Cultural Psychology of Education 14

Irina Engeness

P.Y. Galperin's Development of Human Mental Activity

Lectures in Educational Psychology

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Preface

Several years ago, on the last day of a seminar on the scientific legacy of L. S. Vygotsky, I came across a bookstore in Moscow. Among other books in psychology, a book entitled *P.Y. Galperin. Lectures in Psychology [Lekcii po psikhologii]* (Galperin, 2002), edited by A. Podolskiy and his team and published in Russian for the commemoration of the centenary of Galperin's birthday in 2002, caught my attention. The following day, on my way back to Oslo, I read the book of lectures, and such a detailed introduction to Galperin's work considerably shaped my understanding of cultural-historical theory and affected my further research seeking to position it as an attempt to understand how to educate agentic and conscious learners in the twenty-first century. However, despite numerous reviews and discussions of the contributions of Piotr Galperin (1902–1988), that have been published subsequently (Arievitch, 2003; Arievitch & Haenen, 2005; Arievitch & Stetsenko, 2000; Stetsenko & Arievitch, 2002), his scientific legacy is still little known in the vast community of researchers. In these overviews, Galperin is introduced as an educational psychologist and a scholar who contributed to the further theoretical and experimental development of the cultural-historical activity theory (Haenen, 1996). However, due to limited translations, the holistic structure of Galperin's conceptual thinking has remained undiscovered by a wide community of international scholars.

This volume is composed of eight seminal lectures that have been translated into English for the first time from the collection of *Lectures in Psychology* (Galperin, 2002). They comprise the *Study of the Development of Human Mental Activity* which is presented in full for the first time in English. A brief summary, written by the Editor, precedes each lecture. The translation of the lectures was a challenging endeavour and it required particular efforts and several rounds of discussions of the experts in order to understand Galperian thought and to convey it in English without changing its original meaning. The translations were first conducted by Prof. Irina Engeness and then discussed and validated with the team of experts: Prof. Anne Edwards, Prof. Andreas Lund and Dr. Gethin Thomas. In addition, other experts were invited to provide credibility to the translated materials. Professor Igor Arievitch, who is a native Russian speaker, expert in English and Galperin's Ph.D.

student, provided his feedback on the translated lectures. Professor Andrej Podolskiy, Galperin's Ph.D. student, who collected and edited *Lectures in Psychology* in Russian also provided his feedback on the translated lectures. The comments of both Prof. Igor Arievitch and Prof. Andrej Podolskiy were carefully addressed in the revised drafts of the lectures. In addition to the collection of the translated lectures, the volume presents extended commentaries, which aim to position Galperin's contributions to cultural-historical traditions and outline the implications and significance of Galperin's legacy for contemporary educational research and practice.

The article that precedes the lectures, *Devoted to the Matter of Science: The Life and Professional Career of Piotr Galperin*, introduces Piotr Galperin to the readers and briefly presents the personal and professional milestones of his biography and scientific legacy.

In the article *Freedom as a Pursuit of Human Development: P.Y. Galperin on the Historical Psychology of L. S. Vygotsky,* Engeness and Zavershneva present and discuss Galperin's speech *The System of Historical Psychology of L. S. Vygotsky: Analytical Considerations*, which he delivered at the internal conference and mourning gathering on 6 January 1935, in Moscow, dedicated to Vygotsky, who had died six months prior. The speech is a unique historical document that makes a considerable theoretical contribution by presenting a concise and consistent summary of the theory of consciousness Vygotsky outlined at the end of 1932. In doing so, Galperin's speech exemplifies his profound understanding of Vygotsky's theory. In the article, Engeness and Zavershneva discuss how the ideas central to Vygotsky's theory, which Galperin outlined in his speech, were further elaborated in the legacy of Galperin presented in this volume.

Galperin's *Study of the Development of Human Mental Activity* comprises eight seminal lectures. Although each lecture elaborates on a specific aspect of Galperin's theory, they have to be read in a sequential order to follow Galperian thought unfolding his legacy.

