence the child from his very first footsteps, which he takes in the course of mastering the beginning forms. And in the course of his development, the child appropriates to himself, makes his own internal property, that which was at first a form of external interaction with his environment.

I only wish to conclude this by an illustration of the law of the influence of the environment on child development, which will explain to you what I mean when I speak of the environment as a source of development. In the course of the development of the child (we shall discuss this in detail when we talk about the psychological development of the child), researchers speak of one basic law, which I shall allow myself to formulate in only general terms and to illustrate by only one example.

This law states that **the higher psychological functions in the child, those properties are specific to humans, initially appear as forms of collective behaviour of the child, as forms of cooperation with other people, and only later do they become internal, individualized functions of the child himself.**

I shall take only one example which should make this clear to you. You know that speech first arises as a means of communication between people. A child can, using speech, talk with those around him and those around him can talk to him. But now take each one of us. You know that in each of us, there exists something called inner speech, and that this inner speech, i.e. that which we can formulate silently for ourselves thoughts in words, plays a very great role in our thinking. This role is so great that not a few researchers have even, it is true incorrectly, identified the processes of speech with the thinking processes. But in actual fact, for each of us inner speech is one of the most important functions that we have. When some disorder disturbs this inner speech in humans, this leads to a severe disorder in the whole of thinking.

Where does this inner speech in each of us come from? Research has revealed that **the emergence of inner speech appears on the basis of external speech. At first, speech is for the child a means of communication between people, in a social function, a social role. But little by little, the child learns to apply this speech to himself and to his own internal processes. Speech has become not only a means of communicating with other people but also a means of internal thinking of the child himself.** Then it no longer represents that speech which we use aloud when

we communicate with one another, but it becomes an inner, silent, muted speech. But where did this speech as a means of thinking come from? From speech as a means of communication. From the external activity which was carried out between the child and people in the surroundings, one of the most important inner functions appeared, without which the very thinking of humans could not exist. This example illustrates a general proposition relating to the understanding of the environment as a source of development. In the environment, there is an ideal form, or a finalized form, interacting with the initial form of the child and as a result this leads to a certain form of activity becoming an internal characteristic of the child himself, his own heritage, the function of his own personality.

References

- Goldin-Meadow, S. (2003). *Hearing gesture*. Cambridge MA and London: Belknap.
- Vygotsky, L. S. (1987). Thinking and speech. In *The collected works of L.S. Vygotsky* (Vol. 1). New York: Plenum.
- Vygotsky, L. S. (1997). The history of the development of the higher mental functions. In *The collected works of L.S. Vygotsky* (Vol. 4). New York: Plenum.

Chapter 5

The General Laws of Child Psychological Development



Outline of Lecture 5

Since development is always age specific, Vygotsky begins by asking if general laws of development can exist at all. He answers by proposing three of them, all of which emphasize precisely that age specificity: non-homogeneity, dominance, and consequent maximal development of functions. He concludes by demonstrating how the means of development itself develops: the “overthrow” of one function by another is replaced by a more gradual process of redifferentiation.

Introduction: Do General Laws of Development Exist at All? Vygotsky begins by establishing the necessity of differentiation and shows how this can be done without violating the holism of analysis into units by the example of age periods.

Although development is whole, its uneven quality means that there can be no general law covering all aspects of development. As a result, it is necessary to differentiate development into different aspects. But of course, following the method of analysis into units, we must ensure that the differentiated aspects have the basic properties of the whole under investigation. This means that development, which is a process, can only be differentiated into component processes, such as psychological development (covered in this lecture) and physiological development (covered in the final two lectures). However, this process of differentiation once again raises the old problem: there does not appear to be, in either psychological development or physiological development, any general law covering all aspects. Instead, there seem to be a set of quite distinct stages linked in development. These stages linked in development, are the age periods, in which one particular type of development appears to dominate other types of development.

Vygotsky reminds us that whether we are talking about psychological development or physiological development, what develops is the relationship between systems and not simply the systems themselves. For example, when the endocrine system develops, what develops is not simply each separate gland but the relationship, the specific weight, and the proportion of the system occupied by the separate

gland. Vygotsky complains that this rule, quite generally recognized in physiological development (every mother knows that the proportion of the child's arms, legs, torso, and head must change during development) has been quite generally ignored in psychological development. It is, Vygotsky says, the whole and the relationship of its parts that brings about development, rather than the growth of individual parts that develop the whole.

Vygotsky then illustrates this with three examples drawn from the problem of age periods.

1. During infancy, consciousness is largely undifferentiated: the infant certainly has memory (and in fact, the child has a great deal to take in and to remember, e.g. the faces of caregivers, feeding routines, the precise details of the surroundings, voices, etc.). But that memory is not separable from other activities of consciousness; it only occurs in conjunction with perception as stimulus and affect as a response, and as a result, it cannot be voluntarily called to mind: an infant cannot simply decide to remember something and then remember it without any external stimulus at all. In other words, the function is not externally differentiated by volition.
2. During infancy, memory itself is largely undifferentiated: the child remembers the experience of drinking milk from a bottle of a certain colour and shape and will not drink if given a bottle of a different colour or shape. This suggests that the baby does not differentiate the memory of the milk from the bottle or the bottle from the colour and the shape. The baby remembers drinking square-blue-bottled milk. In other words, the function is not internally differentiated by distinguishing between component functions of memory.
3. During infancy, the baby does not differentiate moving one limb and another; if given something pleasant, the whole body and all of the limbs reach out towards the treat, and if given something unpleasant, the whole body and all of the limbs move away. Vygotsky argues that the most important moment in developing motor skills is the ability to differentiate movement in one limb from another.

Vygotsky then asks how such differentiation takes place. He answers, first, that differentiation takes place one group of functions at a time. For example, the first psychological function to be differentiated is what is called "affective perception". What he means by this is that affective perception can operate separately (the child can see and appreciate a pleasant treat or shy away from an unpleasant experience without invoking any other psychological functions) but other functions, such as memory, do not operate independently; the child cannot and does not remember without the participation of perception (the child sees something and remembers, but cannot simply remember without seeing). Similarly, the emotions of the child depend on perception; it is for this reason that the child seems uninterested in invisible treats and forgets unpleasantness as soon as it is no longer visible.

Three Basic Laws. Vygotsky then introduces three laws of child psychological development: non-homogeneity, dominance, and the maximal period of development.

The first law is that functions are differentiated in different ways: they can be differentiated externally, with respect to other functions, but they can also be differentiated internally, with respect to themselves. For example, affective perception in the very young child is differentiated with respect to memory. However, in the older child, affective perception is differentiated with respect to itself into affect on the one hand and perception on the other. Functions are externally differentiated consecutively rather than all together; they differentiate one by one rather than all at once (e.g. first affective perception and then memory, rather than affective perception and memory differentiating themselves simultaneously). There is internal differentiation within a function as well: the components (e.g. differentiation between perception of visual from auditory perception and perception of colour from perception of shape within perception).

The second law is that functions do not simply become independent; they become dominant. Thus, when affective perception is differentiated, it dominates functions like memory and thinking, which are not related to each other, but mutually subordinated to affective perception.

The third law is that the period of dominance is also the period of maximal development. So for example, from one and a half years to five years of age, speech develops more than during other ages; during early childhood, perception develops more than at any other time, and during adolescence, sexual maturation develops more strongly than during other periods.

Conclusion: Another Way that Differentiation Happens. Vygotsky now adds a fourth law, which has the effect of limiting the application of the previous three laws to the very first years of life.

Vygotsky asks: What is new when the new psychological system dominated by memory arises in preschool and what is the same?

1. The fact of the emergence of one function that then masters the others is the same. For example, thinking becomes dominated by memory just as it was previously dominated by affective perception. This new dominant function is not itself internally differentiated. Just as affect and perception did not operate independently in affective perception, we find that the memory in early preschool is quite holistic and concrete; it is not of a long-term, selective nature as it is in adults, but rather short-term and still highly coloured by perception.
2. The new facts are first of all that memory must reverse the dependency that existed between affective perception and itself. When affective perception first arose from undifferentiated consciousness in infancy, no such reversal is necessary; affective perception had no competitor. Secondly, memory must resubordinate all of the functions which were previously assigned to affective perception; instead of replacing general undifferentiated consciousness with the child's first system, one psychological system based on affective perception is replaced with a different psychological system based on memory.

Vygotsky describes the ascendance of the new psychological system as a kind of treason: the new system begins as part of the old and initially supports it (that is,

memory begins as a loyal component of the system established by affective perception). He notes that on the boundary between early childhood and preschool, it is hard to say which dominates.

As we proceed through further ages, beyond that of preschool, the situation grows far more complex. Perception and memory are now differentiated and operated independently of each other and of other functions; more, they have an internal differentiation as well (perception of colour is different from perception of shape, and perceptual memory is different from verbal memory). All of the remaining functions have therefore served two different masters, first being subordinated to affective perception and then to memory. Vygotsky concludes that this resubordination in itself has the power to change the interfunctional links. This means that a new type of differentiation which does not pass through dominance arises.

Previously, functions were externally differentiated by dominance. So for example, affective perception becomes a dominant function with respect to the previously undifferentiated forms of infant consciousness through an interaction of the child's physiological sensory-motor development and the child's increasing ability to influence his or her environment through gesture and speech. But now, functions may be externally and also internally differentiated without becoming dominant functions, merely by being dominated by pre-existing functions. For example, learning a second language is made very different from the very fact that one already has a first one in place.

Lecture 5

We have spoken thus far, of development in general, of development as a whole, trying to identify its most general laws and, in speaking of heredity and of the environment, of the most general characteristic moments upon which development depends. But we have already seen, first of all, that general laws of development manifested themselves differently in different aspects of development; secondly, that when we spoke of the environment or of heredity, we were also compelled to confront the same question [conclusion–GSK], that there is no common, unified law which could generally define the role of heredity in relation to the development of all aspects in one way.¹ We also said of the environment: there is no law that once and for all in a general formula and in the same general terms gives us the answer to the question of how the environment influences development, such that this response suits all aspects of development. This means that when we examine development in general terms, we confront each time one and the same necessity—to differentiate development, to consider its composition. Once there is no general

¹Korotaeva (2001: 91) notes that in the stenogramme, the word used is *вопросу* (“question”) for which she substitutes the word *выводу* (“conclusion”). But the translation “question” seems acceptable here, particularly since it is the word which Vygotsky uses in the next sentence, so we have reverted to the wording in the original stenogramme. Léopoldoff-Martin translates it as “conclusion” (2018: 79).

law on how heredity influences development, it is necessary, as a consequence, to study how it influences single aspects of development. And, once we know how it influences single aspects of development, we can summarize these and obtain some notion of its influence on development in general and as a whole.

I think that for you, it does not present any difficulty to understand that development must be a differentiated process. **After all, development is a process in which a person from the moment of birth proceeds on the path of developing a mature personality, of becoming a mature human organism. This is such a complex system that it cannot develop all of its aspects in completely the same way.** Different aspects have different significances, different moments have different specific weights, and different aspects find themselves in different dependencies with each other. To put it shortly and simply, a person is a unitary system, with this we all agree, but not a homogeneous system: rather, a complexly organized, heterogeneous system.²

For this reason, the next step which we should take in our study of human development is to get to know the basic elements which we need to take apart, for research purposes of course, remembering all the time **that these individual aspects of development find themselves in certain interconnections, certain interdependencies, with one another.** Yet this does not prevent them from having separate laws which are manifested in a given aspect of development and which do not appear in any other aspect of development.

We begin today by taking apart the general process of development and attempting to address more concretely the laws that govern the psychological development of the child.

But here we find ourselves in the same position as before. The psychological development of the child is, in its own turn, divided into a series of single aspects and again these individual aspects have not a few of their own features. The study of these single aspects of psychological development is included already in the specialized course of pedology, on pedological ages, but today we will focus **on the general laws of the psychological development of the child or on the general laws of the development of the conscious personality in the child.**³

Allow me to begin with the most important and most substantial of what characterizes the laws of psychological development. We already know from what was said before—but you also know this from your other classes—that the course of child development does not simply follow from growth and increase of what was given at the outset. Rather, it occurs through a restructuring of the relations between the

²Vygotsky uses the term *единая система*, which we have rendered as “unitary system”. For the purposes of this lecture, Vygotsky stresses that the components of this unitary system develop at different tempos (e.g. the brain and the nervous system are proportionally larger and closer to its maximal size at birth than the bones and muscles are); even different parts of the same system develop at different rates (e.g. the voluntary nervous system is not as developed at birth as the involuntary). But for clinical purposes, including teaching the child, Vygotsky stresses that these systems work together.

³This seems to refer to the other course included in the “Lectures on Pedology”, namely “The Problem of Age”.

individual aspects of the organisms themselves; **it occurs through a change and a restructuring of organic systems.** For example, we asked ourselves whether, in the growth of the child's body, it ever happens that for some period of time, the feet, all the limbs, the torso, and the head all grow equally. Such a thing never occurs. At all times or most times, one part of the body grows more quickly while others are growing more slowly. This leads to the circumstance that at the next stage of development, there is a reconstruction of the proportions, a reconstruction of the relationships between the parts. This proposition we have treated as a general law of development.

Consider the development of the endocrine system. You know that its development is not a simple matter of glands themselves being small and then becoming larger and more mature; the development of the endocrine system in childhood occurs mainly due to changes in the interrelations in the system of glands of internal secretion. Some glands undergo an involution; i.e. they undergo a path of development which is the reverse of the path that child development shall undertake sooner or later. The thymus gland, which plays a major role in the early processes of formation of the body, begins relatively early on to cede its role to other glands and undergoes a process of reverse development. Other glands begin to operate at a given age, and in the transition from age to age, we encounter a restructuring of the relations between glands of internal secretion. In this way, as we'll see, when we talk about the physical development of the child, **every age has a reigning endocrine formula of its own,** that is, its own formula expressing the unique relation between individual glands of internal secretion which is characteristic of the given age epoch.

In relation to the psychological development of the child, for a long time, this law escaped the attention of researchers. The human psyche presented its own complex formation. Naturally, this psyche had to be taken apart for the purposes of scientific study and it began to yield individual psychological functions; for instance, memory, attention, thinking, will, emotion, etc. When the old functional psychology approached the problem of child development, it considered that the individual psychological functions developed, but the relationship between the individual functions did not develop and remained unchanging. This was a monstrous delusion which placed a great obstacle in our way, hindering the development of scientific views on the psychological development of the child.

And first of all, what we must begin with is an explanation of the most basic law of psychological development. It consists in this: **during the course of psychological development not only do the separate psychological functions change and grow but what mainly changes is the relationship between these functions,** so that each age level actually has its own specific system of relations between functions specific to the given age. **During the transition from age to age, the change is first and foremost in this system of relations between functions, so the development of each separate function depends on the system in which it develops,** i.e. the law which we know concerning the organism as a whole fully applies to the psychological development of the child. The development of the whole determines the development of parts and the development of the consciousness of the child as a whole determines

the development of each of the separate functions, each separate form of the activity of consciousness.

In this way, it does not happen that memory, attention, and thinking each develop on their own, and the totality of these changes leads to a general development of consciousness, a change of consciousness as a result of the development of separate functions. On the contrary, it actually proceeds by the very opposite path—there is a change in consciousness as a whole, i.e. a restructuring of the relations between individual functions, leading to the fact that each function is placed in special conditions of development with which I will today attempt to acquaint you better.

In order to outline more clearly, more precisely, the general position that we need to characterize psychological development, we must take several ages of the child and investigate what transpires during the transition from one age to another.

Let us begin with the age of infancy. Does it appear to you that, in the age of infancy, i.e. the very beginning of development, there is a place for the proposition that there exist in the infant already differentiated functions? For example, do we observe in the infant, memory as such, infants preoccupied with memorizing things? Do we observe thinking that is divorced from action, action that is divorced from affect or emotion? Never. What characterizes consciousness in the neonate and in the infant in his first months? The most characteristic trait that distinguishes consciousness in the neonate and the infant from the consciousness of the child in the subsequent ages consists in this: it is an absolutely undifferentiated consciousness in its functional relations. What does this mean? This means that there is consciousness in the infant; we may demonstrate that there is already the embryo of all of the future functions. But is there a differentiated consciousness, i.e. can the various functions work separately? No.

Consider this example. Is there memory in the infant? There is. The infant recognizes his mother, recognizes familiar objects, and differentiates between these and unfamiliar ones. If for experimental purposes, we feed a child with a bottle of a particular colour and a particular form, and we then offer the infant a bottle of a different colour and a different form, the infant will take the one which he always has and he will reach for it even though it lies far away.

Has this consciousness the capacity to acquire, to memorize? It no doubt does, so much so that many authors even say that what the infant memorizes between zero, i.e. the moment of birth, and one year of life, outweighs all of the things that we memorize during the rest of life. In truth, the infant is born without knowing anything at all of the world. Consequently, all of the properties of things (sweetness, bitterness, all the olfactory sensations and all of the tactile ones: hardness and softness, roughness and smoothness, cold and hot), all of this which seems to us that we have never memorized; all of the basic elementary properties of the world are simply memorized all at once by the child in infancy. So, not only does the infant have the possibility of memorization, but the possibility of memorization is realized so intensely that many researchers believe that memory never does such intensive work as that which it does in infancy.

But at the same time, what else characterizes memory in the age of infancy? It is this: memory as memory does not exist; it is not separable from the general activity

of consciousness. I will give two simple examples. You know that infancy belongs to the ages which subsequently fall into our amnesia, which are wiped from our memories. Who amongst us can remember, by ourselves, when we were infants? No such people exist. There are some people who claim to have saved fragmentary memories. These people are rare, and there is still a question as to what extent these memories actually come from the age of infancy or are attributed to infancy but emerge later. The memorization of the infant exists and works intensively, but he does not remember, does not retain the slightest recollection of this age.

This is one of the foundations that indicates that memory in infants is not different from our memory in that it is weaker than ours, or in that (the infant—T) remembers more slowly, or in that they are remembered for a shorter period or in that fewer things are remembered, but above all, with memory in early infancy, the main difference is that it stands in a different relation to consciousness as a whole; it is not differentiated, not separated from the activity of consciousness as a whole.

Let us take a second example: let us take the experimental trial of memory in the child when the child is fed for a certain time with a bottle of a certain form and a certain colour. It may be asked whether the infant, eating, sets himself the task of memorizing from which bottle he is fed. No, this comes by itself. The fact that he eats, the fact that at this time he is satiated, the fact that he has a given affective relationship to the food, and the fact that he sees are all mixed together. In this way, he remembers, but this remembering is not allocated into different activities within all the activity of the child. This remembering is not separated out from the emotions, from hunger, from instinct, from satiation, nor is it separable from perception. In a word, **it is memory which is undifferentiated, which does not exist as a separate function.** One researcher, who was involved in just these experiments, said that this memory of the infant presents a paradoxical impression.

On the one hand, the infant memorizes very quickly, very soundly, and very easily those things that are at hand, so of course, this memory is striking in its freshness and its sharpness in comparison with the memory of a child of a more mature age. On the other hand, memorization does not yet exist as memorization. The infant does not separate the milk that he drinks from the four-sided form of the bottle, from other perceptions; we get the impression that, as one author says, the infant perceives as a fact that he drinks quadrangular blue milk. If we dwelt on other aspects of the activity of consciousness besides memory in the infant, we would come to the same conclusion that in the age of infancy the functions are in an embryonic form, often very well developed from the very beginning, as with the memory; however, these functions are in an undifferentiated state, not yet separated the one from the other. Just as in the embryo, in the cells we have in an undivided form all of the future organs and tissues of the child, so here **in consciousness, we have in an undifferentiated form all of the future functions which must be developed, as yet not differentiated and not developed.**⁴

⁴The researcher referred to is the Nazi psychologist Hans Volkelt. Volkelt gave a child milk to drink in a square blue bottle. The child was then offered an ordinary bottle and refused to drink. When the child was offered a square blue bottle alongside an ordinary bottle, the child reached for the former

An example which may finally allow us to understand this origin, or beginning point, in the development of infant consciousness may be found in the analogy between the consciousness of the infant and his motility. What distinguishes the motility of the infant? Does the infant in motoric sense develop in such a way that at first, there is some motion, some individual reflexes in individual organs, and then these reflexes incrementally become linked into groups, and then these cause whole movements? I think that anyone who has ever seen an infant will not agree with such a characterization of his motility. His motility cultivates an *en masse* [mass-like—GSK] character.⁵ He moves with his whole body.

One of the researchers demonstrated that if you give something pleasant, say, semolina porridge, to a hungry infant, he bends forward in an arch to meet it, pulling his legs, his arms, and his heads into a bow facing the object, extending his arms, extending his legs, his head, with everything resembling an arc with its opening part facing the object. If we give him something unpleasant, if you drop something bitter on his tongue, then he bends into an opposite-facing arc. **His motility is characterized by the fact that it is a motility of the whole; it is not differentiated, not split into the motion of separate organs.** But wherein is the motor development of the infant? In this, that his undifferentiated, *en masse*, entire motion **gradually starts to be allocated to individually differentiated motions of the arms and legs.** We, for example, hold that the most important moment in the development of motility in the child is when the child begins to do with the hands what he has done with the legs when differential motions appear.

To some degree, this analogy allows us to clarify something which we encounter at the beginning period of infant development, namely the indivisibility, the non-differentiation, of the separate functions of consciousness. If it is the case, I think you will agree, this means that representing an infant's psychological functions—memory, attention, thinking, will, etc.—as if they already existed and as if these functions later developed themselves all by themselves is a view that does not stand up to criticism and is not supported by the facts. The starting point for the development of consciousness in the age of infancy tells us that in beginning of development, separate functions in general do not exist, but there exists only consciousness as an undifferentiated whole, and, clearly, the development as such is in the differentiation of separate functions which, as we have traced here, passes through separate age periods.

If we limit ourselves to this in characterizing the beginning point of the development of consciousness, then we must ask ourselves further: very well then, in the age of infancy, the separate functions are not differentiated, so afterwards, how does this differentiation proceed—do all of the functions appear together? Right here is

and not the latter. Volkelt concluded that “drinking milk” is a concept that exists in an adult mind, on the basis of abstracting away experiences such as the square blue bottle used in the experiment. But since the child only knows what the child experiences, and what the child experiences is the square blue bottle, we should say that the child is not drinking milk but rather “square-blue-bottled-milk”. See Vygotsky (1998: 225).

⁵Korotava has *массовидный* (“mass-like” or “*en masse*”) but she says that the stenogramme actually has *массов воспитательный* (“enculturated/cultivated *en masse*”). See 2001: 97.

the end of the infancy period, the beginning of early childhood, the child entering a second year. Is consciousness differentiated such that all at once memory, attention, imagination, emotion appear together? Studies show that it never occurs in this way. **Firstly, what stands out in early childhood is one group of functions, itself as yet insufficiently differentiated internally, which takes a leading position in relation to all of the other remaining functions.**

Which function is this? I think that the most correct way to designate it, as is done in contemporary psychology, would be as **affective perception**, i.e. as not differentiating between emotion as such and perception, although these functions are separated from the rest of consciousness as a whole already at the border of infancy and early childhood. If earlier we would have depicted consciousness in the form of an indistinct circle, now it is sharply divided between a centre and a periphery. In the centre stands perception linked in an unmediated way to emotion, and **all of the remaining activities are beginning to act only by means of perception.**

Let me explain this. What is it like, the memory of a child in early childhood, particularly the first half of early childhood, in the second year of life, and in part in the third year? The chief form of child memory remains the form of memory which manifests itself in no other way than as perception, i.e. recognition. Have you ever seen a child under three years of age recall anything on his own? No. In what does his memory most frequently manifest itself? Either it plays back a certain situation that transpired earlier, or else having perceived something, it recognizes it or finds events which linked to it; in other words, **in early childhood, the memory acts when and only to the extent that it can participate in a perceptual activity.**

In this, we find its subordination, its dependency in relation to perception of the situation. The instance where a child of this age tries to memorize something all by himself—this memory cannot be found; it does not yet figure.

Let us consider the thinking of the child at this age. Have you ever seen such a child thinking abstractly? His thinking is always reducible to sensory-graphic thinking, or, as is said, **practical thinking in action**, i.e. he can intuit or discern relations between visually perceived objects or make out some rational, purposeful action in the visual situation. What does it mean when we say that in this child, there exists exclusively sensory-graphic thinking? It means that the child thinks only so long as he perceives, i.e. only **within the limits of his perception**. And, what is it that characterizes our thinking? That we can think not only about what, when, and where lies directly before our eyes.

If we take the memory of the child of this age, if we take the thinking of the child of this age, we see that both are dependent upon perception and that neither the one nor the other exists by itself, but they no longer exist in the undifferentiated form that pertained in the age of infancy. Instead, they exist as if submitting to perception and revealing **a dependency upon perception.**

The same thing applies to the emotions of the child. Whoever has seen a child in the third year of life knows perfectly well how easily these children are distracted. Something unpleasant happened: you distracted the child from the unpleasantness, took him to some new setting, and gave him some new object—and all is over. Can the child be distressed because in the future trouble awaits him? It hurts, right

when the doctor places a spoon in the mouth. But if we look in just a few minutes afterwards and at present, the immediate situation presents no danger, and then no emotion is aroused! Can you please him with the news that in five days' time, he will be given something? This is not something he can relate to emotionally. **His emotion is manifested only within his perception.**

I think that these examples are enough to see that already in early childhood, when the child takes the first step or the second step in his psychological development, there is a sharp change in the structure of his consciousness in comparison with the age of infancy. Where, in the age of infancy, we have had to deal **with a holistic consciousness** which was not differentiated into separate activities, then in the second stage of development we are dealing with **the affective perception of the child**, sharply separated from all of the other forms of the activity of consciousness but not yet differentiated within itself, which takes the leading role of central and dominant function, defining the entire activity of consciousness, i.e. the first appearance in this age of what we can identify as an interfunctional relationship in consciousness, that is, relations between functions.

Is there already a defined, differentiated relationship between perception and memory? There is. Can we say that already in this consciousness, perception and memory are dealt with differently than memory and thinking? It seems to me that we can. How are perception and memory related here? As a major function and a subordinate function. Then what about memory and thinking, both of which are in a subordinate relationship to perception? They constitute independent functions. These functions—memory and thinking—are they related to each other, as well as each one being related to perception? No, they related in different ways. Since this is so, it is clear to us that here we can see that there is for the first time a differentiated relationship between functions. This is the beginning of a **differentiation** of functions which is characterized by three basic moments, which we can now formulate as general propositions and which retain their significance in all of the succeeding ages.⁶

From that which we have examined thus far, we may draw a conclusion that covers three basic laws characterizing the psychological development of the child.

⁶Here, Vygotsky makes a simple distinction between two types of interfunctional relations: dependent and independent. Dependent relations are relations between the dominant function (in toddlerhood, affective perception) and all the other functions. The dominant function can and does act alone (toddlers see and respond without remembering and without thinking). But the dependent functions cannot and do not act alone (toddlers do not remember or think about completely abstract ideas without any sensory input). Independent relations are relations between dependent functions.

Imagine a toddler and mother meeting a nursery school caregiver for the first time. The mother does not really notice what the caregiver is wearing but instead memorizes the teacher's name. The toddler is the other way around: she notices exactly what the caregiver is wearing, the sound of the caregiver's voice, and perhaps even the smell but does not remember the name. When it comes time to go to nursery school the next day, what the child will remember is these perceptions (if the child likes them, the child may run to nursery school, and if the child does not, the child may think of some way of running away!). For the child, but not for the mother, memory and thinking are not independent; they are linked only when and to the extent, they are linked to perceptions.

The first of these laws may be formulated thus: Never does it occur in such a way that the original undifferentiated consciousness at once gives rise to all the functions in differentiated forms. On the contrary, it always happens that **the differentiation of each function is performed consecutively**, in such a way that at first, only one function stands out, often not representing the differentiated unity, being within itself undifferentiated. Let me just explain this law. It has in view the thought that it does not happen that there is to begin with an undifferentiated consciousness, and then immediately, one fine day, it becomes differentiated. Differentiation occurs in parts, with separate functions, and these functions themselves are still internally little differentiated.

For example, in an early age, what stands out from the general fabric of consciousness is perception. As I already told you, it has not yet sufficiently differentiated itself from the emotions. Not only that, auditory and visual perception and perception of colour and form are still very undifferentiated. Although the function as a whole may be already identifiable, it is still extremely undifferentiated inside. It stands out by itself as undifferentiated whole.

And the last thing we must add to the conclusion which follows from this law: at every age period, therefore, different functions manifest different degrees of internal and external differentiation. This means, for example, that perception in early childhood is more differentiated than memory is. And therefore:

- (1) **At every age period, different functions are to different degrees separated from consciousness as a whole and are to different degrees differentiated within themselves.**

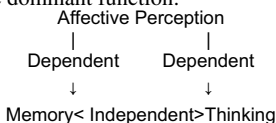
For this reason, there is never a homogeneous development of functions: **such is the first law.**

The second law which characterizes the psychological development of the child also, it seems to me, stems from the facts of which I spoke previously. It can be formulated in this way:

- (2) The function which is differentiated at a given age does not just acquire a relative independence from consciousness as a whole but takes up a central position in the whole of the system of consciousness, acting as the dominant function and defining in one way or another all of the activity of consciousness.

Let me now explain this. This means that the function does not simply stand out and with that, the matter ends. For a function to stand out—this means to lead: it stands out in order to take a dominant position. It, as a part that is already freed up, will colour to a greater or lesser extent the activities of all of the undifferentiated consciousness remaining.

Memory and thinking are linked, but they are not directly linked—they only function through the dominant function:



On what depends, this greater or lesser amount of sovereignty for a given function? It depends upon whether the other functions are differentiated. For example, in the age of early childhood, perception dominates, while the other functions...are they differentiated or poorly differentiated? Poorly so. For this reason, perception determines the activity of consciousness to a great extent. But already in the subsequent age, when we have to deal with other, more differentiated functions, the dominant role of the central functions will be played less distinctly. Nevertheless, the law is at all times in force: **consciousness is being constructed hierarchically.**

Consciousness is not constructed as a series of democratically arrayed separate functions that do not obey each other and are connected with each other on the basis of equality. The very meaning of differentiation in psychological development lies in this: we are confronted by a complex hierarchy, a complex organization. **The freeing up of each separate function means changing the activities of all of consciousness as a whole.** So, what happens is not only the differentiation or separation of given function; what happens is this: **thanks to one separated function, since it begins to take the chief position amongst all the remaining consciousness, all the consciousness as a whole acquires new structure, new kind of activity.**

Thanks to this, there emerges that which I told you of previously—with every dominant function, a system of interfunctional connections is arising in consciousness, i.e. various functions are related differently to one another. Does perception relate to memory in the way that memory relates to thinking? No. Perception dominates. In relation to it, both memory and thinking are subordinate and undifferentiated functions. Thinking is otherwise related to memory. They are linked through perception, to which both of these functions are subordinates. So we could add to the second law as follows: **thanks to this dominance, at each age level, there arises a system of interfunctional relationships that is specific to the age level,** which is never the same for different functions. Different functions stand in different relationships to one another at different ages.

We now turn to the third law. The third law lies in this: the function which first stands out in a given age and which dominates in consciousness, this function occupies something like a privileged position in relation to its development. It is said of these dominant outstanding functions at each given age that they are placed in the most favourable conditions for their development, because all of the rest of consciousness must serve this given function. Perception stands, in early childhood age, at the centre, taking up a dominant position. Is this favourable for its development or not? Thanks to this, will perception at this age develop at a maximal tempo or no? Yes, for memory will not act otherwise than as it is linked to perception, and thinking likewise, only acting as a process of perception. This means that all functions and all consciousness in its activities will serve the given function. This contributes to its maximal growth and development and to its maximal internal differentiation.

Thus following the process of external differentiation, the process of foregrounding this function from the whole of consciousness, there follows a period of internal differentiation of the given function, its maximal development and maximal internal

subdivision,⁷ i.e. the emergence inside it of a complex and also hierarchically organized structure. As a result, the period which is advantageous for the development of each function is precisely the period when it is first adequately differentiated, i.e. here is, as it were, the main epoch in the maturation of perception.

We may say that never, in all of the prior and subsequent history of this function, is there such an intensive development as in the period when it was dominant. Where, then, is the main development of perception as such concentrated? It is concentrated in early childhood, when this function dominates. Is perception developed earlier? Yes. Will it develop later? Yes. But its centre, its chief epoch, is precisely here.

We know already from the general laws of development that each aspect of development, each function, and each system has its central period of development. Take, for example, sexual maturation. Sexual development occurs from the first day of child development and even in the foetal period and lasts until the last day of mature life. But where are the main events in sexual development concentrated? Between the ages of 13 and 15 years. All that came earlier in sexual development and all that will happen after this cannot be compared in importance to what happens in this age period.

Do the rudiments of speech develop in the child from his beginning to the age of one and a half? They do. After five? Then too. But where is the main concentration, where are the decisive events that define the basics of speech acquisition? Between 1.5 and five years. Here is where the child masters all of the basics of languages.

The general law of development states that **each aspect of development, each function, and each system has its own most intensive and optimal period of development**. And the partial law, which we are considering, says that this optimal development for a psychological function consists of that period when **it was first differentiated from the rest of consciousness and took the role of a dominant function**.⁸

⁷The Russian term used is *максимального внутреннего расчленения* which could be translated as “maximal inner disarticulation”. The problem is that this suggests a de-structuration. Actually, what is meant is closer to the very opposite, which is why Léopoldoff-Martin translates the term as “démultiplication”. Vygotsky is describing a new concept of development: not the addition of A + B, but rather the differentiation of As and Bs from some mixed up whole, like ABBA or BAAB and then their relinking into new AB or BA units.

Take, for example, the stratification of infant feeling into thinking and speech. Thinking and speaking can then be relinked into new thinking–speaking and speaking–thinking units in protolanguage. These units are then further differentiated into sounds and meanings and then linked up again through grammar in an even more complex structure in language proper.

The result of this process of subdivision and relinking is actually a more structured, more complex entity, and that is why Lucien Sève has proposed the word “complexification” to describe it (See Vygotskij 2018: 86f). Because “complexification” only gives the outcome of the process, and what Vygotsky is describing here is the process itself, we have chosen to translate this as “maximal internal subdivision”

⁸Vygotsky says that this is a “partial” law, meaning both that it is not a general law and also that it is a part—a kind of codicil—of the more general law. As we will see, it is actually not the case that every function has a dominant period: many functions are differentiated by being shifted from one function to another and not be exercising dominance over all the functions.

If this is clear, we may proceed to the formulation of the third law of psychological development. In the period, following the external differentiation of a given function:

- (3) **The dominant function in consciousness obtains the most favourable conditions for its development**, since all of the other forms of the activity of consciousness are as if subservient to it.

This contributes to the internal differentiation of the given function. In any given period, the dominant function is undergoing maximally intensive development, not only in comparison with other functions in the same period **but also in comparison with its previous and with its subsequent history**. This means that the maximally intensive development of perception is in early childhood, not only in comparison with memory or with thinking or will, that is, perception develops more intensively than all of these other functions, but also compared with the history of development of perception before and after this period. The given period constitutes that which is maximally intensive and richest in content.

If we may consider that this elucidation of the first three laws of psychological development in the age of childhood is complete, we may now proceed to elucidate the fourth, and most important, proposition, which expands upon these three laws.

It would be incorrect to imagine on the basis of that which I have said up to this point that the development of consciousness⁹ proceeds in this way: in the beginning there was an undifferentiated consciousness, then one function stood out, then in the next age, another; the next, a third; in the next, a fourth—and that therefore, each age was separated from the next by the gradual, sequential separation of single functions. If we were to restrict ourselves to the representation which could emerge from the laws that I have outlined, we would come to a completely incorrect representation of the course of development of consciousness that does not correspond to reality.

Already at preschool age, the position of the matter is dramatically altered in comparison with early childhood. If we take the transition from infancy to early childhood, we find in the age of infancy undifferentiated consciousness but in early childhood what stands out is a differentiated perception. If we take school age,¹⁰ the position of the matter is here different again. Perception in preschool age is now differentiated both externally and internally. Now, can it simply be that any new function that arises will just occupy the same place that perception occupied previously? No, because, put crudely, perception had no rival when perception was separated out. The new function that begins to differentiate itself in the preschool years often

In the next paragraph, Vygotsky at last formulates this third law and apparently writes it on the blackboard alongside the first and the second laws, the law the uneven, sequential development of functions (the dominance of one function and then another), the law of the hierarchical relation of functions (the dominance of one function by another). The third law is that the use of the dominant function leads to its internal differentiation.

⁹The manuscript has *познания*, which is not a Russian word. Léopoldoff-Martin suggests that it is simply a typo: *сознания*, “consciousness” is what is meant. See Vygotskij (2018: 87).

¹⁰Léopoldoff-Martin believes that “preschool” is meant here and in the first sentence of the next paragraph as well. Of course, “school age” is also possible, since Vygotsky is simply saying that different functions are differentiated in different age periods. See Vygotskij (2018: 87).

has a mighty rival, a function which is already ripened, relatively independent, and internally differentiated—perception.

Can it be that a new function that has only begun to differentiate itself in this age immediately occupies the dominant position in relation to consciousness as a whole, as perception did in relation to undifferentiated consciousness? Of course not. This is all the more true since perception in early childhood was separated from undifferentiated consciousness. This was the state of affairs: in early childhood, there were already interfunctional relationships emerging, e.g. different functions already in a certain subordination to perception. Now, can a new function, which stands out in the preschool age, immediately seize control of these relationships? Or will functions that are dependent on one function rebuild their relationship differently when they move to another function? Differently, of course. In this way, preschool age is not repeating the story of differentiation which occurs in a relatively simple way in early childhood.

What is different about the differentiation of the new function which stands out at school age? How do the circumstances differ from early childhood? As I just attempted to say, the differences at each new stage consist of the complication of the situation, and this complicated situation is reducible to two moments. First, the situation is complicated by the fact that there already exists in consciousness a function which dominated earlier—a strong, internally differentiated, independent function which was more developed than the one that is only now beginning its development—and secondly, all the other functions are no longer in an undifferentiated, unorganized state but are already subordinated to perception, all of them already acting in a certain system.

That is why when the development of consciousness goes from a complete lack of differentiation to a primary differentiation which at this time presents itself as relatively simple, only here does a certain system appear. But when consciousness goes from early childhood to preschool age, here there is already a system in place. And I think you will agree that it is one thing to go from an undifferentiated consciousness to some form of primordial, simple system, and another to switch from one system to different one. Consequently, the next step in the development of consciousness happens in a different manner. A new function that stands out as the dominant function and that also enjoys the maximally favourable conditions for development in the preschool years—this is the function of memory, and memory mainly develops in the preschool years.

These three laws that we have presented thus far suffice to explain the development of consciousness to the beginning of consciousness in the preschool age, **but then in the development of consciousness from preschool age there appears a new law—a fourth one.** What's new here? What is new is that for the first time in the transition from the age of infancy to early childhood, there arises a general system; for the first time, general functions begin to stand out; for the first time, something has come to dominate the system of consciousness; for the first time, interfunctional relations have appeared, and the transition to the age of preschool now requires switching from one system to another system. **And, this transition from one system to another system is accomplished differently and with more difficulty than that from the**

undifferentiated system of conscious life devoid of any system to some sort of preliminary system.

What is the peculiarity of this second step? What does it have in common with the first step, and what is new and different? What is old, and in what does it repeat the old way? The old way is repeated only insofar as here, in the preschool age, what stands out is not all the functions, but only one function—memory. Moreover, an old step is repeated in that here memory is not yet internally differentiated within itself. What is repeated is that memory too starts to occupy a dominant position in the preschool age just like that occupied by perception in early childhood and that all the other functions of the child act in a subordinate and dependent position in relation to memory, as they used to act in relation to perception. By the middle of preschool age, even perception becomes itself subordinated in relation to memory. What is repeated is the old history is that memory in the preschool years enjoys its maximally favourable conditions for developing itself, i.e. that it develops more intensively than all the other functions at this age and more intensively than memory itself develops at any time before or afterwards, ever. In short, everything that is stated in the first three laws remains valid for the second step. Yet at the same time, there are several new circumstances to which we must pay some attention in turn.

The first circumstance consists in the fact that the new function—memory—in the preschool years should change its relationship with the function that dominated previously, to the opposite relationship. In early childhood, memory was subordinated to perception, and in the preschool years, what must happen is the opposite: the subordinating function of perception must become subordinated, and memory, the subordinated, must take up the subordinating position. The first new thing that we must face is this: the new function, if we may put it so, has a powerful opponent, a powerful competitor, it cannot fill an empty space, as did perception, but must reconstruct the already existing system. This is first.

Second—it must, with all of the other functions, if we may put it thus, and if we literally translate into Russian language a foreign word, resubordinate them. It must not just subordinate those free-floating functions that have not been subordinated, it must resubordinate them to itself, it must transfer functions that are assigned to perception, to its own dependency.¹¹

If we take into account both of these propositions, we can consider them as expressing a general proposition, which I spoke of earlier, that the new situation lies in this: that earlier what had to arise was a general system, but now the system must be rebuilt, and further development is characterized by rebuilding the system.

I think you will understand when I say that the development finds its way out of this situation in a very peculiar way. That is, the new function in all subsequent ages will develop and begin to occupy a dominant position **in no other way than by means of the former one**. As one of the researchers put it, the new function proceeds very treacherously. Wishing to take the place of the function which dominated

¹¹Vygotsky doesn't specify the "foreign word" he has in mind, but Lucien Sève assumes that he means the German term *unterordnen*, which means to "subordinate", to "put under", and to "place in a lower order". See Vygotskij (2018: 87f).

previously, it forms an alliance with it, climbing up on its shoulders. In short, the new function proceeds to the dominating position through the function that dominated previously **by initially supporting itself by it**. On the boundary of early childhood and preschool age, you cannot say with accuracy which of the two functions dominates. And through the function that dominated earlier, through perception, the new function resubordinates all of the remaining ones. That is why it does not take place as if perception were simply removed from its position and its place were occupied by memory, with memory subjugating all the functions to itself. The old system develops into a new one and overgrows it in such a way that memory takes over perception and first of all begins to interconnect with it and then through this centre reconstructs all the rest of the system.

The further we go through the ages, the more the situation becomes complexified. I will for brevity only sketch for you the next steps and will formulate a law with which we'll finish today. At school age, the situation becomes even more complex, because, first of all, we are dealing with two differentiated functions—perception and memory; secondly, we are dealing with the fact that all of the other functions were once subordinated to perception and then resubordinated to memory. The very fact of their resubordination leads to their redifferentiation. They are in a new system, with new relations¹² between one and another. The situation in school age will be even more complex and that of following ages still more and more complex.

In this way, the study of development indicates that in the transition from one age to another, **the complexity of the interfunctional links grows enormously**. Thanks to this, there emerges one new feature which is particularly important: not all functions, in order to be differentiated, need pass through the dominant position. Not every function, in order to be differentiated, must undergo this situation, for **there is a new way of differentiating functions through their resubordination**. At each new step, all of the functional relations are rebuilt. Yes, before they were subordinated to perception, then to memory, then in the school age to intellect, and so on. This restructuring of interfunctional relations brings the differentiation of these relations, i.e. **a number of functions are differentiated very delicately and very precisely, without passing through the dominant position**.

If this is clear, we may move on to the formulate the fourth and final one of the propositions that characterize the laws of psychological development in the age of childhood.

¹²There is a difference between the stenogramme of Vygotsky's lectures and the printed version here. Korotaeva (2001: 109) replaces the word отражении ("reflection" or "repulsion") with the more general word отношения ("relation" or "relationship"). The more general word will do, and we have used it. Vygotsky's point is that this transition happens *without* attention becoming a dominant function. How is that possible?

Consider a child whose attention is dominated by perception. The child becomes a preschooler, and during this period, learns the alphabet, the numbers, and many names for things. The function of affective perception which once linked memory and attention is now differentiated and replaced by memory itself. Then memory is replaced at the end of preschool. So by subtracting one dominant function after another, the child achieves a relatively pure, differentiated attention—without attention becoming a dominant function. In this way, the functions "repel" each other by having the function which linked them subtracted again and again.

- (4) **The process of further functional differentiation of consciousness is not by way of the direct emergence of a new dominant function and new systemic interfunctional relations corresponding to it, but by way of restructuring the old system and transforming it into a new system. Furthermore, the more differentiated the system of consciousness which flows from this restructuring is, the more complex the process of rebuilding the old system into a new one will be.**

And lastly, thanks to the emergence at each stage of resubordinating of functions and the reconstructing of all the interfunctional relationships, it becomes possible to differentiate functions without the path which is typical of the dominant function.