Lecture 1: The Development of Mental Actions and the Orienting Basis of Actions introduces the Study of the Development of Human Mental Activity. Galperin argues that to plan an action, it is necessary to create an *image of an action*. Any human action has a binary structure comprised of *orienting* and *executive* parts. Therefore, planning an action should include the creation of both its orienting and the executive parts. The *orienting part* comprises two subsystems, *motivational* and *operating* the latter of which consists of four components: (i) constructing an image of the present situation; (ii) revealing the potential of the individual components of the present situation to the learners; (iii) planning the future action; (iv) facilitating the action in the course of its execution. These four components are not only complex, but also different. However, they are similar in the presence of *images* of one kind or another: an image of the present situation, an image of the plan of action, or an image of the action that is being executed. In summary, Galperin argues that there are two types of images: *images of the surrounding reality* and *images of ideal actions*. These two types of images constitute the two main components of human orienting activity. Galperin proceeds to discuss the formation of ideal actions by

outlining three premises: (i) ideal is the material transferred to the human mind and transformed in it; (ii) ideal actions have to be created, and it is important to create a material action from which an ideal action could be derived and (iii) not all actions can be transferred to the ideal or mental plane. Galperin explains the difference between the ideal and mental plane as follows: *the mental plane* belongs to the person reflecting the surrounding reality, and *the ideal plane* might comprise a person's reflections and perceptions. Galperin proceeds by investigating the actions that can be completely transferred to the mental plane of a person. He argues that the development of actions that can be transferred to the mental plane is of primary significance in overcoming the situation in pedagogy, where teachers educate learners by simply explaining target concepts. By following such an approach, the entire process of learning remains "behind the wall" and invisible to learners. Instead, Galperin argues that the process of *learning should be deployed and revealed to learners* by identifying the following two steps: (1) The *qualities* and requirements of the future learning process should be accurately identified. These qualities of the action can be used as criteria for the assessment of the action. The *desired learning outcome* of the action should also be identified and (2) A *system of conditions* to ensure the desired properties of the action should be selected under which students cannot help mastering the action and, in doing so, learning how to complete other tasks. This system of conditions is labelled *the phases of the development of mental actions*. Galperin elaborates in detail on the *three* large and interrelated *subsystems* that comprise the above-mentioned system of conditions. Galperin's detailed elaboration of the second subsystem to achieve the desired properties of the action is the topic of lecture 2.

Lecture 2: The Phases of the Development of Mental Actions focuses on the *executive part* of the action, which comprises *three subsystems*: (i) the conditions for constructing the action (*a scheme of the orienting basis* of the action); (ii) the acquisition of the desired properties of the action and (iii) the transfer of the original external action to the mental plane of the learner and the transformation of the action into a new psychological process. Galperin elaborates in detail the first and the second subsystems of the executive part of the action. Galperin points out that to create *a scheme of the orienting basis* of the action, the action should be visualised, and *the outcome of the action* with its particular characteristics should be identified. The desired outcome of the action should be divided into the elements (units) presented in the order of their execution or performance. Galperin emphasises the *properties of the initial materials* and the tools of the action, which can be divided into primary tools, auxiliary tools and control tools. Galperin elaborates on the desired properties of the action such as: (i) *rationality*—the learner's ability to identify the action's objective and significant relationships; (ii) *generalisation*—the learner's ability to identify the significant conditions among the variety of conditions in which he or she operates; (iii) *consciousness* of the action—the learner's ability to give a verbal report of the action; (iv) *criticality*—the comparison or verification of the selected criteria for an assessment of the action in relation to reality; (v) *measure of the mastery of the action*—whether the action can be performed by the learner using the initial material resources or whether it can be

performed verbally in symbolic form, or mentally and how quickly it can be performed. Later, Galperin turns his attention to the *primary properties* of the action: (1) The nature of the object with which the action is performed; (2) Developing the units of the action; (3) The measure of the differentiation of the action; (4) The timely parameters and (5) The power characteristics of the action. Finally, Galperin poses a question about how to develop the desired properties of the action. The detailed answer to this question is the topic of lecture 3.

Lecture 3: The Conditions for the Development of the Properties of the Action. The Phases of the Development of the Action elaborates on the measures needed to achieve the desired properties of the action. For example, consciousness of the action is achieved by the learner orienting his or her action to the identification of the important relationships between the features of the target problem. To achieve the consciousness of the action, the teacher must fully deploy the action so that the learner is able to trace what happens within each unit of the action and how the transition from one unit to the next unit occurs. Galperin argues that if a learner can trace this process, then the action acquires the meaning of a generic and not merely a subjective process. *The second measure* in the formation of consciousness of the action is separating the essential from the inessential aspects of the action and, finally, *the third measure* concerns the presentation of the action as an external process.

Galperin describes how other desired properties of the action can be achieved (i.e. the generalisation, rationality, criticality and the measure of the mastery of the action). For example, to achieve the *generalisation of the action*, particular attention is given to the significance of introducing a general scheme to learners, which should be actively used to solve systematically selected problems. By employing this scheme, learners identify the key features of the target concepts and the essential relationships between them. However, the main idea is that the scheme should not be memorised but understood by learners. Generalisation happens in the process of applying this scheme to a wide range of problems. To develop *rationality/awareness of the action*, as the ability to present a verbal report of the action, learners complete the action through talking. The *degree of the mastery of the action* can be achieved by eventually merging the small individual units of the action into bigger units and subsequently into one continuous process. Establishing the rhythm of the action is an important indicator of the mastery of the action: when the rhythm is fully established, then the speed of the action can be increased. Finally, Galperin turns to the third subsystem: the transformation of the action into mental action which happens through six consecutive phases or forms of activity: (1) motivation; (2) orientation; (3) materialised action; (4) communicated thinking; (5) dialogical thinking and (6) acting mentally. Galperin proceeds by describing the formation of the motivational basis of the action and how learning emerges in each of the other phases (2–6) is presented in detail in lecture 4.

Lecture 4: The Process of Internalisation. Theoretical and Practical Implications of the Study on the Phases of the Development of Mental Actions offers exhaustive descriptions of the phases or forms of learners' activities in the process of the development of mental actions.

Creating the orienting basis of the action is achieved by developing *a generalised scheme of the action*. By applying the scheme as a guiding tool, a person who has never been previously exposed to the task, completes it in one step at a time. A learner's ability to complete the task correctly on multiple occasions can indicate that the scheme of the orienting basis of the action is complete. The *orienting scheme can be created by the teacher* and offered to learners for them to use. By using this scheme, learners are able to solve various tasks, and the process creates a specific attitude toward learning: mastering the target concept becomes a means for achieving the personal success of each individual learner. The orienting scheme can also be *constructed by learners under the guidance of a teacher*. Moving step-by-step under the guidance of a teacher, learners identify the characteristic features of the target concept, and in doing so, create a complete scheme of the orienting basis of the action. When the scheme of the orienting basis has been created, it can be applied by learners to solve various problems.

In *the materialised form of an action*, learners engage in and interact with material or materialised objects that carry the meanings encapsulated in these objects. In the materialised form, the action can be fully deployed and slowed down so that its every step can be traced by the learners. Galperin argues that the desired properties of the action can be developed in the materialised form. Gradually, the material or materialised support is removed, and learners perform the action in the form of externalised social speech (communicated thinking).

In the phase of *communicated thinking*, for the first time, the action takes the form of an ideal action performed with images of the material or materialised objects. Learners do not talk about the action, but they complete the action through talking. When the action in the phase of communicated thinking systematically demonstrates accuracy and the required speed, the action is transferred to the fifth phase, dialogical thinking.

In the phase of *dialogical thinking*, by visualising the material or materialised objects that the learners interacted with previously, the action is performed by silent speech or talking to oneself.

Finally, in the sixth phase, the action is performed in *hidden speech*, which Galperin refers to as *acting mentally*. In this phase, artificial fragmentation into individual units is suspended, and the action acquires its natural flow. In this phase, the maximum automation of the action can be achieved.

Galperin points out that some phases or forms of the action can be rearranged or restructured. However, he recommends following the suggested sequence of the phases when particularly introducing new concepts to learners.