References

- Выготский Л.С. (2001). *Лекции по педологии*. Ижевск: Издательский дом “Удмуртский университет”.
- Vygotskij, L. S. (2018). *La science du développement de l'enfant: Text pédologiques (1930–1934)*. Traduits par I. Léopoldoff-Martin. Berne: Collection Exploration Peter Lang.
- Vygotsky, L. S. (1998). *The collected works of L. S. Vygotsky* (Vol. 5). New York: Plenum Press.

Chapter 6

The General Laws of Physical Development in the Child: The Endocrine System



Outline of Lecture 6

Vygotsky begins the last part of the course with a contradiction: how do we describe the unity of physical and mental development in lectures which treat physical systems such as the endocrine glands and the nervous system as separate from the mind? The answer he proposes is to first consider each system in its unity and then to show that it is part of a larger system: the body. By the end of the course, students will see that this larger system too is part of a larger system and that the development of this larger system is the proper object of pedagogy.

Introduction: Establishing a unity of physical and mental development

Vygotsky begins by establishing the unity of psychological and physiological development, but nevertheless arguing for the necessity of analysis. On the one hand, dividing development into physical and mental development is methodologically impermissible, because the one is quite impossible without the other in practice. On the other, there are discernibly different lines of development even within physical development itself (e.g. that of the skeleton, that of the heart and blood vessels, and—the topic of this lecture and the next one, respectively—the endocrine and nervous systems). The lines of development are at one and the same time indivisible and clearly distinguishable. Vygotsky then offers two examples to demonstrate how this apparent theoretical impossibility is a practical necessity.

Vygotsky now introduces the task of the next two lectures: to lay out the growth and the development of two physiological systems, the endocrine and the nervous system. He begins with the endocrine system and immediately rejects the popular view that endocrine glands exercise unilateral control over the body. Instead, he

The title of this chapter is from the 1996 version of Korotaeva's book (in Vygotsky's lifetime, the lectures were simply numbered, as explained in "Setting the Scene"). In the later 2001 version, Korotaeva calls this lecture simply "Laws of the physical development of the child". We have chosen the 1996 title for the chapter as a whole for two reasons. First of all, it is more precise: the endocrine system is the topic of the chapter and not the physical development of the child in general. Secondly, this title makes the parallel with Chapter Seven more explicit.

argues, the endocrine system too is a part of the body. Poignantly, Vygotsky points to the effect of the endocrine system upon appetite and the reverse effect of starvation upon the endocrine system and suggests instead that the endocrine system plays a mediating role between nutrition and development. He then lays out the order of the lecture: first, to consider the endocrine system by itself and then to consider it in relation to the body as a whole.

The growth and development of endocrine glands as part of a system. Vygotsky first discusses the growth and development of the endocrine glands as a system in itself rather than in relation to other systems. The laws of physiological development, while not entirely identical, are clear analogues to those presented in the last lecture.

1. The first law is the analogue of the first law of the child's psychological development: uneven, heterogenous and therefore non-simultaneous development. Just as the child's psychological development takes place function by function, the development of the child's endocrine system takes place gland by gland.
2. The second law is the analogue of the third psychological law, the period of maximum development: some glands undergo evolution and others seem to involute and almost wither away. In support of this, Vygotsky presents the research of Biedl: the adrenal glands, for example, are disproportionately large and active at birth, but then undergo involution. The thymus and the pineal gland undergo similar processes of involution, either ceasing to play any functional role at all or being dominated by others.
3. Finally, Vygotsky formulates the third law, that one gland matures and represses the activity of another, as a general law of reverse dependencies: if the evolution of a given gland A depends on a gland B at first, this dependency may be reversed so that the involution of gland B depends on gland A.

Conclusion: How the endocrine system relates to other systems. Vygotsky now turns to the relation between the endocrine system and other systems, with particular attention to the nervous system.

1. First, Vygotsky sums up the three laws that describe the development of the endocrine glands as a system: heterogeneity, evolution and involution, and reverse dependencies.
2. He notes that each period of childhood appears to coincide with a restructuring of the endocrine system and that at any given age there appears to be one or some group of glands which define the tenor of the stage as a whole. Finally, he notes that the maturing of "higher" glands (e.g. the sex glands) depends on the involution of lower glands. This means that the effect of a defect in a gland will differ greatly according to the state of development in the organism as a whole. A problem in the pituitary or the thyroid that would be catastrophic for development in a pre-adolescent may be scarcely noticeable in a mature adult.
3. Vygotsky then seeks to draw conclusions for the mutual influence of psychological and physiological development. He notes that the endocrine system is, as Spinoza describes man in nature, "not a state within a state". Like man in nature, the endocrine system is part of a whole and must obey the laws of that

whole. In Vygotsky's time, for example, many endocrine disorders (e.g. goitres) were due to malnutrition of the organism as a whole; in our own time, type II diabetes, which is also an endocrine disorder, is often due to obesity. Because of the link between the nervous system and the whole system of needs, inclinations, and emotions, there is an undoubted link between endocrine development and psychological development. Finally, Vygotsky notes the general relationship between the endocrine system and body height and growth and reminds us that the effect of damage to a gland depends very much on the state of development in the child.

4. Vygotsky concludes that any bodily system is defined not simply by a domestic but also by a foreign policy—for example, the endocrine system is not simply defined by a given “endocrine formula” which defines the relations between glands, but also by its relations to other systems, e.g. the nervous system. Vygotsky then concludes with the thought that just as we find reverse dependencies within systems (e.g. with the sex glands taking over from the pituitary in adolescence), we may find similar reverse dependencies between systems, i.e. the endocrine system as a whole may cede its status and significance to the subject of the next lecture, namely the nervous system.

Lecture 6

Today, we will dwell briefly on **a few of the general laws of physical development in the child**. Strictly speaking, dividing the development of the child into the psychological and the physical, as has been the practice for a long time, appears to be without either commonsensical or scientific justification, as psychological development is closely linked to the physical and never presents us with an independent line of development. Therefore, separation of development into two aspects turns out to be methodologically incorrect and extremely disadvantageous from the point of view of outlining the basic laws of development.

Yet some disarticulation of development is nevertheless necessary. Development is made up of a whole series, as we have already said, of different aspects, different lines. Physical development itself is a summative concept. Into it go the process of growth and the overall development of a series of organic systems, for example, the development of the skeletal system or the development of the cardiovascular system, and the development of the endocrine system and the nervous system—these are all different lines of physical development, very complexly interconnected.

There is a whole series of such aspects of development which cannot be attributed to psychological or to physical development alone. For example, the development of motor skills, the development of motion. On the one hand, motion in humans, in the child, constitutes one of the manifestations of the activities of his conscious activity, his psychological activity; on the other hand, motion is always a motor act, carried

out, taken on, by an organism. And so when considering motility, the separation of the psychological and the physical is simply impossible.

Or, for example, when we study the development of the nervous system, or the development of the brain, we attribute it to physical development, while when we study psychological development, we study it separately. Yet at the same time, any psychological function is a function of a developing brain.

All of these I cite as examples that demonstrate the degree to which it is against common sense to divide development into these two partial summations and the degree to which it is more appropriate to take apart development according to other traits—according to the independent lines of system development—and to treat these separately. In order to mitigate a little the difficulty which is produced by separating the development of these two aspects, I will dwell today on just two such systems: on the development of the endocrine system and its significance for the overall physical development of the child and on the development of the nervous system.

I will attempt to take these two central systems separately and use them to illustrate some of the general laws of physical development, [just as] when we spoke last time of psychological development and we attempted to find the most general of the laws of a general character. In addition, the development of the endocrine system and the development of the nervous system are precisely those most directly linked to psychological development. All of this taken together will allow us to some extent to form an idea of the basic laws of organic development in the child and of their complexity.¹

Let me begin with the development of the endocrine system. It must be said that for a fairly long time, a link has been observed between growth and the organic development of the child, on the one hand, and the activities of glands of inner secretion on the other. From this arose the idea that the glands of inner secretion present us with something like a system for the regulation of the growth and the development of the child, which occur thanks directly to the activity of the glands of inner secretion. Such a representation is not theoretically correct for the simple reason that the endocrine system itself makes up part of the organism, it itself grows and is developed along with the organism, and it reflects the general state of growth and development of the organism and its other systems affects its growth. And it is therefore necessary, first of all, to clarify how the endocrine system itself is developed, and second, it is important to understand, what links exist between the development of the endocrine system on the one hand, and the development of the organism as a whole, on the other.

As for the question of whether the endocrine system itself represents a part of the body and thus develops along with the organism and therefore also needs to be explained and cannot be considered as a primary cause to which we can reduce all the phenomena of physical development, this question receives a speculative

¹Korotava says that the original stenogramme read “как все равно” (“just as always” or “as in any other case”) rather than “подобно тому, как” (“just as when”). Note that Vygotsky doesn’t manage to discuss the neurological system in this lecture. The next and final lecture in this book concerns the neurological system. This suggests that Vygotsky is speaking *ex tempore* and very often plans to cover more in a single lecture than he actually does.

but very plausible answer in connection with the wider knowledge that has been acquired in recent decades in the area of the study of the processes of growth and physical development. In particular, the study of vitamins as factors of growth have led many researchers to revise their view of the endocrine system as a system which regulates by itself the growth and development of the child and to adopt a more precise and more autonomous opinion according to which **the endocrine system is to be considered a mediator between the nutrition of the organism and its growth and development.**

It is, as is the rest of the organism, dependent first and foremost upon nutrition. And studies have shown that general starvation of the child's organism, and in particular, the lack of vitamins leads to a drastic change on the part of the glands of internal secretion. In this way and in this sense, the endocrine system is like the other systems of the organism but not identical with any of them and suffers acutely from starvation in general and from deprivation of vitamins in particular. But at the same time, some central role in the development of the organism of the child appears to belong to it, and this mediating role between nutrition and the simple growth and the formation of the organism appears to be in itself the general form of expression which characterizes the role of the endocrine system.

We shall dwell on two sides to this question: firstly, on the development of the endocrine system itself, and secondly, on the role played by the endocrine system in relation to overall growth and development in the organism. From the one and from the other we may (not only—T) be able to glean some, as I have said, of the most important laws characterizing overall physical development as a whole, but also discover their particular expression in the example of the endocrine system.

What does the growth and the development of the endocrine system consist of? First of all, we are dealing here with growth in the true sense of this word, i.e. we are dealing with the fact that glands, initially small, increase in the course of development and become larger organs. However, this not only does not exhaust the content of the development of the endocrine system, it clearly constitutes a moment that is merely subordinate and not supreme.

As I've said, the most substantial moments which characterize the development of the endocrine system include three moments which have a broader significance than that solely in relation to the endocrine system itself. However, we shall first of all concentrate on the development of the endocrine system as such.

The first moment that characterizes the development of the endocrine system consists in this: the endocrine system matures unevenly. This means that different glands turn out to be not at the same level of maturity at the moments they commence their functions. Some glands mature and attain their maximal level of functioning early, and others late—a third group, even later. Some are already relatively mature at the moment they begin their development, while others mature only near the end of their development. So, first of all, what characterizes the development of the endocrine system is uneven maturity in the individual parts of this system.

Secondly, what characterizes the development of the endocrine system is that it is impossible to understand the development of the endocrine system if we do not take into account the processes of evolution, i.e. those progressive processes

of development that are nearly always interwoven into an unbreakable whole with processes of involution, with processes of regression, or of reverse development.

In the transition from one epoch of childhood to another not only do we encounter the fact of maturation in advance of immature glands, but we also encounter the reverse processes, with involuted glands that have reached their maximum development in the preceding stage. Moreover, these processes of reverse development occur either in the sense of absolute involution, i.e. the gland completely comes to naught in terms of its functional role and, apparently, in the sense of the structural regeneration of their tissues, or else this reverse development does not completely eliminate the gland in the system of internal secretions but only, as some researchers have expressed it, introduces the activity of the gland to a narrower framework and to a reduced activity. In this case, we are also seeing a regressive course of development, but this regression does not bring it to an end but only leads to a relative diminishment in the role of the given gland.

Some numbers which I wish to use to illustrate this and which I take from one of the greatest experts on this question—from Biedl—are extremely indicative in relation to a certain part of the glands of inner secretion.²

The adrenal glands are, during fetal life and at the moment of birth of the child the most mature of the glands in the entire system, while at the same time a number of other functions are found to be at a stage of minimal activity: for instance, the thyroid gland during the first period after birth, as a number of studies have shown, is in a minimal state of activity, and consequently one of minimal structural and functional maturity. The adrenal glands are already to a much greater degree mature organs (in absolute terms—T). However, what is particularly striking is the relative maturity of this organ. Thus, for example, we know that in the first months of embryonic development, the adrenals are larger than the kidneys, by the sixth or seventh month they are equal in size to half a kidney, and subsequent correlations work out as follows: with the newborn, the relationship of the adrenal to the kidney is expressed by the numerals 1: 3, but in an adult 1: 28. If you take the ratio to the entire body, then the ratio of the adrenals in a four- to five-month foetus is 1: 144, in the newborn 1: 750, and in an adult 1: 6000. In this way, the relative maturity, the relative domination of the adrenals and their relationship to the kidneys and to the body as a whole, if we compare the beginning moment with the final moment of development, i.e. the neonate with the adult person, will appear extremely large. And, summarizing a number of studies concerning this question, Biedl says that **such changes occur here that cannot be regarded otherwise than as hyperplasia**, i.e. early overdevelopment, followed by the opposite development—involution.

As examples of organs of internal secretion undergoing involution during the process of child development, we may mention the thymus gland. You know that

²Arthur Biedl (1869–1933) was a Hungarian pathologist, considered the founder of modern endocrinology. He demonstrated that many diverse syndromes such as polydactyly (many-fingeredness), hypogonadism (interrupted puberty), and retinitis pigmentosa (tunnel vision) are related to endocrine imbalances of various kinds. Vygotsky uses Biedl's study of the development of the endocrine system in his own theory for periodizing adolescence in *Pedology of the Adolescent* (1929).

this plays a very important role in the development of the child in the first years of his life. Between different researchers, there is still no agreement about when the main process of involution in the thymus gland occurs. Some claim that the thymus begins to reverse development very early on, within the first two years in the life of the child. Others think that the main process of reverse development commences in the age of sexual maturation. But it cannot be doubted that the thymus gland, which constitutes one of the most matured functions in early development, one of the glands which plays a dominant role in the system of the glands of internal secretion, this gland, in the course of child development, undergoes reverse development. There is a reason to think that the same applies for the **pineal gland**, which also, many authors believe, undergoes **reverse development in the middle of child development**.

But even if we turn to those glands in which, as I have said, this process of involution is taking place does not attain the zero point, in any case when compared to other glands, reverse development is taking place.

Consequently, we may reiterate the **second peculiarity** that characterizes the development of the endocrine system, consisting in this: in addition to the uneven achievement of maturity in individual glands, there is also a very close interweaving of the processes of evolution and involution, processes of progressive and regressive development, in the system of glands of internal secretion.

And finally, the third and the most complex of the laws characterize the development of the glands of internal secretion consists in this: in the development of the endocrine system, we often observe the phenomenon of glands that reach their maturity relatively early, occupy a dominant place in the system of glands of internal secretion, and prepare and stimulate the development of other glands. But it is then solely thanks to the stimulating effects of these glands in maturing others which were previously immature and which mature later that these matured glands then seem to depress the activity of those glands which contributed to their development and to **contribute to the diminution or reduction of their functions, or their relative regression and relative involution**.

The simplest example of this is the change in the system of glands of internal secretion which occurs at the threshold of school age and the epoch of sexual maturity. A number of studies showed this, with perhaps greater reliability than in any other field, allowing us to imagine a picture of the endocrine shifts, the changes in the endocrine system, which occur with the onset of sexual maturation and the process of sexual maturation itself. This shift can exemplify for us the third law, which I would now like to illustrate.

The start of sexual maturation is not entirely due to any actual rapid growth of the sexual glands. The first phenomena that manifest the onset of sexual maturation—for example, the rapid growth in body height, the rapid growth of long bones, a number of changes of a vegetative character³—all of these changes, the research demonstrates, are not immediately caused by the maturation of sexual glands but

³Vygotsky uses the term “vegetative” in distinction to “animal”—that is, functions like respiration, metabolism, and growth which we share with plants as opposed to functions like volition, mobility, and sociality that we share with animals.

by the hyperfunctioning—the enhanced activity—of the thyroid gland, on the one hand, and the anterior pituitary gland, on the other hand. These glands seem to govern the period of school age to such a degree that many authors call school age the age of pituitary childhood, intending by this to point out that the pituitary is the ruling, reigning gland, determining the entire character of development at school age; these are the glands preparing sexual maturation. Pituitary and thyroid glands have a stimulating and triggering effect on the growth and maturation of the sexual glands. This is known from the simple fact that when we are confronted with a defective pituitary or thyroid gland, sexual maturation is delayed or does not occur at all.

As for sexual maturation proper, there arises in sexual maturation a series of changes from which sexual maturation commences. And all of these changes, the research has shown, are due not to the maturation of the sexual glands as such but to the hyperfunctioning of the thyroid gland.⁴

In this way, the onset of sexual maturation, as Biedl says, is not thanks to the maturation of the sexual glands, but, if I may put it this way, despite this maturation, thanks to the inadequacy of the sexual glands, thanks to the hyperfunctioning, the enhanced functioning, of two glands: the thyroid and the pituitary—and thanks to the strong reverse development of the thymus gland, which, as the gland of early childhood, seems to have an inhibiting effect, depressing and delaying the maturation of the sexual glands.

In this way, according to Biedl, the beginning of sexual maturation proceeds with three changes. On the one hand, the thymus gland which inhibits and delays sexual development withers away. On the other hand, there is the intensifying action of those two glands which do promote sexual maturation—this is the first period of sexual maturation, when the sexual glands themselves do not play any significant role—therefore the maturing sexual glands are not only not the direct cause of the changes which occur at the beginning of this change, but they themselves are a secondary consequence of the changes in the system of glands of internal secretion. Only then do we observe the epoch or the period of sexual maturation, which may be characterized as a struggle between the sexual glands, already relatively mature, and the very glands which prepared the path for these glands.

There occurs, in this way, a state of affairs such that the pituitary and the thyroid glands, as researchers put it, prepare their own adversaries, because of the well known law which consists in this: the pituitary and thyroid glands in their development have a way of stimulating the development of the sexual glands, but the sexual glands have an inhibiting action on the activity of the pituitary and thyroid glands. I will offer you some facts in which you will see the presence of this law. The pituitary and thyroid glands stimulate the development of the sexual glands, but when the sexual

⁴Vygotsky is right that puberty does not simply start with the maturation of the sexual glands. But while thyroid function and thyroid volume do increase during puberty, the hyperfunctioning of the thyroid doesn't seem to play an important instigating role. The accepted explanation today is that it is the hypothalamus, not the thyroid, which releases GnRH (gonadotropin-releasing hormone). This in turn stimulates the pituitary to emit hormones which begin the process in the gonads.

glands reach a given stage of development they repress the activity of the thyroid and the pituitary glands, i.e. those glands which provided for their own development.⁵

This second page—the struggle of the sexual glands for hegemony and for dominance—is characterized by a whole series of symptoms in the physiological and psychological development of the child.

And finally the third epoch, which is already the epoch of maturity, is characterized by the fact that the thyroid gland and the pituitary undergo relatively regressive development; they enter into, as Biedl says, narrow confines, and their function is reduced. This can also be seen in a series of symptoms. And the conducting role in the whole endocrine concert begins to be taken by the sexual glands, which maintain this conducting position through the life of a mature person, up to the threshold of old age.

So what should we attach to this example, so that it becomes clear to the very end to us? It seems to me that there are two propositions. First of all, we need to ascertain what factual data supports these two propositions which I have just mentioned in an abstract form, and second, we need to generalize from this example and see what general law is demonstrated from this example.

Let me begin with the factual traits that let us establish that the relations that I have been trying to explain actually exist. The first one is simply this: as I have already said, pathological data shows that if we are dealing with a defect, either hypofunctioning or hypoplasia or aplasia of the thyroid or the pituitary gland, sexual maturation may not take place at all. Tomorrow we will consider by way of illustration to the whole of today's theme some children with disorders in physical development and in these cases we will be able to see clearly how the presence or absence of sexual maturation is linked to primary hypothyroidism or hypoplasia of the pituitary or thyroid glands. This means that the absence of one of these glands leads already to the absence of sexual maturation. This is one dependency. This is one of the basic moments which convince us that the pituitary and the thyroid glands stimulate and promote sexual maturation.⁶

Now for the reverse dependency. From the facts known about the sexual glands, they are developed in an inhibitory way, i.e. they lead to regressive development of the function in the pituitary and the thyroid glands. We know that the pituitary gland, particularly its anterior lobe, is associated, as you know, with growth in body height, and particularly with growth in the limbs, the legs. We know as well that as soon as sexual maturation takes place, as soon as the process reaches a middle stage, the growth in body height in particular, of course very intensive during the

⁵Note that this paragraph only gives one “page” in the three pages of the great drama of puberty described by Biedl: first, the struggle between the sexual glands on the one hand and the thyroid and pituitary on the other. Second, the production of “vegetative” changes (e.g. changes in sleep, changes in appetite, appearance of pubic hair, breasts, menstrual periods in girls, and ejaculation of semen in boys). Third, the “withering away” of one set of glands has been displaced by another. The second and third pages follow in the immediately following paragraphs.

⁶Primary hypothyroidism means that the thyroid is functioning below normal level and the problem is with the thyroid itself (secondary hypothyroidism means that the thyroid is functioning below normal level, but the poor performance is caused by some other organ, e.g. the pituitary).

first period of sexual maturation (during the reign of the pituitary gland) is now somewhat suspended and the relative length of the limbs in relation to the height of the entire body becomes less with sexual maturation. But we also know that, if for some pathological cause, sexual maturity is delayed or does not take place at all, then what happens? Then what happens is an extremely intensified growth in length of the limbs, the arms and legs: so-called eunuchoid growth. You have probably heard of this anomaly of growth. Why does this intensive growth of the whole body and especially this growth in the length of the limbs take place in the absence of sexual maturation? Because the pituitary gland continues to govern and no regressive development in the function of the pituitary occurs, as would occur in a normal child when the sexual glands occupy a dominant position in the endocrine system.

Both of these moments, i.e. delayed sexual maturation with a defect of the pituitary and the cessation of pituitary function with the onset of sexual maturation, as with eunuchoid growth in delayed or non-occurrence of sexual maturation—all of this together is one of a few illustrations of the proposition that at the same time that the pituitary and thyroid glands contributed to the growth of the sexual glands and can be considered as the proximal factors determining the maturation of the sexual glands, the sexual glands act in a depressing, inhibitory way upon the activity of these glands, bringing about the regression of their development.

If we try to return once more to a general formulation of the third law of the development of the endocrine system, we may say the following: in the development of the endocrine system we often observe inverted dependencies between glands of internal secretion, which in the process of child development are reversed in the transition from one age to another. Well and good: the sexual glands, for example, in their development become directly dependent on the pituitary gland and thyroid glands, so that with insufficient development or functioning of the pituitary and thyroid glands, the sexual glands are not developed. This sexual development, as we have seen, begins with what? With the extremely intensive functioning of these two glands. This means that with the onset of sexual maturation what dependency exists, what depends upon what? The sexual glands depend on the pituitary and the thyroid. But once sexual glands have developed, the dependency is reversed. These same pituitary and thyroid glands begin to depend upon the sexual glands. So these links, these dependencies, which characterize the development of the endocrine system under the government of the sexual glands—these links are established only in development or even at the end of development. What has been a dominant and determining magnitude in the existing, in the mature, system, comes to act as a magnitude which is dependent upon others, and that which in the course of development has acted as a magnitude that determines the development of other glands becomes, in a mature system, a dependent magnitude. To put it simply, the dependency between individual glands in the developing endocrine system and in the developed endocrine system are often

reversed. This third proposition is that which characterizes the development of the endocrine system.⁷

Now we can draw a few general conclusions concerning the laws of development of the endocrine system from what we have discussed so far, and turn to the second aspect of the matter, i.e. **look at the consequences of the development of the endocrine system for the development of the organism as a whole.**

We saw that, first of all, the endocrine system matures unevenly in its parts. Some glands attain maximal maturity at the beginning of development, while others reach their maxima at the end of development, and a third group somewhere in the middle—earlier than some and later than others. For example, there exists every reason to agree with the majority of researchers that the thyroid gland at the beginning of child development carries out a minimum of activity, but soon after a year it begins to mature quickly and reaches a governing position in the system of glands of internal secretion relatively early, holding this position for about two years until the beginning of the preschool period. Then it appears to give up what has been called its first period of extension, i.e. the period of its initial intensive growth in length prevailing over growth in girth, a period, beginning about at three years or somewhat later, which is already linked to enhanced activity of the pituitary gland. Other glands mature later.

Then, we discovered that the processes of evolution in the glands are closely interwoven with processes of involution, which either bring about a process of regressive development to zero, or if not exactly zero, then in any case relatively far back.

And finally, we discovered that the dependencies between separate glands which can be observed in development are replaced, in the course of development, by reverse dependencies. If the development of the sexual glands is directly dependent upon the thyroid and the pituitary glands, then once the sexual glands have been developed the thyroid and pituitary glands themselves fall into a subordinate relationship to these glands. How can we generalize and, using [these conclusions], form an overall picture of the development of the endocrine system, and see in it some of the laws that are common to a whole series of organic systems?⁸

We see, firstly, that the organic development **cannot** to any extent **be reduced solely to growth**, that growth itself is a derived value from the state of the system as a whole. In addition, we see that the system develops as a whole and is developed in such a way that in this system there are, at each age level, **ever newer relationships**, and newer dependencies between the separate parts of the system.

What does an organism or an organic system represent? It represents a complex unitary whole. What does development mean when applied to an organism or an organic system, to a complex unitary whole? Development means above all the changing of relations, the changing of the very organization of this system.

⁷Vygotsky uses *величина*, literally “magnitude” in English. The meaning is the value, the variable, but the literal translation “magnitude” better captures Vygotsky’s idea of relative specific gravity, so we are leaving it in this somewhat un-English form and (once again) asking the reader to think in a somewhat writerly, Russian, manner.

⁸Korotaeva inserts the word *выводами* (conclusions, findings) as a direct object here (2001: 121).

In the glands of internal secretion, we often see that the process of development first and foremost embraces the system as a whole, includes growth in itself as a subordinate moment and consists first and foremost chiefly in a change of the internal organization of the system. But a change in the internal organization of a system affects above all the relations, the dependencies, the links that lie at the base of the system and that integrate the individual parts of this system together into a unitary whole. Thanks to this a situation is apparently created such that **each age period of childhood begins from a given endocrine shift, begins with the restructuring of the organization of the endocrine system.**

The system as such is reconstructed in the sense that the previously governing glands either begin to move to an anterior plane, or they undergo a process of involution, and previously immature glands begin to mature quickly, attain governance, and the previously dominant glands take up a subordinate position; those which were subordinated earlier, now change their status and begin to dominate. In other words, there is a change in the order, the organization, the structure of the endocrine system. For this reason, it is said that every age has its own endocrine formula, that is, each age has its own construction of the endocrine system. And for this reason, the child, in terms of his proper organic structure, differs from an adult person, in that the organism differs as a whole, with different internal links between systems and within them, and different inner links between the elements of these systems.

The endocrine system of a child at seven differs from the endocrine system of a child at three, and a child of thirteen is not the same, not only insofar as some of the glands are still small but sooner or later will be large or will be still smaller, but also insofar as the endocrine system of the child at one age differs from the endocrine system of the child at a different age period and above all insofar as it constitutes a different system, i.e. **it is organized differently**; the elements are linked to each other in another way, and they are combined in another way into a whole.

We may simplify somewhat, as we did in relation to the psychological development of the child, and we may, as many researchers do, say that **the endocrine system is characterized at each age first and foremost by some dominant, i.e. that in the endocrine system at a given age there appears one or a certain group of glands which dominate, which define the tone of the system as a whole**, which act as the centre of the entire endocrine system, and upon which the determination of all the links and relationships within this system depends.⁹

⁹Vygotsky uses the word *доминант* ("the dominant", i.e. the dominating source of stimuli in a group of competing stimuli). Sherrington had noted that when stimuli compete, there appear to be some which dominate, but he simply compared this to a funnel, where the order of emergence is not predetermined. In contrast, Ukhtomsky, in replicating Pavlovian experiments with cats, noted that a cat on the verge of defecation could not be stopped with an electric shock, and in fact, the shock seemed to increase cat output. He theorized that the dominant was situation sensitive and then theorized that it was sensitive to the social situation of development as well, e.g. an infant cannot be distracted from nursing, but a toddler can (Ukhtomsky was a devout Christian and thought that the highest "dominant" was the recognition of the needs of others). Here Vygotsky takes Ukhtomsky's idea still further, applying it not to stimuli but to the underlying systems. See Hardcastle (2005) for a fuller account.

In this way, the internal restructuring, the internal reorganization of the system turns out to be the most general trait, which embraces the development of the endocrine system in all three of the aspects with which we began this study.¹⁰

And **one last conclusion** that may interest us here. The conclusion lies in this: in the course of development the parts which are higher in relation to the whole system turn out to depend on the lower systems. The lower part of the system matures relatively early as if preparing the path for the development of higher systems; they are like preconditions only on the basis of which the development of the higher systems may begin. They provide in a very complex way a delay to the higher systems and they stimulate their development at a definite time; e.g. for example, on the basis of the facts of what is called “pubertas praecox” (precocious sexual maturation), there can be no doubt that this later maturation in human sexuality is due to the retarding influence of a series of glands on the development of the sexual glands.

For a very long time, the belief that has reigned that the pineal gland carries out this function, that the pineal gland inhibits the development of the sexual glands, that trauma to the pineal gland provokes a precocious sexual maturation, and that the involution of the pineal gland constitutes a prerequisite for the onset of sexual maturation. In the last ten or fifteen years, particularly after the war, this view was doubted. In particular, Biedl began to question this dependency, albeit without the resolution to deny it completely. Yet almost no one doubts that the thymus gland has a great significance in the process of development in early childhood and so, no doubt, performs some inhibiting function in relation to the maturation of the sexual glands, and the involution of the thymus gland constitutes a prerequisite for the development of the sexual glands. **In this way, the later maturing higher system is provided by a series of inhibitory influences coming from other glands.** On the other hand, certain glands, as we have seen, [determine–GSK] the development of the sexual glands, stimulating the development of the sexual glands.¹¹

¹⁰When Vygotsky refers to “all three of the aspects”, he apparently means the law of disproportionality, the law of alternating epochs of evolution and involution, and a law of reciprocal stimulation and suppression. As we’ve seen, the different glands of the endocrines system develop at different rates, with the thymus developing early and the sexual glands late. We have also seen that certain glands evolve, while others wither away. Finally, we’ve seen that the rise of one gland can instigate and even necessitate the decline of another. In this way, the development of the endocrine system demonstrates all three laws introduced at the beginning.

¹¹Korotaeva (2001: 124) inserts the word обуславливают (“stipulate”, “determine”, “decree”) in square brackets. Vygotsky has “pubertas praecox” in the original Latin, misspelt as pubertas praecex (2001: 123). He was an artful lecturer, keenly appreciated by his students. He is doing more than drawing a final conclusion here. He is planting the seed for his differentiation of the lower and higher nervous system in the next lecture (and of course the higher nervous system is the physiological basis of the higher, sociocultural, psychological functions that are specific to humans).

But why does Vygotsky consider that the sexual glands are “higher” glands within the endocrine system? It cannot simply be that they are late developing, since that would make his final conclusion here circular. But the fact that the sexual glands are late developing does show us that they are not immediately necessary for life the way that, for example, glands that regulate metabolism are. So, they are functionally higher.

We see, in this way, the following basic law: the endocrine system develops as a whole, but here what occurs is not that each individual gland is developed and that accordingly, changes in the system as a whole occur but, on the contrary, there is the inverse dependency: the endocrine system develops as a whole, reconstructed within itself, and according to this development and reconstruction of the whole, growth occurs in the development of these or those glands. This is especially clear in disturbed development or in the facts of a premature or a delayed sexual maturation, or one that does not occur at all.

How is it that sexual maturation can fail to occur? The proximal cause is aplasia—underdevelopment—or hypoplasia—inadequate development—of sexual glands. This is the proximal cause for the failure of sexual maturation. But more often sexual maturation fails to arrive not for this reason but because some other function has been afflicted—because the pituitary gland has been stricken, or because the thyroid gland has been stricken. Children with a congenital or early-acquired aplasia of the thyroid or the anterior pituitary gland remain sexually immature for the rest of their subsequent lives. So, consequently, the changes which have taken place in another part of the endocrine system have already determined the fate of the sexual glands. Consequently, the development of the sexual glands depends upon the state and the course of development of the whole system and vice versa.

What can explain premature sexual development? It may be explained, of course, sometimes by a direct hyperplasia, i.e. an overdevelopment, an accelerated or surplus development of the sexual glands. But this is not a rather frequent but a rather rare case. And most of the acceleration of sexual development is determined by a hyperfunctioning or a hyperplasia of other glands—the adrenal, the pituitary. There is a change in these glands, and then, we must deal with a sexual maturation which does not occur at thirteen, but rather at seven or at three years.

All of these facts lead us to this: the endocrine system is developed as a whole system, in which the development of the whole, consisting in the reorganisation of the system and relations of parts of this system, precedes the development of separate glands, and the development of separate glands is a functionally dependent variable derived from the system as a whole, and not vice versa, the development of the whole system is not a dependent variable or a result of the development of separate glands.

From this we may draw just one more important conclusion, consisting in this: lesions on glands, defects in glands in the age of childhood and the age of adulthood, and in different childhood ages can have completely different significances, because in development, as we've seen, there exist dependencies which later in the course of development can be transformed into their opposites. Imagine a sharp disturbance in the activity of the pituitary or thyroid gland which occurs in the primary school age, between eight and twelve years. What will its significance be? It will lead to a profound underdevelopment. But if we must deal with the same lesion of the thyroid or pituitary gland in the already developed system, will it have the same influence upon the sexual glands? No. This means that role and significance, both in

They are also far more differentiated. Not only do the sexual glands involve many organs and many systems (including, of course, the nervous system), they are actually differentiated between people. And since differentiation is always a sign of higher development, Vygotsky considers them to be a higher part of the endocrine system.

the positive course of development or negatively, from the point of view of a defect in development, change from age to age and differ qualitatively in the age of childhood and in the age of mature adulthood.

Now, to finish with this question, we will dwell only upon the question of the relative influence of the endocrine system on the overall development of the organism—psychological and physiological.

We have taken the endocrine system and attempted in a general manner to imagine how its development unfolds. But the endocrine system is, after all, part of the organism; it is linked to other systems; its development is not limited to its own internal self-reconstruction. It is not autonomous, some kind of state within a state, within the organism. It depends for its own development on the other systems of the organism, on the condition of the organism as a whole, and it in turn influences other systems. Pointing out the complex dependencies that exist between the development of the endocrine system and other systems of the organism and the organism as a whole, I would now like to conclude our theme with this.

I have already spoken regarding those data which have been obtained from the observation of changes in the endocrine system and its development under the influence of starvation in general and vitamin starvation in particular. When we are dealing with a drastically starved organism as a whole, then we have profound changes in development and in the endocrine system. It is, of course, a crude example of the general dependence of the endocrine system on the general condition of the organism, which I wished to illustrate. A specific dependence appears when we take the special case of vitamin starvation because vitamins are directly linked to growth. We are dealing here with a moment which is in a proximal way linked to the regulation of the growth of the endocrine system. Here, we come to a more specific, a clearer insult to the condition and to the development of the endocrine system, when the entire organism as a whole is placed at a disadvantage in relation to its own growth and development.

An even more specific illustration we may take from the field of pathology. Some general illnesses of the organism lead to a profound disruption, reduction, and enfeeblement of the whole life activity of the organism, including the ability to grow and to develop, as well as in a still more specific and differentiated manner various disorders which the endocrine system is forced to undergo.

All of these facts taken together once more most firmly demonstrate that the endocrine system is not a locomotive engineer inside the organism directing it as he wishes, but is itself part of the organism, one of the systems which in the course of growth and development often plays a dominant role but which should firstly be regarded as a component system within the entire organism as a whole. In particular, there exists a profound dependency which is as yet, unfortunately, poorly studied in its details, presenting many controversial moments. There is, in the sense of an undeniable fact, a dependency between the endocrine system and the nervous system, a mutual dependency. We know that, on the one hand, the correct development of the endocrine system provides, as we shall see, for the correct development of the nervous system.

In this way it is known, for example, that children born with a congenital cerebral defect, i.e. with some brain impairment, remain profoundly retarded in relation to mentality, children who have underdeveloped brains, as well as whenever we have a congenital underdevelopment or absence of any of the glands of internal secretion more or less directly related to the activity of the brain, in particular to the thyroid gland. You know that the absence of the thyroid gland leads to idiocy, i.e. to an extreme underdevelopment of the brain and its functions, along with the physical underdevelopment of the organism. We know that the endocrine glands, in different and to varying extents, in different and to varying degrees, are linked to the activity of the central nervous system, and with the development of the brain and its functions. And for this reason it is comprehensible why, let us say, in the period from birth to the first six months of life when, as we have just seen, the activity of the thyroid gland is found to be at the minimum level, the activity of the brain at this time will, of course, differ significantly from the activity of the brain in subsequent period when the thyroid gland attains its maximal development, not only because the brain itself has grown but also because the activity of the brain, as determined by the endocrine system, has reached its highest level. But there is a reverse dependency; there is dependency between the activity of the brain and endocrine development as well. As is known, some parts of the brain, in particular the midbrain which is linked to vegetative life, and with exchange in particular, are, it appears, closely related to the functioning of the glands of internal secretion. This connection is, I repeat, better established with the help of some general observations; the mechanisms which directly service this link, as I have said, still offer many controversial moments. For example, Ceni, one of the major researchers in this field, wrote that a wide variety of brain damage leads to profound developmental disorders of the endocrine system as such, and therefore, secondarily to those common organic changes that occur as a result of the underdevelopment of this or that part of the endocrine system.¹² In particular, we will talk in more detail about the nervous system and the endocrine glands when it comes to brain development, i.e. next time. Now I would like to add one consideration to this part of our theme. Since the activity of the endocrine glands is directly related to the development of the brain and the functioning of the brain, it is

¹²Vygotsky begins by saying that contrary to both biologicistic and intellectualistic accounts of development, the endocrine system is not a homunculus driving development down a track (able to go faster and slower but not change direction). On the one hand, the endocrine system is itself driven, both by external forces and by other systems within the body. And on the other, the direction of development can and does change. Vygotsky accounts for these two points by the concept of mutual dependency, and he illustrates this mutual dependency using the endocrine system and the nervous system. The first part of this paragraph, then, illustrates the dependency of the nervous system on the endocrine system, and the second part of the paragraph illustrates the dependency of the endocrine system on the nervous system.

Vygotsky is probably referring to the work of Ceni (1931). As Vygotsky says, he was the foremost expert in this field of his day. He started as the director of the institute of psychiatry in Reggio Emilia, and then became a professor at the University of Modena and the University of Cagliari, before moving to Bologna. Ceni is the source of much of what Vygotsky says in the next lecture about the “upward transfer” of functions to the cortex. Ceni believed that basic sensorimotor perceptions were not only represented in but actually controlled by the cortex.

directly related to psychological development, because psychological development is the development of brain functions, the development of central nervous system functions. Therefore, you know, it is most likely that the endocrine shifts that occur during the transition of a child from age to age, signify not only a change in the organic development of the child, but also a change in the psychological development of the child.

In the transition from age to age the child changes the system of needs, inclinations, instinctual impulses, emotions, affects—in general, all of those driving forces behind our behaviour, the whole of the system of, as they say, motors, i.e. all of the semi-organic, semi-psychological functions that are the engines of our behaviour. The whole system of organic needs, interests, and inclinations is, apparently, in a direct link with the development of the endocrine system of the child. Firstly, what distinguishes one age from another consists not in the fact that a child of an older age is more developed, let us say, in intellectual functioning, in understanding, than a child of an earlier age. Foremost, what occurs before anything in the transition from age to age is a change in needs, a change in life inclinations, which are linked to each age as such. Therefore, we can say that the endocrine formula which determines in a proximal way the development of the endocrine system has a more distant corollary: it defines the course of development in the brain, characterizes the activity of its function at this age, and to a certain extent it thus determines the very psychological development of the child. This is the link with the endocrine system, if we consider it from one aspect, i.e. the aspect of the brain and the aspect of the link between the brain and the psychological development of the child.

There remains for me to say a little in relation to the link between the development of the endocrine system, taking in the opposite aspect, the aspect which is known as the physical development of the child.

The initial data, which were obtained in two ways—either by the way of experimental removal of or damage to a particular gland in young animals, or else by the way of observation of the growth and development of a defect in one or another gland—led to a fairly rough representation that separate glands play a leadership role in the growth and process of development of the child. Indeed, it is difficult to imagine a case such that one or another gland by itself is more or less directly and immediately producing all of the changes in the organism which lead to the process of growth or the process of development.

In fact, the character of growth and development at whatever age level is not determined by a gland itself, but by the entire state of the endocrine system at a given age. However, this does not only not exclude but rather presupposes that the system is an articulated (partitioned, multi-component—T) system, i.e. a system in which individual glands play a different role in relation to different aspects of development. Otherwise, it would not be an organic system. After all, we would never call a combination of parts in which all parts perform separate functions an organism. So it is with the endocrine system. It acts as a whole to its individual members, which at different age levels play different roles in relation to this or that aspect of development.

And this can be expressed formulaically thus: some glands, in particular the thymus, presumably the thyroid, and probably the pituitary, its anterior lobe in particular, are glands that are undoubtedly directly linked to the process of growth and morphogenesis of the organism as a whole and its individual organs and tissues. This only means that each of these glands is not acting on its own but exercises the influence on growth that inheres in it only through the endocrine system as a whole and only at a particular level of development of this system characterized by a particular organization of relations between the individual parts of this system.

Therefore, the process of growth and the process of development, as was known from the beginning of the study of the physical development of child, have a completely specific expression for each age level. Growth proceeds differently in different epochs of childhood. For us, for the Russian literature, the first who formulated this idea of heterogeneity of growth at different age levels, heterogeneity not only from the point of view of the fact that at different ages different parts of the body grow at different tempos, but heterogeneity in the sense that the very biochemical basis of growth itself varies at different age levels, the first who formulated this idea was Maslow, although the idea was not first developed by him.¹³

In this way, one and the same external change, let us say growth in body height or growth in the length or diameter of an individual body part, these same phenomena in different age epochs have different significances depending on what source they spring from and what type of processes in their nature lie at their bases. You know the experimental facts from the damage or removal of this or that gland in animals during the period of their early development and the facts obtained from observing congenital or early acquired defects of this or that gland, what kind of deformity develops in such cases.

For example, we have dwarfism, the child remains at the level of three or five years in instances of serious deficiencies, for example, in the thyroid gland or defects in the area of the pituitary gland, particularly the anterior lobe of the pituitary. Consequently, damage to the pituitary gland and the general growth in the development of the endocrine system emerging from this leads to the fact that the process of growth in general is suspended or altered to some completely other character. In extreme catastrophic cases, we may have to deal with the fact that the physical development of the child, in particular, the growth in body height and sometimes in other dimensions is frequently held to the level which we find in normal children at three, at five, and so on.

I think that, if you understand that, as I said before, the specific weight of each gland is different in every age, it is likely that you understand that we can draw the inverse conclusion as well. If we see that a child's growth slows at six, or at three, or at the level of eight, we can draw the inverse conclusion as to what the reasons for this suspension of growth on the boundary of a given age is.

¹³“Maslow” does not refer to the American psychologist Abraham Maslow (who created the idea of a pyramid of hierarchically ordered needs crowned by self-actualization) but rather to the Russian paediatrician, Mikhail Stepanovich Maslov: Маслов, Михаил Степанович (1885–1961). He published clinical lectures on childhood illness in 1924, and Vygotsky cites him in his work on belly button formation in neonates (1998: 214).

And finally, you can imagine that the same damage to one and the same gland at different ages will have different significances because the specific gravity of this gland both in the system of glands of internal secretion and in its own organization will have, of course, a different significance.¹⁴

To sum up what I said today, we may put it in just a few words. I attempted to show, firstly, that development of the endocrine system itself as such is characterized, as is any form of development (as we've said from the very beginning) by an extremely complex organization of the process of development as a whole, in which growth is not the basic or the dominating moment by itself, but in which the processes of the internal organization of the system, processes of evolution and involution, processes of changing dependencies of development and their reversal come to the fore.

I then attempted to show that the system itself, which we have selected as an example of one of the organic systems, reveals itself not only in its internal but also in its external politics. It is linked not only to the restructuring of its internal relationships but also with a whole series of other systems, influencing the development of these systems such as, let us say, the development of the nervous system, and experiencing influence on their development from the side of these systems, like, say, from the side of the nervous system.