Finally, Galperin elaborates on the method of psychological research as a method for studying the development of psychological phenomena with the required properties. Galperin argues that to examine the phenomenon, the phenomenon must be created. He continues his argument by criticising the notion of epiphenomenalism or mechanical materialism and indicates that to develop human consciousness, a system of opportunities should be created by designing external and internal human activities.

At the end of the lecture, Galperin discusses the psychological grounds of achieving and underachieving students. He points out that underachieving students do not need extra time for tuition, but they do need specific interventions that are aimed at compensating missed phases of the actions that students need to master.

Lecture 5: Psychological Grounds of the Development of Ideal Actions and Concepts starts by reminding that the development of mental actions comprises two parts, *orienting and executive*, and both are transferred to the learner's mental plane.

The orienting part of the action has a guiding function that is needed to perform the action; therefore, *the executive part* of the action is connected to the orienting part. The orienting part includes four main purposes or tasks: (i) evaluating the present situation; (ii) identifying the potential of the objects present in the situation for meeting the actual needs of the learner; (iii) creating a plan for the action and (iv) controlling the action's execution according to the created plan.

The development of mental actions begins in the materialised form during learners' interactions with material or materialised resources, followed by the transfer of the action to communicated thinking, where for the first time the action acquires the form of an objective thought. During these transformations, the action is transferred to the learner's mental plane where the action undergoes further changes. Galperin argues that researchers should not study phenomena as such, but rather the ontological grounds, as well as the causes and the processes, that underlie these phenomena. He suggests that psychological phenomena should be understood as internal actions that have been transformed from external actions with objects. How the actions are performed indicates whether they have been developed correctly.

The discussion of the development of mental actions is continued by considering the *development of concepts.* Galperin indicates that concepts constitute one of the two main forms of reflecting on the real world; the second form is sensory images. It is indicated that the development of concepts is central to learning in school and higher education. Galperin concludes that the development and generalising of concepts in learners happens gradually. By applying the concept in various situations, learners enrich it with features that are derived from their everyday life experiences. However, because such concepts lack structure, the essential (scientific) and inessential (everyday life features) are given equal weight, and students struggle to identify the primary and secondary features of the concept.

Galperin argues that the development of scientific concepts is possible in 6 and 7-year-old students by identifying the characteristic features of the target concept and introducing them to the learners. *First,* learners must identify the presence or the absence of the characteristic features of the target concept in the object they are interacting with and then determine whether the object belongs to the target concept. *Second,* the characteristic features of the target concept must be presented to the learners on an orienting card and arranged in a column where each feature is under its number. *Third,* different tasks should be offered to learners (based on the principle of contrast), such as subject-specific, logical and psychological tasks. By following this approach, learners develop an understanding of the target scientific concept. The learning process happens quickly without memorisation, and the learners are able to apply the target concept in various situations.

Lecture 6: Development of Sensory Images presents a case study of the development of *sensory images* in learners by tasking them with the analysis of mediaeval Armenian churches. Both the target and control groups participated in the study. In the control group, the students were presented with photographs of typical examples of mediaeval Armenian architecture. The students had to compare and contrast the photographs to identify the characteristic features of Armenian churches and outline the differences and similarities between Armenian and other churches. In the target group, the phases of the development of mental actions were applied. The learners were introduced to the functions of Armenian churches: (i) temples of religion, (ii) places for public meetings and (iii) fortresses to protect the city's inhabitants from enemy attacks. The construction of the churches and the building materials used were also explained to the students. They were also introduced to the historical circumstances of the construction of Armenian churches. In analysing this information, the students identified the characteristic features of mediaeval Armenian churches. When the students had identified the characteristic features of Armenian churches, these features were presented to them on cards in a distinct order. The learners analysed the images of the churches by using the list of characteristics and then concluded whether the church was Armenian or not.

At the end of the learning process, the students in both the target and control groups were able to identify Armenian churches. However, in the control group, the students' ability to recognise Armenian churches was unstable: the students were unsure about their analysis, and they could not justify or explain their answers. A different situation was observed in the target group: the students could explain their answers, which they expressed with confidence. Galperin concludes that when they are exposed to spontaneous comparing and contrasting, learners develop conceptual understanding; however, the process of learning remains unstructured and invisible to them. Learners in the control group could identify the characteristics of the target concept; however, they demonstrated uncertainty in their choices. In addition, the learners were unable to justify and explain their answers, and they did not develop an understanding of the learning process.

Galperin proceeds by discussing a method of *psychological research*. He argues that a system of psychological conditions should be created to develop actions with the required properties. In the absence of such a system, the development of the desired phenomenon cannot be ensured. Galperin points out *that human mental activity* has material grounds and originates in a real external process. The transfer of the external process to the mental plane of the learner is also a real process that can be traced. If we do not ensure the successful transfer of the activity from the external to the internal plane, a psychological action with the desired properties cannot be developed in learners.

Lecture 7: Development of Physical Actions discusses the process of the *development of physical actions*, which are also referred to as *motor skills*. The focus is on the development of physical actions in which the *executive part* remains on the external plane, and the *orienting part* undergoes development by transferring through speech to the mental plane of the learner. Galperin argues that physical actions can be developed by employing two types of orientation: incomplete and complete.

In an *incomplete orientation*, which Galperin termed *the first type of orientation*, a learner acts by trial and error, and after numerous trials, some may appear to be successful. The development of a psychical action in the first type of orientation comprises two phases: first, a learner seeks an action that leads to a successful outcome; second, a learner directs his or her efforts to improve this action. Galperin describes this approach to mastering physical actions as unconscious and not understood because the relationships between the action and the external conditions remain unrealised by the learner. The result of such a process is that in a group of students, there is always a wide variety in their academic achievements. Moreover, the developed actions are sensitive to any changes in the conditions of the actions: learners do not achieve similar results after several attempts. In traditional education, these variations are explained according to learners' individual abilities. Galperin argues that *learning is a psychological process,* and therefore, to examine learning, one needs to explore its psychological grounds. These grounds comprise *learners' orientation in the learning process.*

The complete orientation, which Galperin terms *the second type of orientation*, might offer another approach to developing a physical action. In the learning process after the complete orientation, students utilise the orientation scheme created by the teacher to develop an action; hence, unnecessary trials and mistakes should not occur. Most learners develop the desired action, and there are almost no variations among their achievements. Galperin summarises that when a complete orienting basis of the action is offered, the action is performed correctly by students in the first attempt, and the skills developed during this action are stable and can be transferred to other situations. By using a complete orientation, students develop a positive attitude towards the process of learning by engaging in the learning process, not by trial and error, but consciously. Galperin concludes that in developing learners' conscious skills, *the duality between skills and knowledge disappears*. Finally, Galperin describes the process of the *automation of action* through the formation of bigger units of the action and then by merging all units into one continuous flow of the action.

Lecture 8: Psychological Grounds of the Process of Automation starts by referring to the previous lecture, in which the process of skill development was considered. Galperin describes the internal process of skill development as the transformation of the unfolded and divided into units of action in one indivisible process. After the automation of the action is achieved, the learner performs the action by (i) recognising the situation and (ii) performing the action according to the image of the action he or she has developed. This process is termed *acceptance of the action*. However, from a psychological perspective, Galperin describes the acceptance of the action as the development of an image or a model of an action. He emphasises that skill development should not be understood as a process of memorising the action's structure by subsequently repeating and improving it. Instead, skill development involves the processes of transformation and change that can be developed gradually in learners. During these transformations, the actions performed by learners undergo considerable change. To develop an action, the following steps may be followed: (i) the model of an action has to be identified and

presented to the learners; (ii) the model of the action should be divided into individual manageable units with specific characteristics (secondary structure). The *secondary structure* of each unit should be recognised by the learners. This structure assists learners in performing the action. The characteristics of the entire action comprise the *primary structure*, which also has to be presented to the learners. Understanding the primary structure is crucial in the process of *action automation*. Galperin summarises that (i) when action automation happens, learners do not need to examine the situation, but to recognise the situation that was introduced previously. The learners' performance of the action is controlled by comparing the actual flow of the action with the image of the action developed by the learners; (ii) in automated actions, the detailed orientation of learners is substituted by the recognition of the situation and the comparison of its specific characteristics with the action's generalised orientation. The control of the action's performance happens by comparing the actual flow of the action with its imaginary model. When the action becomes automated, it acquires *expressiveness*, which has a double meaning: (i) it is directed to the outside world and (ii) it connects the acting person with other people. Finally, Galperin summarises his *study of the development of human mental activity* and identifies other psychological phenomena that warrant study, such as attention, thinking, creative thinking, memory, dreams, feelings and will.