And finally I wish only to point out that some of the most courageous researchers have allowed themselves on the basis of their factual data to advance the proposition with which I would like to conclude today and begin next time, that is, the proposition that consists in this: the process of organic development in the child takes place not only through the changes in internal dependency to a given system but through changes in dependencies between systems.

For example, Biedl has advanced this proposition, that in the process of metabolism the endocrine system—in particular the thyroid gland—plays a decisive role at a defined moment, but the brain, the midbrain in particular, is of secondary importance in relation to the endocrine system—but from the period of sexual maturation not only the internal relations of the endocrine system are changed but also the relations between the brain and the endocrine system, and this previously subordinate role of brain in relation to the organic life now becomes the dominant one. In other words, the change of relations into their reverse, which we have found inside a system, Biedl now finds in the relationship between systems.

¹⁴In chemistry, “specific gravity” refers to the relationship between the weight of one substance and some reference substance (usually water). So if the specific gravity of something is more than one, it sinks; if less than one, it floats. Vygotsky says that the “specific gravity” of gland changes. So the specific gravity of the pituitary gland is more than the sexual glands before puberty and less afterwards. But he also says that the specific gravity of gland changes with respect to itself. So the specific gravity of the pituitary gland after puberty when it is “withering away” is less than the specific gravity of the pituitary gland before puberty.

When we know the development of other organic systems, for example, that of the nervous system, then the link between the systems will become more clear.

References

- Выготский, Л.С. (1929). *Педагогика подростка. Задание 1-8*. Москва: Издание бюро заочного обучения при педфаке 2 МГУ.
- Выготский Л.С. (2001). *Лекции по педагогике*. Ижевск: Издательский дом “Удмуртский университет”.
- Ceni, C. (1931) *Cervello e increti: proprietà biologiche e terapeutiche dell ghiandole a secrezione interna e loro correlazioni cerebrali*. (The brain and endocrines: the biological and therapeutic properties of the glands of internal secretion and their cerebral correlations). Bologna: Zanichelli.
- Hardcastle, J. (2005). Of dogs and martyrs: Sherrington, Richards, Pavlov, and Vygotsky. *Changing English*, 12(1), 31–42.
- Vygotskij, L. S. (2018). *La science du développement de l'enfant: Text pédologiques (1930–1934)*. Traduits par I. Léopoldoff-Martin. Berne: Collection Exploration Peter Lang.
- Vygotsky, L. S. (1998). *The collected works of L. S. Vygotsky* (Vol. 5). New York: Plenum Press.

Chapter 7

The General Laws of Physical Development in the Child: The Nervous System



Outline of Lecture 7

Vygotsky begins by noting that functions are transferred from lower nervous centres to higher ones (e.g. from the peripheral to the central, from the midbrain to the cortex). But the lower centres retain the ability to function and can revert to their function when the higher system is damaged. Vygotsky then argues that if higher functions have already emerged in development, it is also possible for the lower functions to entirely transfer their functions to the higher centres when they are damaged. For Vygotsky, this shows a very clear unity of mental and physical development, and he concludes with some thoughts about how growth and development might be related, noting that the traditional relationship, which places growth as a precondition for development, could be the very opposite of the truth.

Introduction: Three Laws of Development. With scarcely any introduction at all, Vygotsky lays out the three “customary” laws of neurological development.

1. The first law is that functions which are initially carried out in lower “centres” of the nervous system are subsequently taken over by higher centres when these emerge. The law appears first of all in the form of a phylogenetic observation. Vygotsky points out that the brain develops in layers during evolution: the brain basis of lower elementary functions such as breathing and heartbeat is the same in almost all animals (i.e. it is located in the midbrain and the medulla). In fish and frogs, we see the emergence of a cerebellum, in reptiles the cerebrum appears, but it is only in mammals and especially in humans that the cerebrum begins to make up the bulk of the brain. Vygotsky then turns his attention to ontogenesis and to brain functions. He notes that in little babies, there are movements which resemble the movements of lower animals (squirring and writhing and reflexes such as Babinsky’s reflex) but that these disappear as higher brain “centres” mature. They only re-appear in cases of brain lesions, for reasons explained by the second law.
2. The second law is that lower centres that transfer their functions to higher centres retain the ability to perform the function, but they do so only under the control of

higher brain centres. Vygotsky argues that this higher control of a function makes the function more flexible, more responsive, and above all more voluntary. One example of this is locomotion: if we wish to see what walking is like without the direction of higher centres, we have only to examine patients where the areas of the cerebral cortex which are involved in the control of walking have been affected by a brain lesion, and we see that the person's walking begins to resemble that of lower animals, and can even be completely paralyzed.

3. The third law is a generalization of this example. Vygotsky says that in any case where a higher centre has already emerged (e.g. in an adult) and taken over control of functions from lower centres, if the higher centre is disabled, the function can be resumed by the lower centres. Vygotsky points out two corollaries of the law. The first is that in cases of brain lesions, we see a reversion to developmentally primordial forms of behaviour. The second is simply the converse of this: in early moments of development, we see primordial forms of behaviour that are analogous to pathological symptoms. So, for example, in the case of a brain lesion, adults will sometimes develop a Babinsky reflex, and the Babinsky reflex in infants reminds Vygotsky of adult pathology. Similarly, in the case of a brain lesion, perception becomes unreliable and it is difficult to resolve objects (agnosia), which reminds Vygotsky of perception in infants, and perception in infants appears to Vygotsky to be similar to what is reported in pathological brain conditions. Vygotsky explains this by the "emancipation" of the lower centres, and their resumption of the functions previously transferred upwards.

However, Vygotsky warns that this analogy is misleading. First of all, it is an analogy between two functions considered statically. When we consider ontogenetic and pathogenetic development dynamically, we see immediately that they are headed in opposite directions, and their momentary coincidence is a little like a train going from Moscow to Leningrad which passes the train going from Leningrad to Moscow. Earlier Vygotsky introduced these laws of development of the nervous system as conventional and remarked that the third law, in particular, would require revision and amendment. This revision is what Vygotsky undertakes in the next section.

Revision of the Third Law. In this section, Vygotsky argues that while "emancipation of the lower centres" can result in involution, as when in a commander is wounded in battle and the enlisted men are left leaderless or the commander's place is taken by a lower officer. There is, Vygotsky argues, another possibility: a still higher centre may take control. This is the basis for the argument that Vygotsky makes for circuitous and indirect forms of compensation that Vygotsky makes in his "defectological" works, and also at the end of Chapter One of *The History of the Development of the Higher Mental Functions*. He offers a number of examples from clinical practice.

Vygotsky's first example of compensation by still higher centres is precisely the example of agnosia given in laying out the Third Law. Unlike the infant, who does not yet have higher centres, an adult suffering from agnosia can mobilize reason, hypothesizing, and interpreting, as normal people do when they find themselves suddenly in an unexpected situation. This explains why, for example, a man might mistake a

pair of scissors for a pair of eyeglasses, or even mistake his wife for a hat. Vygotsky reminds us that in the presentation of the Third Law, there were two corollaries—one comparing early stages of ontogenesis to pathogenesis, and one comparing pathogenesis to early development. While the second corollary seemed irrelevant to development, Vygotsky now shows that it is in fact relevant to developmental pathology: the same pathological condition can have very different significance at different points in development. For example, a person who is born deaf will not develop speech in the same way as a person who goes deaf after speech acquisition has taken place.

Vygotsky says that just as the same pathological condition can have different meanings, different pathological conditions can have the same significance. Vygotsky then generalizes this. If a child suffers a lesion in a given centre B, the child's higher centre C, as yet undeveloped, will be hard hit, while the lower centre A will be relatively unaffected, but with an adult, the reverse situation obtains: the higher centre A will be developed and intact, and in a position to compensate for the loss of B, but the lower centre C will be affected.

Vygotsky offers clinical examples in support of this generalization from epidemic encephalitis, a brain inflammation that was epidemic in Vygotsky's time, which appears to lead to uncontrollable activity in children, but a state of near immobility in adults.

Vygotsky argues that the situation is somewhat similar to the situation we observed in the last lecture, with endocrine development. That is, if the pituitary gland does not develop in a child, then the sex glands do not develop normally either (pituitary dwarfism). But if the sex glands do not develop normally in an adolescent, then the pituitary does not undergo its normal involution (eunuchoid growth). In development, then, the higher centre C depends on the development of the lower centre B, but in a developed organism, the lower centre B depends on the higher centre C (where "dependent" is understood as the relationship between an independent and a dependent variable).

Conclusion: Growth Emerging from Development. Vygotsky now presents a set of general conclusions, which are clearly aimed towards the next course on the syllabus.

Vygotsky notes that all of the processes explored in this course—psychological and physiological development, in general, as well as endocrine and nervous development—are part of a complex but unitary process of development. Without the brain, the mind does not develop. But without the endocrine glands, the brain does not develop either. This complex interdependency explains why there are general patterns, and also why there are no domain-specific laws that explain any one process exhaustively.

This complex but unitary process may be understood as a set of age periods, and that it is the change of internal relations within a stage which permits ascent to a new stage. At the beginning, everything depends on the relationship between lower centres. But as higher centres emerge, these lower centres become dependent on them in turn. This appears to be as true of the brain centres as it was of the endocrine glands, and from this Vygotsky concludes that the central fact of development is the organization of relations between organs in a system, and between systems in a complex whole.

Vygotsky concludes with the idea, which he attributes to a researcher in the field of child anatomy, that if we think of development chiefly in terms of bulk, we have to say that it is only at the beginning that development is intensive (e.g. it is only in infancy that the child doubles his or her weight in a single year). But if we think of development in terms of intersystemic relations, we have to say that on the contrary, there is very little development in the early months of life, and that instead development increases with age. Vygotsky takes this even further, and suggests that viewed qualitatively, even growth changes, and that growth is not the cause but the realization of development.

Lecture 7

Today, we must consider the development of the nervous system, of the brain, as one of the most important moments of child development.

It is usual to say that there are three basic laws of development of the nervous system and its functions. We will begin with an exposition of these three basic laws of development of the nervous system and its functions and then attempt to draw, as always, some general conclusions in relation to the development of the brain, in relation to linking the development of the brain with psychological development, and in relation to the overall physical development of the child as a whole.

The first law of the development of the nervous system consists in this: in the course of child development, we observe a phenomenon which has been called the transition of functions upwards. **This means that functions which in the beginning stages of development were performed by the lower centres, in the lower regions of the brain, shall begin to be performed by higher centres.** This law of the transition of functions upwards exists in phylogenesis most clearly but exists in the ontogenesis of the brain as well. If we take, let us say, the phylogenetic development of the brain, you know that the brain, particularly in vertebrates, proceeds through its development mainly along the path of forming new floors, new superstructures. But, as Edinger, one of the foremost experts on the phylogenetic development of the brain, puts it, this inner lining, this basis of all elementary lower functions, is much the same or less common to all vertebrate animals.¹

And that is why we see that when we take the lower animals who do not possess these higher formations, the ones which emerge in higher animals and in man in particular, then those very functions which in humans are performed with the aid of higher centres, for example, with the cerebral cortex of the brain, are performed in

¹Ludwig Edinger (1855–1918) was a German physician and neurologist. Being poor himself, he was an early advocate of universal education. Also because he was poor, he had a hard time financing his research, but he eventually succeeded in setting up the neurology department at the University of Frankfurt with his wife's money. He performed many observations on children born without any cerebrum, who generally lived for a short time after birth. Edinger's daughter, Tilly, was the founder of paleoneurology—the study of dinosaur brains! She did much of her research while hiding from the Nazis in the Senckenberg Museum of Natural History in Frankfurt (the Edingers were Jews).

lower animals with the aid of lower centres. For instance, the function of movement, of locomotion (movement through space), displacement, is in this way performed in lower vertebrates using the lower brain centres, whereas in higher animals it is carried out with the aid of higher centres.²

Since the object of our considerations is not phylogeny but ontogeny, allow me to dwell on the illustrations of this law in child development. If you take, let us say, the motility of a newborn baby, or even of an infant, particularly during the first stage of this age, then as you probably know we can see for the first time movements which have been for a long time mysterious and inexplicable and which have analogues in only two areas. First of all, there are such analogues in various stages of phylogenesis, e.g. something that may resemble some archaic, ancient functions which we do not observe either in man or in those humanoid animals which stand closer to man, particularly the apes. And on the other hand, there are in neonates phenomena which have analogues in the field of pathology as well. The explanation for this we shall discover later. One group of movements which are very typical of the motility of the neonate, for example, consists in the so-called athetoid worm-like movements that are observed in diseases of the nervous system as the result of disease-impaired functions. You know, perhaps, that in the neonate, in the infant, we may sometimes observe a number of reflexes which in an adult would constitute symptoms of organic illnesses of the central nervous system, for example, Babinski's reflex. If an adult patient shows the presence of the Babinski reflex, we may take it as a symptom of an organic lesion of the nervous system. Yet in every neonate and infant, this reflex is the norm and the absence of the reflex constitutes a sign of some anomaly. Still other reflexes that arise only later as the result of illness may be observed in the neonate and the infant and sometimes even later as a state that is normal and natural.³

In this way we can see in motility, let us say, in the motor functions of the neonate, a whole series of forms which, I repeat, have their analogues either in the earlier stages of phylogenesis or in lesions of the central nervous system.

²In our time, we can see the "upward transfer" of functions quite easily in male-to-female transexuals who have sex reassignment surgery. In most cases, this involves removal of sex glands, and in some cases, this does result in a temporary diminution of sexual function. However, because sexual functions in humans are transferred to higher centres in the nervous system and the cortex, transexuals are usually able to lead normal sex lives after sex reassignment. A negative example, where higher centres are cut off from lower centres, is the practice of "pre-frontal lobotomy", which, although banned in the USSR and Germany, was very widely practised in the USA, England, and Scandinavia. After the cortical centres are cut off from lower centres, patients sometimes lost symptoms that were considered pathological (lobotomies were, for example, used to "treat" homosexuals and transexuals, as well as epileptics and depressives). But often the brain lost all control over lower functions, resulting in paralysis (e.g. Rosemary Kennedy, the president's sister) or death (Josef Hassid, one of Poland's greatest violinists).

³Babinski's reflex occurs in babies and children up to two years old. You stroke the bottom of the foot, starting from the heel and pressing firmly with a finger or a pencil, as you move the pencil or finger towards the toes. The big toe moves upward and the other toes fan out. If this reflex occurs in older children or in adults, it can be a symptom of nervous disorders such as multiple sclerosis, meningitis, brain tumours, strokes or spinal cord injuries of various types.

What conclusion may we draw from this? I think you will agree when I say that we may conclude as follows. Such motions take place in the early stages of phylogenesis because this function is performed by a lower centre. In pathological cases, they take place because we have either an impairment of the higher centres or one of the link between the higher centres and the lower ones. To what, then, does the presence of these movements in the infant point? To the fact that in an infant these motor functions are performed by lower centres. As the child develops, it is these very functions that are moved upwards, i.e. that begin to be performed by the higher centres. In humans with, for example, cortical lesions, diseases of the cerebral cortex of the brain, we obtain, let us say, a series of paralytic disorders, a series of motion disorders, a loss of motor function, and a disorder in walking. And yet animals which do not have a cerebral cortex of the brain can displace themselves perfectly well. Obviously, the same function of locomotion, of movement through space, is carried out in the early stages of phylogenesis in lower centres and in the course of phylogenesis and ontogenesis, these functions are moved upwards.

But of course, there is still a good deal not known: first of all, how this transition takes place, and secondly, why the early stages of motility in ontogenesis remind us of these forms which we observe only in pathological changes in brain functioning.

But before explaining this—and the explanation consists in the second law below—I should like to illustrate the same principle with the sensory functions, with the function of vision. Sensory functions in the infant also remind us either of something we meet within the early stages of phylogenesis or of something we meet within illnesses. For example, the infant sees, but he does not differentiate between objects; objects have not yet acquired a certain consistency or constancy. He does not perceive stationary objects. There is every reason to believe, apparently, that the infant, or the newborn baby in this case, perceives everything as in motion because while moving his own head the images on the retina of the eye are shifting and there is the illusion we have in a train when we think that everything is moving and we are stationary, i.e. with the motion of his or her own head or eyes, the infant perceives fixed objects as moving. If in an adult you find such a state where he loses the constancy of perception, when objects begin to seem to move with his own movements, it will always be a symptom of some organic lesion of the central nervous system.

So too with the motoric and sensory functions, as we have seen: the infant in both sensory and motor functions performs them with the help of the lower centres and for this reason, they are of a character analogous to early stages of phylogenesis, when higher centres do not exist or are analogous to symptoms occurring in pathological changes in brain function, with the failure of higher centres or of the link with the lower ones.

In this way, we may, in formulating **the first law**, say once more that during the course of development, one of the basic laws is the transition of functions upwards. This means that **in the beginning stages of development certain brain functions are carried out with the aid of the lower centres but in the course of development these functions are passed on to higher centres**. This is in the first place.

Now **the second law** explains to us how the transition takes place, what lies behind it in development. The second law consists in this: **in the course of passing a**

function upwards, the lower centres which used to perform this function do not entirely give the function up, but persevere, by entering, as one subordinated instance, into the activity of the higher centres. Previously some function, let us say the sensory function in the infant, was carried out with the aid of the lower brain centres. In the course of development, as we have said, there is a transfer of this function upwards, i.e. the sensory function begins to be performed by higher centres. The question arises, what happens with the lower centres—have they played out their role and do they then involute, die off, as is the case sometimes in the history of development, for example in the history of the endocrine system? No. Such a thing never occurs in the central nervous system. **The lower centres** that performed, let us say, the sensory or motor function in the early stage of development, do not die in transferring their functions upwards; however, **they lose their independence.** They used to perform the whole function in its entirety, but now they have joined some kind of whole, have become part of it, and form a subordinate instance in relation to these higher centres. In other words, the higher centres do not simply replace the lower centres but begin to carry out the same function through the lower centres, with the higher centres regulating, guiding, and enriching this work. Later on, I will tell you by what path, in what way, they have come to stand above the lower ones, but nevertheless act by means of them. In this way, the lower centres determine the course of a function at some early stage of development and when the function is transferred upwards, I repeat, they do not lose their relationship to this function but only lose their independence and become a subordinate instance in relation to the higher centres. Yet they persist, they represent the performance mechanism, the final part of a complex mechanism which is already beginning to be ruled by the higher centres. This preservation of the activity of the lower centres as part of the higher centres in the transition of the functions upward is the second law of development of the central nervous system.

I think that you understand that in this situation **the lower centres change their functions during the transfer of functions upwards.** Once they lose their independence, once they no longer perform the complete function, it seems to me, that for you it must be completely clear that the way in which they function, their activity, becomes different, because in the past their activity was independent, but now this activity constitutes part of some hierarchical whole; it is only a subordinated instance. Therefore, the transition of functions upwards is always linked to changes in the activity of the lower centres, which were independent and have now become **subordinate performance instances.**

But the upward transition of functions is not only **linked to** a change in the activities of lower centres but also to changes in the function itself. Previously for simplicity, I presented the question somewhat wrongly. I said that, for example, locomotion, movement through space is done through the lower centres. And how does a person carry out walking? With higher centres, so that with lesions of the cerebral cortex come disturbances of the gait, of walking, and sometimes complete paralysis of the lower limbs. But what of the walking that is transferred upward, does it remain the same function or become a completely different function? I think it is clear that the function itself has become infinitely richer, more flexible, finer, and

more robust than ever before. Therefore, the upward transition of functions implies at the same time **a powerful functional development of the nervous system, i.e. the emergence, in the sense of functionality, of entirely new opportunities.**

If this is clear, we may formulate the second law of development of the nervous system. The law of the conservation of the lower centres in the transition of functions upwards means that the lower centres performing a given function at the beginning stages of development do not move aside in the transfer of functions to the higher centres but are conserved as subordinate instances; they do not act by themselves, but solely under the governance of the higher centres. Thanks to the loss of independence of the lower centres, the upward transition of functions changes the functional role of these centres and the functions that they perform are raised to a higher step of their development by their inclusion in the higher centres.

The third law will be set out as usual, but it needs serious correction and amendment, which we shall undertake later. The sense of the third law is that if in the developed brain of an adult, due to some reason of an organic character or a dynamic order the higher centre, the higher instance is weakened, then the function resumes in the lower centre, which used to act independently in the course of development. In this way, there arise two very odd consequences. On the one hand, in pathology, we see cases which return to early steps of development. The patient reveals those forms of motility, those forms of sensory functions, and those forms of speech and thinking which we met with earlier steps of development as normal forms, due to the fact that the functional weakness of the higher centres is compensated for by lower activity, and this constitutes the norm, it constitutes the rule for the early steps of development. In this way, we often witness, with pathological changes in brain function, a regress, a return to early steps of the work taken in the individual's development.

On the other hand, there also arises due to this a state of affairs in which we may draw an analogy between the symptoms which we observe in the early stages of development and those symptoms which we observe in pathology, with brain lesions. For example, the Babinski reflex, as I told you, is the norm in the young child. Why? Because, self-evidently, this reflex belongs to the independent reactions of the lower centres, those lower offices which are charged with motility. Why does it subsequently disappear? Because the lower centres lose their independence, and the movements that are here in the form of the Babinski reflex can no longer manifest themselves but appear instead only as part of the whole series of other more complex innervations, leading to more complex motoric reactions. But by this third law, with the loss of a higher brain centre, or a lost connection between the higher and lower brain centres, the lower one once again becomes independent. It is once again able to perform motoric functions and therefore is led into such a situation in which the Babinski reflex occurs, i.e. a reaction that in the age of infancy had the quality of a normal reaction.

As another example, let us take, say, the sensory functions. Perception in the infant is, as we have said, distinguished by inconstancy, instability, and a lack of ability to differentiate individual objects. But we observe these same features with the failure of the higher centres of perception. Why? Because the lower sensory centres that perform this function in infancy then become independent again and once more assume

this function. Consequently, in some lesions of the higher centres of perception, we again observe this depiction of regression to an earlier stage of development and we again observe this analogy—of course, only an analogy, because in an infant the Babinski reflex is one thing and in an adult the Babinski reflex is another; their significances are opposed, but all the same, we again observe an analogy—between pathological symptoms and symptoms of early development. From where does this analogy arise? From a common source, from the fact that in pathology and in early development, the lower centres attain an independence from the shutting down of the activity of the higher centres. In one case, it shuts down due to the immature state of higher centres, and in the other case, they are shut down due to lesions of these centres.