In the article that follows Galperin's lectures, *Demands and Realities: Significance and Implications of Galperin's Legacy for Learning and Teaching in 21st Century*, Engeness, Thomas, and Podolskiy discuss the central ideas in the *Study of the Development of Human Mental Activity* and outline the implications of Galperin's conceptual foundations for educational practice and research.

Galperin's lectures presented in this volume were originally delivered to the students at Moscow State University in the 1960s–80s. According to Podolskiy (Galperin, 2002), these lectures were held in a special atmosphere, which he claimed combined sophisticated intelligence and true democracy. Podolskiy described Galperin as a revolutionary thinker who created a new paradigm of scientific and psychological thinking about the problems of developmental psychology, teaching and learning and identified qualitatively new directions in research and practical work in these fields.

This volume is intended to be of interest to readers concerned with the theoretical framings of learning and development, educational practitioners, and those who work within cultural-historical traditions. I hope that the *Study of the Development of Human Mental Activity* will present Galperin's thinking in some detail to a wider audience and will introduce one of the most fascinating concepts in educational and developmental psychology in the twentieth century.

Sincerely
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Devoted to the Matter of Science: The Life and Professional Career of Piotr Galperin

For most people, their professional careers go hand-in-hand with their private lives and the development of his or her scientific ideas, is inherently connected with the person's life journey. In this article, I very briefly present Piotr Galperin's biography against the backdrop of the historical context to gain insight into the trajectory of the contributions of this outstanding scholar.

Family, Education, and Early Research (1902–1930)

Piotr Galperin was born to Jewish parents on 2 October 1902, in Tambov, Russia. At that time, Tambov was a provincial and underdeveloped town in czarist Russia, where Jews were allowed to settle. Galperin's father was a doctor in Tambov, and young Piotr often accompanied him on visits to sick people. In 1911, his father became a professor at Kharkov[1] Medicine Institute, and the family moved to Kharkov, then the capital of Ukraine. In Kharkov, Galperin studied at the grammar school, where he met his future wife, Tamara Meerzon (Haenen, 1996). It was her, who Galperin dedicated his first book to, *Introduction to Psychology*, published in 1976. Little Galperin was often ill (at the age of 17, he contracted tuberculosis) and often stayed at home. However, young Galperin compensated for the gaps in his education by reading books on psychology and philosophy from his father's library. From his early days, he wanted to become either a philosopher or a psychologist. However, after a strong recommendation from his father, Galperin chose to pursue medicine. He enrolled at Kharkov Medicine Institute in 1921 and graduated in 1926, as a psychoneurologist.

During his school years, Galperin was fascinated by several schools of psychology that attempted to explain human consciousness—the period that Vygotsky described as a crisis in psychology (Dafermos, 2014). Vygotsky presented a thorough analysis of the crisis in psychology in his famous essay "The Historical

[1]Kharkov—Russian; Kharkiv—Ukrainian. During the events described in the article, the spelling Kharkov was mostly used and therefore this spelling is maintained throughout the article.