This third law we may formulate as the law of **emancipation of nervous centres** (as it is usually referred to). The law of the emancipation of nervous centres signifies that **when a functional weakness in higher centres arises as the result of organic or dynamic causes, the lower centres are emancipated, and begin to act independently**, assuming the performance of functions which are no longer guaranteed by the damaged higher centres.⁴

I wish to clarify something, in order to pre-empt any misunderstanding of this third law. It would be incorrect to suppose that when damage to the brain occurs there is a direct return to earlier stages of development. I said that this must be understood only as an analogy, as a certain external resemblance. For example, can we say, when a person is paralyzed in both legs or simply has some disturbance of gait, that although movement remains, there has been a return to the stage when the child was unable to walk as a baby? It is impossible to say this, just as it is impossible to say that a person whose speech centres have been damaged by some physical disorder has returned to the stage when a child could not speak at all. We cannot say this. But is there some link between these phenomena or not? It seems to me there is. Why is the child not able to speak until a given age? This is due to the fact that the speech centres are not well developed, not yet mature, and the lower speech functions, motoric and sensory, are performed by lower centres. This means that the child does not yet walk, does not yet speak, because the higher centres are not yet ready. But a patient loses walking or loses speech because these higher centres are damaged, i.e., in both cases, there is the basis for an analogy: in the absence of the activity of the higher centres. In both cases, there is a similarity between the early stages of development and the depiction that emerges when there are lesions of the brain.

However, this resemblance remains a resemblance only so long as we consider it statically, but if we take it **dynamically**, there is, of course, a difference **between an immature centre and centre with a lesion**. An immature centre means one dynamically situated in such a way that day by day, sooner or later, it matures. But a diseased centre—let us say, a process of inflammation in the centre—is a centre which disintegrates. So, whenever, there is some external resemblance between the

⁴After introducing and explaining each law, Vygotsky “formulates” it, presumably on the blackboard, so that the students can remember it. The “formulation” is usually quite short and memorable, and this one is no exception.

depiction which arises from brain impairment and the depiction that is observed in the early stages of development, we need to look at the contrasts between them, for in one case, the depiction has a dynamic significance for the development of these functions, but in the other case, it means their disintegration and destruction. For this reason, the lack of walking and speech in a child merely signifies an early step in the formation of the higher centres, through the aid of which alone an upright gait and speech is provided, and the gait disturbance and speech disorder in, let us say, some patient with a process of inflammation, signifies a process of morbid change in the function of the brain, which is, it may well be, a beginning stage in its disintegration, i.e. one from which all of the activities of the remaining brain functions will be degraded still further.

So, if we consider these functions statically, at a given moment, there is an analogy. If we consider them dynamically, they belong to two counter-posed processes of development and collapse. For this reason, the similarity may be fortuitously compared with the passing of two trains going in opposite directions. They travel in opposed directions, and because they are going in opposite and not in different directions, they pass by each other at one point on their paths. Trains going from Moscow to Leningrad and from Leningrad to Moscow will meet at a certain moment in time at such and such a point in space. But with a train which is going from Paris to Vienna and a train that is going from Moscow to Leningrad this does not occur. In this way, the development and the collapse of the functions of the nervous system are oppositely directed processes; they are not processes which, in general, have nothing to do with each other.

As I told you, this **third law of the development of the nervous system requires very substantial amendments and addenda**. The amendment lies in this: in fact, this law reflects only one aspect of the changes brought by lesions of the brain; that is, only the aspect that makes up a resemblance to the early depiction of development. But the other side, which is in sharp contrast, distinguishes the changes in brain function observed due to the destruction of the higher centres from the pattern observed in the early stages of development. This second aspect of the law does not illuminate. For this reason, it does not give a thorough but rather a flawed answer to the question. This law states that with the infirmity of the higher centre, the lower instance then assumes its functions, taking over the senior position, as in wartime when, with the death or wounding of a senior commander, the next in command then assumes control of the entire unit. It is true that such cases can be observed. But there are regularly—nearly always—cases of another kind. With a lesion of some part of the brain, the function may not be solely assumed by a lower centre, which in the course of development has already to a certain extent lost its independence and so cannot directly replace the higher centre in a mechanistic way. Instead, **a still higher centre often takes over responsibility for the function**, which now cannot be carried out in a normal way as a result of the lesion of the responsible centre.⁵

⁵Vygotsky warns that when the link between higher and lower functions is disrupted, it is not always the case that the lower centres simply take the place of the higher as best they can (as when the vice-president takes over from the president). With the rupture of the link, the lower centres

Let me give a simple example. With lesions of the higher centres of perception, a pattern of disorders of the sensory functions is observed which is known as **agnosia**. The essence of this disorder consists in the fact that the patient continues to see objects, and his vision is not altered, but they appear such that he ceases to recognize them. He sees something that is black, rectangular, soft, but that this is a briefcase—this he cannot discover. He does not discern reality as a series of separate objects; he cannot from the perceived object identify appropriate qualities, etc. What then occurs with the patient? On the one hand, what occurs is what is provided for by this third law, i.e. eyesight and perception of the patient return to the kind of features that we see in the early stages of the development of perception, let us say, in an infant—this is true. But, on the other hand, as we already have a whole series of development of higher centres, such a patient is not just someone who does not recognize an object and that is the end of the matter; he starts guessing what the object could be. He begins to flounder, to interpret, to act as we would if we were blindfolded and made to orient ourselves in this room. We would simply not see the direction, where to go and what things were around us, but groping, suspecting, interpreting, inferring, we would act as an investigator does when he reconstructs some crime from evidence. Thus would we have done in this case. And thus precedes, as a rule, the patient who has lost his ability to recognize objects directly. He begins to guess, and with this, he might make a good guess or he might be wrong. But in any case, what is important is that he does so with the help of a higher function, with the help of interpretation, with the help of guessing; with the help of argumentation he does what we all do with the help of a lower operation. We would not conclude that, as it is black, and as it has buckles, and as it has an opening, and as it is filled with something, so, it appears, it is a briefcase. We just see that this is a briefcase, but our patient has to resort to this complex reasoning. Here is an example: the patient is shown spectacles. He says they are scissors. Why does he err? Because the frames in the glasses suggest two apertures, which could be a pair of scissors. And if we were given only the two holes in the scissors to feel, we might take them for eyeglasses, or take eyeglasses as a form corresponding to scissors. However, often such a patient guesses correctly. And whether he guesses correctly or incorrectly, we observe the same pattern of phenomenon which is that a function which a healthy person performs in relation to a lower centre is now not possible for the patient because of a lesion on the centre, and it begins to be performed with the help of higher centres. In this way, with a

are “emancipated”, that is, independent. But the higher centres are emancipated too, and when the higher centres are emancipated with the rupture of the link to the lower centres, it is possible, in some instances and above all with some intercortical (that is, intermental) assistance, for the higher functions to re-assert some control.

One example of this, chronicled by Luria (1972) was Lev Zasetsky, the patient who received a severe brain wound in the Battle of Smolensk in 1943 when he was in his early twenties. Zasetsky lost sensory perception in one half of his body, and also who could not remember more than what was given by immediate or “eidetic” memory, which lasts only a few seconds after the present. By using written language, Luria taught him to use a higher centre to carry out daily life tasks such as lighting a stove.

lesion to a given centre, the function begins to be performed by the lower, it is true, but also by a centre which is higher in relation to it.

If we take into account this amendment, then we may draw from this a very important conclusion with which I would wish to conclude our consideration of the laws of development of the nervous system in the age of childhood. I would not have brought up this amendment if it did not appear to have any relation to development. The first half of the third law which I formulated previously, indicates to us, tells us, why in the early stages of development we observe a certain pattern analogous to that which we observe in brain lesions. The second part of the law did not seem to have any direct relation to development, but in fact it does; on closer consideration, we can see that this second part of the law has a very important relation to the problem of development and in particular tells us some very important rules of irregular, abnormal development in childhood. Observations show that **a lesion on one and the same centre in childhood and in adulthood will have very different consequences and different symptoms.** It is worth disentangling them.

Let us assume that in a child due to, say, some hereditary reason or brain damage occurring during intrauterine period of development or early, in the first months of life, there arises some central deafness, i.e. underdevelopment, a defect or lesion of the hearing centre. We may ask, will this have the same significance for the child in its development as in an adult person where there is a bullet injury to the centre of hearing? In themselves, the immediate results will be the same: a child with an impaired hearing centre and an adult with an impaired hearing centre will be equally deaf; they will have the same loss of hearing. But the child with lesions to the hearing centre will be speechless for life, even though the speech centres have not been damaged, because in child development speech develops itself only thanks to the child's hearing of speech, and once he cannot hear speech, such a deaf child remains mute and becomes deaf and dumb.

However, in an adult, if we have to deal with central deafness—if a bullet hits and injures the hearing centre—does this mean that the patient immediately loses the ability to speak? No. In him speech has already developed, and he does not lose this ability immediately. True, speech is organized in such a way that with the loss of hearing this ability to speak begins to suffer. But if you take precautions against this loss of speech, if in time you enable the patient to control his speech, then speech may be preserved to some extent in an adult person. Moreover, even if it is not preserved, it disintegrates and dies out in a completely different way and not all at once, not automatically, following the loss of hearing. This means that the same injury given in childhood has different consequences for development than in the age of adulthood.

But the inverse is correct too: **different lesions in different centres can present, in childhood and adulthood, the same picture.** For example, in the adult, we have dumbness, so-called motoric aphasia—the inability to speak aloud, the inability to articulate speech brought about by a lesion of the motor speech centre, the so-called Broca centre. And in the child what brings about complete speechlessness? A lesion

of the auditory centre. This means that the same picture in the child and in the adult may occur with differing lesions, and different patterns may be encountered with similar lesions.⁶

What explains this state of affairs, in which the same lesion in adult and child ages may offer a different picture and different lesions may offer one and the same picture? It seems to me that this is covered by a law which can be regarded as a basic law of development in any child with a particular defect in the nervous system. On the one hand, with this we enter the domain of pathological pedology, and, on the other hand, we are given by this law material for certain generalizations about the development of the normal child. This law can be expressed in the following way: **if a lesion strikes a particular centre “B”, then in childhood the higher centre “C” will suffer more than a subordinate centre “A”. But if an adult injures centre “B” then, other things being equal, the lower centre “A” will suffer more than the higher centre “C”.**

Let us clarify this with an example from epidemic encephalitis. We know that epidemic encephalitis, which usually afflicts the subcortical area of the nervous system, produces various disorders in childhood and in adulthood. In particular, in the age of childhood epidemic encephalitis usually has, as its consequences, motor disturbances, hyperdynamism, i.e., excessive mobility, an overabundance of movements, and in these cases, very much damage to the mental development of the child, the development of his character, and the development of his higher voluntary movements. If we say that it is the injured centre “B” which is struck, what afflicts the child the most? His primary movements are not affected. He is even more striking in these movements. So where has he been afflicted? In “C”, the highest voluntary movements. In the child in this case “A”—the simple movements—will be less affected. The post-encephalitic child, in this case, will never—or only very rarely—be able to restrain his motor energy; he will always be on the go, he snatches at things, he cannot sit still for a minute, his hands are constantly on the move. Primary, impulsive movements are not only not disturbed but strengthened to a frightening degree, not inhibited as in a normal child. But higher and meaningful movements are greatly

⁶The motor speech area of Broca is located in the frontal lobe, but the auditory centre is in the temporal lobe.

Note that Vygotsky uses the term “centre” in a very general way. For example, when he is talking about phylogenesis, the brain as a whole is a higher centre, with respect to the rest of the nervous system. Within the brain, the cerebral cortex is a higher centre, with respect to the rest of the brain. Within the cerebral cortex, active, voluntary centres such as Broca’s area are higher than passive, involuntary centres, such as the auditory area on the temporal lobe.

Throughout this lecture, Vygotsky has been showing us how the “depiction” that arises from the observation of symptoms can differ dramatically from the underlying causes. So, for example, different syndromes may arise from the same lesion (in an adult and in a child) while the same syndrome can result from very different brain lesions. When neurosurgeons operate on the brain they are very concerned with the precise areas of the brain, and so they do not use general terms such as “higher centre” or “speech centre” (as you can see there are many different centres involved in speech). But Vygotsky’s purpose here is not to give an accurate topographical map of the brain, but rather to discuss how the process of psychological development has an analogue in the process of neurological development, and for this purpose, the term “higher centre” is very useful.

affected. In the child the higher centre “C” associated with voluntary movements is affected more than “A”, more than simple movements.⁷

What do we see in adult patients of this kind? The very opposite picture. Usually, we do not observe any hyperdynamic disorder, but an adynamic disorder. They become immobile, shackled, they develop walking disorders, and they cannot reach out a hand without tremors and shivering. If they extend a hand once or twice, they do so with extreme slowness. Simple reactions, such as when you say to a patient, “Click on the key when I hit the table”, take them 100–200 times longer than for anyone of us. Simple movements in these cases are hindered or impaired. But if we suggest to such a patient a task that requires higher forms of motion, then it is as if he is unchained; he performs it well. Already long ago, from the beginning of studies of post-encephalitics, this paradox was noted in their motor skills. A patient cannot take two steps across a room, or two small steps, and yet can walk up the stairs very well because walking around the room—this is an automatized act, which is already mainly transferred to lower, automatized centres, i.e. centres in charge of automatized movements. But walking up the stairs requires successive, voluntarily placed footsteps.

What is more, one may get a patient to walk around the room in the following way: draw a line in chalk on the floor and say that he will walk by putting his footsteps exactly on this line. Then he will walk. Thus, it is possible for the more complex action to be easier than the simpler one. Even more impressive are experiments in which a chair is placed before a patient who cannot walk or takes only tiny steps and the patient is asked to step over it. Then, by putting the chair before each step, you can get him to go a long distance, i.e. each time when we replace an automated simple movement with a complex one, the patient can do it, but simple movements are performed poorly.

Or take, for example, experiments which I observed: a patient is invited to close his eyes. He cannot immediately perform this kind of automated act; after a while he performs it, but it appears that he does so in a complex and roundabout way. For a long time, he could not show us how to close the eyes. We wished to examine how this mechanism works: he was asked to show how he sleeps. Then he closed his eyes, bowed his head to one side, and demonstrated. And now, when he is told to close his eyes, he thinks to himself: I must demonstrate how I sleep and he then closes

⁷There are many kinds of encephalitis (including Japanese encephalitis, which is born by mosquitoes). As Vygotsky says, encephalitis can cause seizures and uncontrollable motion particularly in children—such children were often diagnosed as “juvenile delinquents” and some of them, in the USA, given lobotomies. But in adults, it can produce the very opposite—a kind of paralyzed, immobile state.

There was an epidemic of encephalitis lethargica worldwide in 1930, leaving many people immobile for the next 30 years. Oliver Sacks wrote his 1973 book “*Awakenings*” about his (limited) success in treating cases of people who had been essentially asleep since the 1930s with the drug L-DOPA. Some of the patients recovered for a short time, and then lapsed back into immobility. Harold Pinter also wrote a 1983 play about it (“*A Kind of Alaska*”). It is this kind of encephalitis that Vygotsky discusses in the next paragraph.

See Vilensky et al. (2007) a historical survey of more recent work.

his eyes, i.e. he complicates the task, solving it in some roundabout way, and then performs it.

The last example is an experiment that I also had the opportunity to observe. The patient was highly impaired in the simple form of his motor reactions, and when asked to click an electric key in response two or three times, he did so slowly. But if you ask “How old are you? Click out how old you are”—then he can click out 37 years. When he is not simply clicking, and when the click is included into the whole operation of counting out the years, he could carry out the operation.

In the adult, paradoxically, “A” may be very strongly afflicted, while in the child there is no affliction, or is afflicted in the opposite direction, because of the increased activity of the lower centres, which has become free, independent, and devoid of the inhibitory influence which comes from the higher centres. In an adult, just the center “A” suffers very much, and “C” suffers much less. And this is reflected in the fact that when a simple automated task becomes a task which requires volitional higher forms of motion, it becomes very easy. The adult encephalitic when walking on a level floor, fails in the task, but when stepping over chairs he does so very well; when he is made to utilize centre “C” it is carried out well, but with centre “A” it is done badly.

I think that, from these examples, the factual regularity at the basis of this law will be clear to you and that we now have only to proceed to the explanation of this regularity and, consequently, to the general conclusions which can be drawn from this law and from the three laws of development of the nervous system previously laid out.

How can this be explained, that in the child with a lesion in a certain centre the higher centre is more afflicted, but that in the adult the corresponding lower centre is more afflicted? We have already met with something analogous when we spoke of the development of the endocrine system. If you remember, we saw dwarves, talked about pituitary dwarves, and tried to show that when in the age of childhood, we deal with a deficiency in the pituitary, that this implies aplasia of the sex glands, which in the normal course of development constitute higher endocrine centres in relation to the pituitary and thyroid gland at the age of sexual maturity and thereafter.⁸

What constitutes the essence here? It seems to me that it consists in this: **the relations between the centres in the brain that characterize an adult arise, every time, in development.** For an adult, it is characteristic that “A” depends on “B”, “B” on “C”. However, this is not given from the beginning by the nervous system but arises instead through development. Firstly “A”, as we have seen, acts according to the first law, independently and regardless of “B”. Then, its function is transferred to “B” upwards. Then to “C”, which is even higher. This means that, in the age of childhood what has not yet been established are those dependencies, those **hierarchical relations**, the subordination of the lower centres to the higher centres, which is the law of activity for the already developed brain. Because of this, if in childhood

⁸At the beginning of the chapter, Vygotsky said that there “it was usual” to say that there were three laws. But he also said that the last law was in need of emendation and amendment. So now it appears that there are four laws.

centre “B” does not develop or is afflicted, we may ask, is it possible for centre “C” to develop or not? No, because “B” constitutes a precondition for centre “C”. The law of transition of functions upward says that **development goes from the bottom up**. In the beginning, the lower centres act and then the function proceeds upwards. But if this lowest centre is not there, if it does not act, then there is nothing to proceed upwards. This means that those relationships which characterize the activity of the developed brain of a person are established in the course of development, and because of this if a lesion afflicts a still immature brain, i.e. that brain in which these relations are not established, the consequences of this affliction will be, in childhood, opposite in some sense to what they will be in a mature adult. Why is this? This is because in the age of childhood there is an inverse relationship in a certain sense, to that which is in maturity. Let us remember again the endocrine system. In its development, what depends upon what? Is it the pituitary glands upon the sex glands, or the opposite? The sex glands depend on the pituitary. Now, do you remember the endocrine system in the transition to adulthood? What depends upon what? The pituitary gland upon the sex glands. It is the sex glands which in the age of sexual maturation lead to the fact that the activity of the pituitary gland is reduced and eunuchoid growth does not occur. It undergoes aplasia.

In the developed brain, what depends on what? Does B depend on C, or C depends on B? B depends on C; the lower depends upon the higher in the developed brain. But in development what arises earliest? The lower does. In development, “C” depends upon “B”. This is why the same lesions in a mature and in a developing brain necessarily make for different pictures.

Now allow me in the time remaining to present only in the most general words the **conclusions** to which the consideration of these four basic laws of the development of the nervous system have led us.

The first conclusion consists in this: although we have considered the development of the nervous system and although each system, in particular, the nervous system, has a whole series of specific features of development, at the same time what we have found here are such dependencies that remind us of the development of the endocrine system. I would now like to point out the dependencies that resemble what we found in psychological development.

In view of these, is it possible that the development of the nervous system, the development of the endocrine system and psychological development share some regularities? Yes, in view of this: **all these aspects of development are part of a unitary process of development**. This I have, for the sake of convenience of presentation, divided into parts, but in essence, a psyche does not develop without a brain, nor a brain without an endocrine system; it is all a unitary process. And in this view of this unity, although each aspect of development has its own specific laws, and the laws that I have outlined cannot be transferred directly to psychological development or to the development of the endocrine system, nevertheless all of these aspects of development constitute the unity, and we consequently observe some general patterns.

What have we found as the main trait of the child’s psychological development? If you remember, we formulated it thus: **the essence of psychological development is**

not that the functions primarily grow by themselves—increased memory, increased attention, increased perception—but rather that **each age stage has its own system of psychological functions under the domination of a particular function** which lies at its centre. We found something analogous in the development of the nervous system, which is related in an intimate way to psychological development, in the sense **that psychological development is something like the functional side of the development of the nervous system.**

What do we now see? In **the transition from age to age**, is it only the centres themselves that change, or is it the relationships between the centres? There is a change in relationship between the centres such that by the end of development, they have changed into their opposites. At the beginning, everything depends upon the lower centres, and at the end, the lower centre depends entirely on the higher centres. This change in intercentre relations as a basic fact of the development of the nervous system, and the change in interfunctional relations as a basic fact of psychological development, are indeed closely linked the one to the other, as two sides of the same process of development.

But relations change in the endocrine system as well. In what consists the development of the endocrine system? We have seen that different glands mature at different times. Not only does the force and capacity or the mass of a particular gland change, but also the relationships between glands. And it seems to me that we have now found a general formula that will help us to a correct theoretical understanding of the essence of any aspect of child development. That is, we have found that the essence of this development consists in a change in relations that exist within a given whole, that the organism is a complex whole. These relationships also determine how the organism is being constructed, as well as its building as a whole. The child at a given stage of development differs from an adult not in the fact that the same relations that exist in the adult are given to the child in a reduced form, he differs in that there are different relationships, i.e. he presents an organism which is in itself in a certain sense different. **The central fact of child development—whether we take the development of the endocrine system, or the organism as a whole, e.g. so-called physical development, development of central nervous system or psychological development—the central fact remains the change of the internal relations of a given whole, new organization, to which the child makes a transition in each new age level.**

And I wish to conclude with this thought, which I recently heard from one of the most authoritative researchers of the morphological development of the child, an idea which he came to in his field just as we have come to this idea in our own field. He says that we first saw growth as the basic phenomenon in physical development, and so we believed that the most energetic physical development takes place at an early age, in the very first months, in the first years of life, and then the energy of growth decreases. He points out that in the early months of life, in the early years of life, at the beginning, development mainly occurs as an increase in mass, i.e. development in itself proceeds extremely non-intensively. Development, which consists in reconstructing parts and relations, proceeds with particularly strenuous growth in each age, and the whole essence of the physical development consists in

restructuring relations between systems at each new age stage. In the extended course of age pedology, it could be shown that the young child does not draw his breath in the same way that the older child does. This is not simply in the sense that his breath is more or less than that of an older child, but in the sense that a different system, a different organic mechanism of lungs and a different process of respiration takes place here. The same is true in relation to the skeletal system, the muscular system, etc. At the same time, growth does not in itself lose its significance. In all areas of development, growth is taking place—both in physical development and in psychological development. That is exactly why this is development. Changes move in a definite direction, in the direction of increased growth, but growth is not primary, not that from which the whole development could be explained. **Growth itself is a result** and is an increase of function that occurs as the result of the new and more effective organization of the whole which is developing.

So that growth is not the primordial cause but in a certain sense the result of the manifestation, as it were, of the processes of development.

References

- Luria, A. R. (1972). *The man with a shattered world*. Cambridge: Harvard.
- Pinter, H. (1983). *Other places: Three plays (A Kind of Alaska, Victoria Station, and Family Voices)*. New York: Grove Press.
- Sacks, O. (1976). *Awakenings*. Harmondsworth: Pelican.
- Vilensky, J. A., Foley, P., & Gilman, S. (2007). Children and encephalitis lethargica: A historical review. *Pediatric Neurology*, 37(2), 79–84.

Correction to: L. S. Vygotsky's Pedological Works



Correction to:
L. S. Vygotsky, *L. S. Vygotsky's Pedological Works, Perspectives in Cultural-Historical Research 7,*
<https://doi.org/10.1007/978-981-15-0528-7>

The original version of the book was inadvertently published without mentioning the deceased author's name 'L. S. Vygotsky' in the copyright page, which has now been updated.

The updated version of the book can be found at
<https://doi.org/10.1007/978-981-15-0528-7>

© Springer Nature Singapore Pte Ltd. 2020
L. S. Vygotsky, *L. S. Vygotsky's Pedological Works, Perspectives*
in Cultural-Historical Research 7, https://doi.org/10.1007/978-981-15-0528-7_8

Leaving the Stage

We set the scene with a single question: Why should we choose to resurrect a long-dead science of a natural whole devoted to children in development? We gave three answers, but these answers rapidly took the shape of new questions: How did pedology justify itself in the first place? If we do choose to resurrect it, what will this mean for more familiar sciences like child psychology and education? And finally, what was Vygotsky's own position in this lost science of pedology? In the outlines and footnotes, we have attempted to foreground some of the answers that Vygotsky offered in his own lectures: how methodological holism is central to the project of describing change in all its complexity (just as whole photographic moments are central to making motion pictures), how the concept of "development" forms an overarching theme that draws in and can even reconstruct neighbouring sciences (just as "history" reconstructed natural sciences in the nineteenth century and "structure" reconstructed human sciences in the twentieth), and how pedology had been and still was the central preoccupation of Vygotsky's own meteoric career when he died (just as Vygotsky is and will be a central figure in any refoundation and reconstruction of pedology today). So there might seem little left to do here except take a bow, draw down the curtain, and start sweeping the stage.

Not so. As with any epic drama, we find ourselves leaving Vygotsky's lecture theatre with questions that are more precise, more profound, but if anything still more troubling than the ones we have just had answered. They are also far more numerous, but in this concluding note we will focus on just three. First, if pedology is neither an elemental science like psychology nor a technological application like education, how does it work in practice and how does this practice rebound on its theory? Secondly (and relatedly), what happens when development goes awry—how many developmental problems may be dealt with within a science of development and how many should be referred to neighbouring sciences such as psychiatry or neurology? Thirdly (and again relatedly), since ontogenesis, if not exactly inversely related, does seem to be linked in some way to pathogenesis, can normal development too be diagnosed and "treated"?

Each of these three new questions is, in its way, merely a sharpening of the three old questions that we set the stage with: the epistemological foundations of pedology,

the relationship of pedology to neighbouring sciences, and the life and career of the historical or “biographical” Vygotsky. The detailed answers Vygotsky himself gave to all three of these new questions will only be found in the second volume of L. S. Vygotsky’s pedological works, *The Problem of Age*. But, leaving the stage, we propose to leave you some foundations of pedology upon which Vygotsky’s solution to “the problem of age” can build—a simple schematic set based upon the content of this course which will include the backdrop for the drama’s next act.

How Does a Holistic Theory Like Pedology Work in Practice?

Pedology can be seen as part of still more ambitious project, constructing a general science of human development, and this more ambitious project led pedologists to reject any hard distinction between natural and human sciences. The methods that pedology had to employ in approaching this integral natural/human science of development then led pedologists in the early Soviet Union to reject a hard border between applied sciences and so-called pure sciences. Instead of attempting to choose between high theory and lowly praxis or trying to chart a course midway between them, pedology found itself having to engage both fronts simultaneously. This left the young science exposed to the politically motivated attacks masquerading as high theory which were eventually its downfall. But, as Vygotsky argued on behalf of “general” psychology in *The Historical Meaning of the Crisis in Psychology* (1997a), it was, in the interim and even in the long run, a source of immense strength.

High theory was in high regard in the USSR. There were, ironically, some highly practical reasons for this: paper-and-pencil research was cheaper and quicker than experimentation (even the post-war Soviet nuclear weapons and missile programmes tended to rely on slide rule calculations rather than the computers which were already widely in use in the US military-industrial complex). It should not surprise us too much that Vygotsky, in his more speculative work, prefers what he calls “experimental philosophy”—an elegant form of abstraction in action—rather than elaborate attempts to recreate an environment in a laboratory (see, e.g., his experiments on the “selection reaction” in the *History of the Development of the Higher Mental Functions* [1931/1997b] and the Sakharov blocks in *Thinking and Speech* [1934/1987]). What is at first somewhat surprising is that in the pedological works, Vygotsky shows a rather different preference: on the one hand, individual case studies from his clinical work (as when he describes an alcoholic mother with three children in Lecture Four on the environment) and, on the other hand, mass studies including hundreds and even thousands of respondents (as when he refers to pedological standards in Lecture Two, or to the mass studies of twins in Lecture Three). Vygotsky’s *Pedology of the Adolescent* (1929, especially Chap. 6) includes data from thousands of questionnaires on sexuality by Gellmann, Aryamov, and other pedologists in the USSR

whose frankness as well as scope would have astonished Havelock Ellis, Alfred Kinsey, and possibly even Masters and Johnson.

Two circumstances may help us reduce our astonishment and augment our understanding of the context that led Vygotsky to create these texts. The first is that there is a sense in which the whole of the early USSR was an experiment in social engineering, and at least some of the riches of Vygotsky's data were by-products of that exorbitant (and, at least at first, exuberant) experimentation. Following the revolution, the Soviet Union was invaded by fourteen great powers and the land was torn apart by civil war; the immediate result was between three and seven million homeless children, which the new government attempted to care for in a wide variety of orphanages, collectively run foster homes, and even "forest schools" designed to care for tubercular children (like Vygotsky's younger brother, who died at the onset of the civil war and may well have been the source of the tuberculosis which eventually killed Vygotsky). The young science of pedology served, staffed, and nourished itself with data from these institutions, and this goes some way to explaining why and how Vygotsky focuses on clinical data in Lecture Four and his reliance on mass studies in Lecture Three and the *Pedology of the Adolescent*.

The second explanation is more theoretical and even meta-theoretical. Hostility to blind empiricism was not simply an adaptation to harsh conditions, nor was it merely a cold war conceit, a politically motivated reaction to Anglo-American scientific culture. It formed an organic part of the great Hegelian heritage of Marxism. Like the French rationalists and the German idealists, the Soviets had a somewhat paradoxical predilection for stating patterns, regularities, and even descriptions as "laws", even though the term suggests, in Russian as in French and English, that a particular regularity is deliberately created, and therefore that the universe has regular patterns because of the divine will of a holy lawgiver. Soviet science dispensed with the holy lawgiver, but clung to the idea of regular, rational, meaningful patterns of organization in both natural and human phenomena. Soviet science believed in intelligent design, but relegated this intelligent design to human agency and the socialist future.

As a result, the word "law" is something of an overgeneralization, and it needs to be differentiated to be understood. A "law" of grammar is one thing—no one goes to prison for being ungrammatical; a "law" of society is another—you can break it, but then you must pay in some way; and a "law" of nature, which cannot be broken at all, is yet another. The laws of pedology here are actually laws of human nature—a kind of nature which is both thoroughly biological and completely social, and which as a result changes through time and is ultimately although not immediately subject to human control. That is why Vygotsky emphasizes, in Lecture Three, the keen interest of the pedologist in functions which are central to development but sensitive to the environment, functions which turn out to be sociogenetic rather than purely phylogenetic, and thus ultimately susceptible to human interventions. It is also why Vygotsky emphasizes, in Lecture Four, that child development, and especially speech development, is like no other kind of development at all. The same goes for psychological development: it is not like speech development, on the one hand, and not like physiological development, on the other. The truth of a "law" is always concrete, not least because it has to intersect with infinitely many other laws, some

of which are like laws of grammar, some of which are like laws of society, and some of which really are laws of nature. As a result, Vygotsky announces somewhat perversely at the beginning of Lecture Five that the General Law of Development is that development cannot have any law in general. Similarly, it may seem perverse that the four laws of human nature that we called “ADAM” in our introductory section (Asynchronicity, Disproportionality, Alternating epochs of evolution and involution, and Metamorphoses) are all general laws, in the sense that they might also apply to sociogenetic history (Marx’s laws in political economy [1845/1932/1968], Engels’ laws in history [1973]) or even to phylogenetic evolution (Gould’s reinterpretation of Darwin as punctuated equilibria [2002]). But the paradox is perhaps not that hard to explain if we keep in mind the grand vision that underlies both the bold experimentation and the broad philosophical vision of Soviet pedology.

As a concrete example of how experimentation and vision were to be interrelated, consider the way Vygotsky formulates the crucial concept of age in Lecture 1:

An age is nothing but a given cycle of development, which appears as if set off by itself, separated from other cycles, which has its own specific pace and its own specific content of development.

Why does Vygotsky use the term “cycle” in this definition? Why not say a “stage” or a “period” or an “epoch”? After all, a “stage”, or a “period”, or an “epoch” is more obviously historical; these terms all emphasize progress and highlight the difference between the beginning and the end, whereas “cycle” seems to end up just where we started. And of course, Vygotsky does use terms like “stage”, “period”, and “epoch” in expanding, extending, and metaphorically enhancing this definition into what he calls “the problem of age”. But if we picture Vygotsky’s definition graphically and metaphorically as a kind of double helix of the child and the environment, with the widening gyre representing the expanding horizon of subjectivity on the part of the child and the deepening impact of the social environment upon the child, each “cycle” in the ascending spiral has the power to portray all three laws of dialectics laid out by Engels in *Dialectics of Nature* (1973); each “cycle” enacts contradiction, metamorphosis, and the “negation of negation”.

First, each “cycle” portrays the idea of opposites which interpenetrate rather than mutually exclude each other: during some critical periods of development, e.g. birth, the child doesn’t seem to learn much by imitation but instead seeks to self-emancipate by imposing his or her own impulses, while during other more stable periods, including infancy, the child does attend to and try to assimilate the forms of behaviour observed in the environment. These two different types of development are not mutually exclusive in the way that “assimilation” and “accommodation” were portrayed by Piaget (1951) in *Play, Dreams and Imitation in Childhood*. On the contrary, they are interpenetrating in the way that the child and the social environment really are in practice. So we need not be surprised to find that such cycles of development end up in a state that is in some way analogous to the state in which they began. It is perhaps for this reason that Vygotsky, in *Pedology of the Adolescent*, finds himself agreeing with the otherwise rather mystical and masculinistic sentiment of Rousseau (1763/1979) that puberty is a kind of second birth into manhood.

Second, each “cycle” depicts a metamorphosis of quantitative changes into qualitative transformations. Unlike Rousseau, Vygotsky saw that the child’s “second birth” into culture actually takes place long before adolescence, with the transition from the “autonomous speech” of biling, cooing, and baby babble into the adult speech of the mother tongue. Some aspects of this transition are indeed qualitative changes in direction: the introduction of the vocabulary and grammar from the social situation of development. But some aspects look more like the gradual accumulation of quantitative changes: the mastery of intonation and stress, as well as expansion of the child’s semantics to include one interpersonal function after another. It is rather hard to see these two different aspects as completely unrelated: indeed, they seem interdependent rather than mutually exclusive.

Third, each “cycle” conjures up the notion of negation and then of a “negation of the negation”. Somewhere around age three, the child masters a bit of vocabulary and grammar that appears to simultaneously double and halve child power: the word “no” and its attendant interpersonal functions. Vygotsky says that around three the child inserts a kind of wedge between affect and will: the child will insist on something that is not actually wanted, simply because it is the child’s stated will, or contrariwise, the child will refuse to do something that the child actually wishes to do, simply out of pique with the person doing the invitation (one child in the clinic, e.g., wanted to accompany him to a clinical interview, but refused to go when she was asked). We often assume that preschool play has an important function in developing creativity in the child, and this is of course true, but it is equally true at other periods of the child’s life and does little to tell us why play might be of particular importance for the early years. For Vygotsky, this creativity takes a very specific form in preschool. For the first time, around age three, the child is aware of the social origins of the things that the child wants—the route to objects lies inevitably through other people, and when that route is blocked, it is other people that the child blames. At the same time, the child is able, for the first time, to want experiences that are not available or even possible. In preschool play, the child is able to accomplish some negation of this negation.

And if the child cannot do this? By a direct route, this brings us to our next question.

What Happens When Development Goes Wrong?

Vygotsky himself approached pedology through a science the Russians still call by the name “defectology”, the study of the blind, deaf, “disabled”, and “mentally impaired”, as well as juvenile delinquency. The name is somewhat unsettling to us today, perhaps because it seems to suggest that the child is in some way less than perfect when leaving the hands of the Creator. But in the Soviet scheme of things, the term “disability” would be far more unsettling, as it would seem to imply an imperfect potential and an inequitable future. Vygotsky certainly did not hesitate to call himself a defectologist any more than he shied away from self-identification as a pedologist, even when pedology came under forceful State-sponsored attacks. You will have already noticed that Vygotsky often refers to deaf and mentally impaired children, sometimes as if they were a natural experiment, a way of finding out what language

might be like without sound, or what a child's self-image might be like if the child could not generalize from the *perezhivanie* of abuse into a sense of humiliation. How, Vygotsky seems to be asking, would child development take place if it came about blindly, in the way that species have developed and the way that human societies develop, without the presence of a final, complete, and ideal form in the social situation?

This cruel natural experiment is also a little unsettling. But, once again, we might do well to critique our own unsettled ideas and find them unsettling in turn. Just as we have tended to imagine the mind as a spiritual body double, we have tended to conceptualize mental "illness" by analogy with physical illnesses. In medieval times, for example, mental illness was thought of as an infestation, a possession by some parasitic or infectious demonic agent (Shakespeare's *Hamlet* and Burton's *Anatomy of Melancholy*); in our own time, it has been variously thought of as the result of either heredity (McDougall, critiqued in Vygotsky 1931, Chap. 9) or trauma (perhaps the dominant therapeutic discourse today). This insistence on an analogy with physical illness is all the more odd, because to this day, the vast majority of mental illnesses—e.g. bipolar disorders, the autism spectrum, borderline personality disorder—are thought of as a kind of continuum of symptoms rather than as a clear single cause with a certain range of possible realizations (in contrast, doctors are careful to distinguish the syndrome AIDS from the causal agent HIV, and nobody speaks of broken leg syndrome or the measles continuum). Yet although we do speak of mental "illness", and even use terms like "diagnosis" and "treatment", what we have in reality is little more than a set of behavioural syndromes without a clear notion of cause. Vygotsky would say that we are in the presence of a purely phenotypical form of science: a gathering and naming of specimens similar to what eighteenth-century gentlemen of leisure engaged in rather than an activity that rises to the level of cycles of causal explanation and subsequent re-engagement with data on a higher level, the kind of activity which characterized evolutionary biological science in the nineteenth and twentieth centuries.

Pedology offers us a direct route to that next level. Because pedology, at least in the form given to it by Vygotsky, is monist, anti-reductionist, and thoroughly dialectical, the child's mind is not envisioned as some kind of body double, nor as a simple function of the child's individual brain. Instead, the nervous system taken as a whole is part of the developing interface between the child and the social situation of development. Disruptions of this interface may be:

- (a) hereditary and congenital (e.g. sickle cell anaemia),
- (b) congenital but not hereditary (e.g. foetal alcohol syndrome, of which Vygotsky speaks long before it was recognized in the West),
- (c) non-congenital and simply due to non-development (e.g. illiteracy or what Vygotsky calls "primitivism", at the end of the first chapter of *the History of the Development of Higher Mental Functions*, 1930/1987).
- (d) inherent in the process of development itself. This is what parents mean when they observe that a child is "going through a phase", and as with many parental

observations, this folk wisdom is a good starting point for a scientific understanding.

Of course, since body and mind form parts of a complex whole, it is entirely possible that the symptoms of mental impairment or dysfunctional child behaviour are the result of organic factors rather than factors which stem from the source of development in the child's social environment. But very commonly—in fact, universally, since certain moments of crisis are inherent in the achronological, disproportionate, and alternating metamorphoses intrinsic to development—the disruptions in child feeling, thinking, saying, and doing are simply due to development itself.

Understanding mental illness as a defect in development would explain why it so often appears as a spectrum, why it is hard to distinguish from health, and why causation can be so difficult to pinpoint: symptoms of mental impairment or dysfunctional behaviour are also part of normal development, and the first thing that happens when development goes awry is that these critical symptoms seem to become unusually long-lasting and threaten to become permanent. Understanding mental illness in this way would also explain why many treatments for mental illness seem to involve counselling, discussion, and what Freud liked to call the “talking cure”—and it would pinpoint why these “talking cures” are often merely palliative, since they do not address fundamental problems in the social situation of development itself.

In introducing the third law, the law of alternation between involution and evolution, Vygotsky says:

There exists a whole series of irregularities in child development, child developmental disorders, called the **infantilisms**. An infantilism literally translated into Russian means a “childishness”. And when we study the essence of these developmental disorders, we see that **the essential consists in that the processes of involution are disturbed, that there is no timely withering away, and that the child does not undergo an inverse development of a system that in the normal course of time should revert to a background plane. The child proceeds to the next age and acquires traits that are typical of adulthood, but in him there are some individual aspects that retain their earlier, more childly, organization, retaining properties of an earlier age, a childishness within the system of traits proper to an older age.**

Now, on the face of it, there is little that is original in this insight. In the seventh lecture, Vygotsky is just borrowing this then fairly well-known observation from Ernst Kretschmer, a well-known Nazi psychologist in his day who—due to his association with the Nazi regime and the subsequent de-Nazification of German universities after the second world war—is little known or cited today. Kretschmer, who became familiar with shell shock and brain damage as a doctor in the first world war, noticed that damage to brain tissue results in a loss of the higher function but not the lower one. Along with other doctors, Kretschmer attempted to use the wide range of bullet wounds with which he became familiar to map what he called the “higher centres” of brain function. Note that Kretschmer too was not entirely original: as Vygotsky points out in his lectures, paediatricians have long been aware that certain instincts like the Moro reflex (the tendency of a child who is shaken or jostled to try to grasp the mother) or the Babinski reflex (the tendency of the child to fan out rather than

curl the toes when the sole of the foot is stroked) will disappear in infancy, but may reoccur in pathological cases even in adults.

What is specific to pedology—and even, to a certain extent, original with Vygotsky—is the attempt to generalize this insight into the development of all higher psychological functions, to explain it by their cultural–historical and not merely biological origins, and to provide a way forward for diagnosis and treatment, by circuitous and indirect means of development. Contrary to Kretschmer, Vygotsky found that in cases where higher psychological functions of cultural–historical origins had already well developed in a child, it was possible to use the system of higher functions to circumvent the loss of a lower function; only in cases where the higher functions had yet to develop did the loss of a lower function mean permanent loss of potential. For example, patients who had apparently lost volitional control of facial muscles could still close their eyes if they were asked to pretend to sleep; patients who had lost control of their legs could walk by using sheets of paper as “stepping stones”, and—an example with which we all eventually become all too familiar—the loss of sexual function must have a very different effect on the development of romantic love in adolescence than it does in old age. As usual, the clearest examples of this appeared, to Vygotsky, with the development of speech. Vygotsky the defectologist must have noticed very early on that it was far easier for lip-reading to develop in people who had lost their hearing after early childhood than for those who were born deaf; even the remarkable recovery of speech function in Helen Keller appears to owe something to her loss of hearing during early childhood rather than in infancy. Vygotsky the pedologist would not have been surprised that Luria’s patient Zasetsky who had lost the function of coherent speech from bullet wounds to the brain in World War II could still write bring himself to write cohesively (Luria with Soltaroff 1987).

So does pedology offer the possibility of redefining all illnesses—including the illnesses we commonly think of as purely mental illnesses such as bipolarity, autism, and schizophrenia—as developmental disorders with developmental diagnoses and developmental treatments rather than as the various results of heredity, infection, and violent trauma? Since pedology does include a very wide range of phenomena—from the products of evolution through those of culture and history to those of learning and child development considered more narrowly—this conclusion would seem to follow as a matter of course: developmental problems, whether phylogenetic, sociogenetic, or ontogenetic, can only have developmental solutions. So perhaps the only real distinction between, for example, the apparent “cyclothymia” of the three-year-old, and the bipolar disorder of the adult is relative impermanence, and the only difference between the “schizothymia” of the adolescent and the schizophrenia in an adult is that the former, arrested, becomes the latter: the one is only a passing phase, while the other is more or less permanent? In the light of Vygotsky’s lectures, three important reservations seem in order.

The first reservation is the restriction of subject matter with which Vygotsky begins these lectures. The subject matter of pedology is the development of the child: it is not embryological development and therefore cannot include hereditary or even congenital developmental disorders except as data from neighbouring sciences.

Similarly, adult problems of bacterial or viral infection and the results of violent trauma in adult soldiers are not included in the primary object of study, although they can certainly provide illumination on questions of child development which do fall into the purview of pedology. The natural whole which really is the direct object of study in pedology is not eternal and in fact does not even last a single human lifetime; as Bronckart (2018 and forthcoming) remarks, the embryo grows but does not learn, while the adult learns but does not grow—pedology is the science of that group of human beings which is undertaking learning and growth at one and the same time.

The second reservation stems from this: it is that the fate of the developing child and the fate of the mentally ill person may widely differ. This explains the curious remark that Vygotsky makes in the course of the seventh lecture, while describing all of this work on compensatory treatment of brain injuries, encephalitis, and even the cases of agnosia later made famous by Oliver Sacks (1998) in *The Man Who Mistook his Wife for a Hat*. Vygotsky says that involution and evolution may momentarily coincide, just as the Red Arrow train which Vygotsky took from Moscow to Leningrad to deliver these lectures would sometimes pass the Red Arrow which Vygotsky would have to take returning home again. Within ontogenesis, evolution and involution may present a similar picture, but the resemblance is momentary like ships passing in the night, because the outcome—even assuming compensation and remediation, even with circuitous and indirect forms of development appropriate to the developmental disorder—will not be exactly the same. As for the larger analogies between ontogenesis and sociogenesis, or even ontogenesis and phylogenesis that Nazi psychologists were attempting to make, these are, for the reasons that Vygotsky stated at the end of the first lecture, quite beside the point: a train from Moscow to Leningrad will never pass, much less overtake, a train on its way from Paris to Vienna. Ontogenesis does not recapitulate phylogenesis and that for two reasons. First of all, as Vygotsky says, ontogenesis includes the “final form” in its social situation of development. Secondly, even in sociogenesis, Darwinian laws are radically altered: the “Jennings” principle, that organisms are only capable of what their organs enable, is overruled by the use of tools, and we find that precisely those societies which are best able to look after the very old, the very young, and the very sick develop the best means of self-preservation.

And this leads ineluctably to a third reservation: the specificity that holds true for ontogenesis as a whole must likewise hold true for the various cycles we find within ontogenesis. The cycles we find within ontogenesis are not *sui generis*—each one builds on the previous one and leads to the subsequent one. But precisely because this is so, each one neither repeats exactly nor is it exactly repeated; a cycle can neither begin where the previous cycle began nor can it end where the subsequent cycle will end. Whether we locate the “second birth” in adolescence, as Rousseau did, or in the child’s discovery of speech in early childhood, we must always recognize that any second cycle of development is not exactly like the first, precisely because it has had the first cycle as a precondition and stands radically closer to a third cycle than the first one did.

But how close is it exactly? This too appears to vary. Since developmental disorders can be diagnosed—and since even normal development does appear to involve critical periods of disorder in its reorganization—perhaps it may be possible to “diagnose” a next period of development? This brings us to our last and final question, a question that unites our first and second questions: the question of using pedological theory in order to diagnose—for practical purposes such as learning and teaching—a next or proximal zone of normal development.

How does pedology provide for the diagnosis and prognosis of normal development?

We heard, in Lecture 2 on the characteristics of the pedological method, how Vygotsky carefully distinguishes between years in the chronological or “passport” age of the child and years in the child’s “developmental” age. The latter was, in Vygotsky’s time, to be measured using tasks and a developmental schedule worked out by Binet and Simon. This is why Vygotsky’s famous and very much misunderstood example of the zone of proximal development on p. 85 of *Mind in Society* uses two ten-year-olds who are only eight in their developmental age, a detail that has escaped nearly everybody who quotes the example. Vygotsky says:

Suppose I investigate two children upon entrance into school, both of whom are ten years old chronologically and eight years old in terms of mental development. Can I say that they are the same age mentally? Of course. What does this mean? It means that they can independently deal with tasks up to the degree of difficulty that has been standardized for the eight-year-old level.

What exactly are these tasks that Vygotsky is referring to? Here, for example, is a task for normal seven-year-olds taken from a book Binet wrote with Simon in 1907 on abnormal children.

1. Quand on est en retard pour arriver à l’école, que faut-il faire? (“When one is late for school, what must one do?”) (Binet and Simon 1907: 98)

How does one score the response? Here is what Binet and Simon suggest.

Nous cotons 3 les réponses bonnes, 2 les passables, 1 les médiocres, and 0 les absurdités et les silences. Ce sont les silences qui parfois embarrassent; ils peuvent provenir soit de timidité soit même d’un réflexion prolongée. (“We count three points for good answers, two or those that are passable, one for those that are mediocre, and zero for absurdities and silences. It is the silences which sometimes embarrass one; they may stem from shyness or from some prolonged reflection.”) (1907: 99)

If we were grading this today, it would not just be the silences which embarrass us; it would be trying to apply the one-point distinction the authors have made between “passables” and “médiocres”. The rubric which Binet and Simon use to explain the descriptors is, to put it mildly, not crystalline in clarity:

Question 1, la réponse “se dépêcher” vaut mieux que celles-ci: “sonner—se dépêcher le lendemain—on est à la retenue”. (“For Question 1, the response “hurry up” is better than these: “ring the bell”, “hurry up the next day”, “get a detention”)

Clear as mud. But one thing that is unambiguous is that “hurry up” does not represent a higher level of intelligence than “hurry up the next day”: on the contrary, it suggests, although it doesn’t prove, a lower level of lexicogrammatical complexity and semantic detachment. To be fair, Binet did not design his tasks as tests of mental development, and he objected strongly when Goddard and the American eugenicists decided they would make a good IQ test (Binet and Simon 1905). Binet and Simon were simply trying to diagnose children who might need special help interacting with public school teachers, and the test is adequate for that purpose. Nevertheless, Vygotsky, who did not often find himself on the same page as Thorndike, fully agreed with the latter’s criticism of the Binet tests: “(W)e never know what we are measuring and how we are measuring or whether the measurements we have are reliable” (Vygotsky 1997: 234). Mysteriously, Vygotsky proposes in their place “abstract units”. Unfortunately for us, he never actually explains what these “abstract units” are and how they can be measured.

Two moments in these lectures, however, suggest a forthcoming answer. The first is the moment where at the beginning of the fourth lecture on the environment, where Vygotsky insists upon relational measures rather than absolute ones. A system of age periods detached from chronological age must be immanent: that is, the periods must be defined in relation to each other rather than to any external criterion which does not develop. The law of achronological development prevents us from rigidly attaching age periods to the calendar in individual cases, but it also allows us to distinguish periods where development is sudden and rapid from periods where it is gradual and slow. Similarly, the law of alternation between involution and evolution prevents us from presenting development as linear increase, but it also allows us to distinguish periods where change in the capacity for schoolwork, for example, is positive from those where it is negative. The second moment which suggests a system of “abstract units” is the moment in the second lecture where Vygotsky suggests the use of “pedological standards” determined by mass studies; by calculating average ages, abstract units of development such as “developmental years” might be linked to the environment (as periods defined by the social situation of development) and in relation to each other (as periods defined by the tempo of development).

Vygotsky’s zones of proximal development are not age periods themselves: they are the zones that link and separate the age periods—the zones of potential or possible development for a given child or a group of children and for a given social situation of development. This zone between age periods is likewise measured in years (and this is another detail which often escapes those who have tried to use the ZPD in educational work), but these years are likewise not “passport” years but developmental years. And of course, this leads us to at least three more troubling problems with the whole scheme. First, if the Binet tasks are inadequate for the measurement of mental or developmental years, we will certainly need a new set of tasks which are appropriate both to the child and to the social situation of development before we

can diagnose potential or “proximal” development. Secondly, in describing the ZPD, Vygotsky refers in a quite off-hand fashion to leading questions, starting solutions to tasks and even doing demonstrations, as if the difference between these was of little consequence. But even if we have ideal tasks for doing this, we will have to work out a system of providing assistance to children doing the tasks that can be kept invariant in order to be able to compare children; otherwise, the variation in developmental age that we observe may simply be a function of variation in the forms of assistance. Thirdly, if developmental years are only measured as success or failure at certain fixed tasks, they cannot also be defined as success or failure at the tasks, because then the whole scheme becomes tautological: the child is always ready to learn whatever and only what the child is able to learn next.

These are just three of the outstanding problems with the zone of proximal development that Vygotsky must tackle in the next course. Working out solutions will require, as we indicated when we set the stage, a whole new constellation of concepts with names like “neoformation”, “central and peripheral lines of development”, and “social situation of development”. But to these outstanding problems, our own educational research, here in the West, has managed to add its own non-Vygotskian assumptions. Chaiklin (2003) has pinpointed three of these: generality, assistance, and potential. We might refer to them by yet another acronym, GAP.

The “generality” assumption is that there is a zone of proximal development for everything—almost any skill or form of knowledge comes with a zone. In contrast, Vygotsky posits quite specific “neoformations”, some of which are central to development (e.g. everyday speech in early childhood, sexuality in adolescence) and some of which are only of peripheral interest to development (everyday speech in adolescence and sexuality in early childhood). The “assistance” assumption is that the ZPD is brought into being wholly by the assistance available in the environment. Vygotsky, however, makes it very clear that the social situation of development includes the child himself or herself at every moment, and there are even critical moments where the influence of the child on the social situation almost seems to outweigh the influence of the environment on the child. Finally, the “potential” assumption is an equal and opposite reaction to the assistance assumption—it is that the ZPD is solely and wholly a potential that lies within the child. As Vygotsky set forth even in the very first of these foundational lectures, each step of development stands neither within the child nor within the environment. A step is not a stance at all: it is a process of linking stances, at first with assistance and only later—developmental years later—alone. But just as Binet’s purpose was not to diagnose development but only to facilitate teaching, the purpose of the ZPD is not to facilitate teaching, but rather to diagnose development. In short, the ZPD is not pedagogical but pedological.

By now you will have realized that the answers Vygotsky prefers are rarely conclusive and almost never short. Let us nevertheless leave the stage with some kind of summary response to the three problems we posed at the outset. We asked how pedological theory and practice can interact. The short answer, as any attentive student of Vygotsky’s course will conclude from his lectures, is that pedology works with and through practice: that was the whole purpose of alternating these lectures with clinical visits. But when we back up a little and take the whole of the history

of the theory into account, we notice that practice also works with and through theory, likewise remaking it in its own image. Perhaps the whole distinction between theory and practice becomes somewhat theoretical in pedology; perhaps it is not a distinction that holds up very well in living practice.

We wondered how much of what goes wrong in the child's life could be defined as developmental rather than, say, hereditary or due to environmental trauma. Pedology takes a very expansive view of development—because it is a holistic approach that includes heredity in interaction with the social environment and the development of psychological functions in interaction with endocrine changes and transformation of the brain and the nervous system, pedology makes it possible to understand a wide range of non-normal phenomena, physical and mental, as developmental rather than genetic in the contemporary sense or the direct impact of a traumatic environment. On the one hand, the centrality of speech to the social situation of development may offer some explanation of why “talking cures” for mental illness seem to have some effectiveness; on the other, it might suggest that some more sustained transformation of the social situation of development may be required.

Finally, we queried whether there might be some kind of diagnosis and prognosis available for normal child development. Looking over the foundations Vygotsky established in these lectures, we saw that Vygotsky does not measure development in calendar (“passport”) years. Unfashionably, Vygotsky divides childhood into definite periods, but those periods are defined not by external tasks or by internal growth: they are defined immanently, by the pace of development itself. As a consequence of this immanence, these periods are not completely predictable or programmable, but it is always possible to replace astonishment with foresight; the zone of proximal development, Vygotsky's most widely known and wildly misunderstood theoretical construct, is a key part of the puzzle.

In *Foundations of Pedology*, we have seen that a method and approach take on many characteristics and even the overall character of their subject matter and problematic. As the very title suggests, *The Problem of Age* will be neither conclusive nor short. Sometimes the scenic route is better; the path less taken may be in the end far less misleading than the direct one, not least because it gives us a better sense of an achronological, disproportionate, alternating-and-fluctuating qualitative metamorphosis than any purely logical, formal, linear, and quantitative scheme ever can. Even though the inquiry is cut off at the threshold by the death of the author, and in spite of—nay, because of—that author's meandering path to the goal, *The Problem of Age* succeeds in presenting us with the next “cycle”. But as we have seen in this volume, a cycle of development is more like a spiral; it does not end exactly where it began. Like a cycle in an epic drama, it sets the scene for a new act and offers a stage to new actors.

Nikolai Veresov
Monash University, Frankston, Australia

David Kellogg
Sangmyung University, Seoul, Republic of Korea

References

Binet, A., & Simon, T. (1905). Méthodes nouvelles pour le diagnostic du niveau intellectuel des anormaux. *L'Année Psychologique*, *11*, 191–244. <https://doi.org/10.3406/psy.1904.3675>.

Binet, A., & Simon, T. (1907). *Les Enfants anormaux*. Paris: Armand Colin.

Bronckart, J.-P. (2018 and forthcoming). Understanding the place of pedology amongst the once and future disciplines to better understand what pedology is. Presentation at the 7th international seminar on Vygotsky in Geneva, Switzerland. See forthcoming article in *Mind, Culture, and Activity* special issue.

Burton, R. (1638/2009). *Anatomy of melancholy*. Ex-classics Project, <http://www.exclassics.com>.

Chaiklin, S. (2003). The zone of proximal development in Vygotsky's analysis of learning and instruction. In A. Kozulin, B. Gindis, V. S. Ageyev, & S. M. Miller (Eds.), *Vygotsky's educational theory in cultural context* (pp. 39–64). Cambridge: Cambridge University Press.

Piaget, J. (1951). *Play, imitation and dreams in childhood*. London: Routledge & Kegan Paul.

Engels, F. (1973). *Dialectics of nature (Translator, Clements Dutt)*. New York: International Publishers.

Gould, S. J. (2002). *The structure of evolutionary theory*. Cambridge MA: Harvard University Press.

Keller, H. (1903). *The story of my life*. New York: Doubleday.

Luria, A., & Lynn, S. (1987). *The man with a shattered world: The history of a brain wound*. Cambridge, MA: Harvard University Press.

Marx, K. (1845/1932/1968). *The German ideology*. Moscow: Progress.

Rousseau, J.-J. (1763/1979). *Emile, or. On education*. Translation and notes by Allan Bloom (ed.). New York: Basic Books.

Sacks, O. (1998). *The man who mistook his wife for a hat*. New York: Touchstone.

Shakespeare, W. (1601/1985) *Hamlet*. Cambridge: Cambridge University Press.

Выготский, Л. С. (1929). *Педология подростка. Задание 1–8*. Москва: Издание бюро заочного обучения при педфаке 2 МГУ.

Выготский, Л. С. (1931). *Педология подростка. Задание 9–16*. Москва и Ленинград: Государственное учебно-педагогическое издательство.

Vygotsky, L. S. (1978). *Mind in society*. London and Cambridge, MA: Harvard.

Vygotsky, L. S. (1987). *Collected works* (Vol. 1). London and New York: Plenum.

Vygotsky, L. S. (1997a). *Collected works* (Vol. 3). London and New York: Plenum.

Vygotsky, L. S. (1997b). *Collected works* (Vol. 4). London and New York: Plenum.

Index

A

- Accelerated development, 22, 36–39, 41
- Adolescence, 65, 87, 107, 147, 150, 151, 154
- Adrenal glands, 106, 110
- Affective perception, 86–88, 94, 95
- Age level, 10, 14, 41, 61, 68, 71, 90, 97, 115, 121, 122, 141
- Agnosia, 126, 135, 151
- Alcoholism, 70
- Analysis
 - into elements, 27
 - into units, 22, 85
- Aphasia, 136
- Aplasia, 113, 118, 139, 140
- Athetoid (worm-like) movement, 129
- Attention, 9, 47, 48, 67, 71, 90, 91, 93, 94, 101, 106, 125, 141

B

- Babbling, 12, 13, 33
- Babinsky's reflex, 125, 126
- Biedl, A., 106, 110, 112, 113, 117, 123
- Brain
 - damage, 120, 136, 149
 - higher centres, 56, 125, 126, 128, 129, 132
 - impairment, 120, 134, 136, 149. *See also* brain damage
 - lower regions, 128
 - ontogenetic development, 58
 - phylogenetic development, 128
- Broca's area, 137
- Bühler, Karl, 46, 51, 52

C

- Capitalism, 19, 22
- Case, 4, 12, 13, 28, 31, 34, 36, 38, 39, 46, 47, 52, 53, 55, 62, 70, 72, 73, 82, 93, 110, 111, 113, 115, 118, 119, 121, 122, 125, 126, 130–135, 137, 138, 144, 150, 151, 153
- Ceni, C., 120
- Cerebral cortex, 126, 128, 130, 131
- Clinical method, 22, 35, 36, 39, 41
- Clinical study, 22, 35, 36, 45
- Comparative-genetic method, 22, 39–42, 45
- Comparative twin research, 52
- Comprehensive method, 21
- Consciousness, 56, 65, 67, 77, 82, 86–88, 90–100, 103
- Conscious personality, 69, 89
- Constitution, 13, 27, 62, 72
- Constitutional types, 62
- Cosmological development, 16
- Cycle of development, 5, 9, 146, 151, 155

D

- Darwin, C., 35, 146, 151
- Deafness, 136
- Death, 73, 134, 155
- Differentiation, 47, 85–88, 93, 95–97, 99, 100, 102. *See also* non-differentiation
- Disproportionality, 9, 11, 13, 146
- Divorce, 73, 91
- Dominant, 87, 88, 95–103, 111, 114, 116, 119, 123, 148
- Dwarfism, 122, 127

E

Early childhood, 60, 87, 88, 94–102, 112, 117, 150, 151, 154
 Edinger, L., 128
 Elementary functions, 56, 58, 125
 Emotion, 66, 72, 86, 90–92, 94–96, 107, 121
 Encephalitis, 127, 137, 151
 Enculturation, 4, 69, 81
 Enuresis, 70
 Eunuchoid growth, 114, 127, 140
 Eye color, 46–49, 60

F

Final form (ideal form), 65, 67, 78–84, 148, 151
 Functional differentiation, 103

G

General laws, 45, 47, 61, 67, 77, 85, 88–90, 98, 106–108, 113, 146
 Genetics, 34, 35, 39–41, 45, 48–50, 52, 60, 62, 67, 155
 Growth, 5, 8–10, 13, 29, 40, 47, 62, 77, 86, 89, 90, 97, 105–109, 111–116, 118, 119, 121–123, 125, 127, 128, 141, 142, 151, 155

H

Heredity, 15, 20, 22, 28–30, 34, 35, 42, 45–50, 52–56, 58–62, 65, 67, 68, 77, 88, 148, 150, 155
 Higher functions, 46, 47, 56, 58–60, 65, 67, 125, 135, 149, 150
 Holism, 21, 85, 143
 Hygiene, 21, 34, 35, 62, 68
 Hyperfunctioning, 112, 118
 Hypofunctioning, 113, 118, 139, 140. *See also* hypoplasia, aplasia
 Hypoplasia, 113, 118

I

Ideal form (final form), 65, 78–80
 Infancy, 2, 9, 55, 65, 86, 87, 91–95, 99, 100, 128, 132, 146, 150
 Infantilism, 2, 12, 149
 Inner speech, 83
 Involution, 2, 12, 90, 106, 110, 111, 115–117, 123, 126, 127, 146, 149, 151, 153
 IQ, 38, 153

J

Juvenile delinquency, 46, 51, 147

K

Kidneys, 110

L

Law of the emancipation of nervous centres, 133
 Laws of psychological development, 89, 99, 102
 Long bones, 111
 Lower brain centres, 129, 131, 132

M

Maslow, M. C., 122
 Maturation, 87, 98, 110–114, 117, 118, 123, 140
 Maximal development, 85, 87, 97, 120
 Mechanism, 46, 120, 131, 138, 142
 Memory, 1, 9, 11, 40, 86–88, 90–97, 99–102, 141
 Mental retardation, 2, 5, 66, 73, 74, 120
 Metamorphosis, 2, 13, 146, 147, 155
 Midbrain, 120, 123, 125
 Morphology, 33
 Mother-witch complex ‘Mutter-Hexkomplex’, 70
 Motility, 10, 93, 108, 129, 130, 132
 Motion, 9, 27, 56, 93, 107, 130, 138, 139, 143
 Movement, 10, 18, 22, 30, 56, 86, 93, 125, 129–133, 137, 138
 Musical ability, 46, 53–55
 Mutual dependency, 119

N

Nervous and psychological disorders, 70
 Neurotic symptoms, 70
 Non-differentiation, 47, 85–88, 93, 95–97, 99, 100, 102. *See also* differentiation
 Nursery skills, 69, 81
 Nutrition, 21, 27, 28, 55, 106, 109

O

Ontogenesis, 65, 67, 125, 127, 128, 130, 143, 151

P

- Passport age, 2, 5–8, 36, 38, 40
- Pathology, 4, 74, 119, 126, 127, 129, 132, 133
- Pearson correlation, 51
- Pedological age, 6, 7, 89
- Pedological standards, 7, 144, 153
- Perception, 9, 11, 29, 86–88, 92, 94–102, 126, 132, 133, 135, 141
- Perezhivanie* (переживание), 38, 66, 69–72, 74, 76, 148
- Personality, 10, 13, 18, 19, 21, 34, 56, 66, 67, 72, 77–79, 84, 89, 148
- Peters, Wilhelm, 46, 50, 51
- Phoneme, 22, 30, 31, 33
- Phylogensis, 67, 128–130, 151
- Physiology, 25, 27
- Pineal gland, 106, 111, 117
- Positive definition, 25
- Practical thinking in action, 94
- Preformism, 3, 15
- Psychosexuality, 12, 47, 61
- Pubertas praecox, 117

R

- Relative indicators, 68
- Respiration, 22, 142
- Restructuring, 10, 11, 13, 89–91, 102, 103, 106, 116, 117, 123, 142
- Resubordination, 102
- Reverse development, *see* involution
- Rhythm of development, 4
- Rousseau, J.-J., 3, 13, 14, 146, 147, 151

S

- Sensuo-graphic (наглядный), 75
- Sexual glands, 111–115, 117, 118
- Sexual maturation, 87, 98, 111–114, 117, 118, 123, 140
- Socialism, 19
- Sociogenesis, 46, 67, 151
- Soviet pedology, 17, 36, 146

- Speech development, 7, 30, 34, 49, 50, 54, 67, 145
- Speech environment, 34
- Starvation, 106, 109, 119
- Subordinated moment, 100
- Symptomatic method, 35

T

- Tabula rasa, 17, 18
- Thinking, 9, 11–14, 65, 67, 76–78, 81, 83, 84, 87, 90, 91, 93–95, 97, 99, 132, 144, 149
- Thymus gland, 90, 110–112, 117
- Traits
 - complex, 46, 49, 52, 55, 56
 - dynamic, 50, 56
 - mutable, 50
 - simple, 48, 62
- Transition of functions upwards, 128, 130–132, 140
- True genius, 38
- Twins
 - dizygotic, 45–47, 52–56, 59
 - monozygotic, 45–47, 52–56

U

- Underdevelopment, 82, 118, 120, 136

V

- Vegetative life, 120
- Vitalism, 14
- Vitamins, 109, 119
- Voice timbre, 57, 60

W

- Walking, 2, 10, 13, 69, 126, 130, 131, 133, 134, 138, 139
- Word meaning, 66
- Wunderkind, 37, 38