Fig. 1 Kharkov medicine institute (2019). Photo: Irina Engeness

Meaning of the Psychological Crisis" (Vygotsky, 1997). In the essay, Vygotsky argued that psychology should overcome the Cartesian dualism of body and mind in order to understand human cognition. Vygotsky postulated that the higher psychological functions could be studied by objective and experimental science and that human consciousness is rooted in social life. Consequently, in order to understand human consciousness, one should turn to real life, which is stimulated by the development of relationships among humans involved in practical activities (Vygotsky, 1980). The central idea in Vygotskian theory is that participation in social practical activity, using tools, is the main factor influencing the development of human consciousness. Although Vygotsky's essay on the crisis in psychology was written in 1926, the fact that Galperin met Vygotsky in the early 1930s, and worked closely with him on a regular basis for several years (Haenen, 1996), makes it quite possible that Galperin had the opportunity to read Vygotsky's manuscripts even at the beginning of the 1930s. Considering Galperin's interest in dualism and understanding psychology when he was young, the influence of Vygotsky's works might have been significant.

A further argument also suggests that Galperin was familiar with and influenced by Vygotsky's view on the crisis in psychology. In the early 1930s, Vygotsky wrote a study on emotions (Vygotsky, 1984), which was published in full only in 1984. In this study, Vygotsky attempted to connect the crisis in psychology with the issue of mind–body dualism (Van der Veer & Valsiner, 1991). In 1970, a short excerpt of this manuscript was published in the Soviet journal *Voprosy filosofii* (Philosophy Matters), accompanied by a preface written by Galperin. This suggests that Galperin might have been familiar with Vygotsky's works through the original manuscripts and that Galperin's quest to overcome mind–body dualism might have originated in Vygotsky's works (Haenen, 1996). However, first, he had to complete his education.

In 1926, Galperin graduated from Kharkov Medicine Institute as a psychoneurologist—a specialisation in medicine that dealt with both organic and functional nervous and mental disorders. In his third year of studies, in 1924, Galperin completed a study under the supervision of Professor Platonov on the effects of hypnosis on digestive leucocytosis.[2] Platonov (a well-known physician at that time in the field of hypnosis whose research was concerned with examining the effect of verbal activity on the human brain) was involved in the study of hypnosis and the possibilities of using hypnosis for treating neuroses and as a substitute for anaesthetics in operations and in childbirth. The results of Galperin's study were published in 1926, in the Ukrainian *Journal of Reflexology*, which might be considered his first scientific publication (Stepanova, 2017).

After graduation, Galperin worked as a physician at a hospital for drug addicts led by Prof. Platonov. He successfully used hypnosis to treat drug addicts and became quite a skilled hypnotist. However, after a while, Galperin began to understand that addiction was not merely a human weakness but a real illness, and he suggested that addicts had a sort of weak link in their metabolisms that could be compensated for by one or another type of poison, such as alcohol or other drugs. Having translated the German book *Treating the Drug Addicted*, he wrote a foreword to the Russian edition in which he suggested that the reason for drug addiction might be a dysfunction of metabolism in humans and described in detail how to treat drug addiction (Haenen, 1996). Although Galperin's hypothesis seemed promising, he did not pursue any further research on this matter.

A Path to Psychology: Kharkov School (1930–1936)

The period from 1930 to 1936, in Piotr Galperin's biography is associated with the so-called Kharkov school, headed by Leontiev. In 1928, Galperin was invited to work at the psychoneurological research laboratory, which together with the hospital for the drug addicted was part of the Ukrainian Psychoneurological Institute in Kharkov. In 1932, it merged with another large psychiatric clinic in Kharkov, the Central Clinical Psychoneurological Hospital of the Ministry of Railways, and finally reorganised into the All-Ukrainian Psychoneurological Academy (UPNA) (Yasnitsky, 2009).

The best professionals in the areas of psychology, neurology, neuropathology, and other areas from the whole Soviet Union were invited to Kharkov to work at the newly founded UPNA. Vygotsky, Leontiev, Luria and others from the so-called Vygotsky's circle, the leading psychologists in the Soviet Union at the time, were also invited to join the Academy (Yasnitsky & Ferrari, 2008b). The members of Vygotsky's circle accepted the invitation for two main reasons: First, Kharkov was the capital of Ukraine and a well-recognised scientific centre. The second and perhaps more important reason was that the atmosphere in Moscow, in the 1930s,

[2]Leucocytosis is concerned with the production of white blood cells (leucocytes) connected with digestion.

Fig. 2 The main building of the All-Ukrainian Psychoneurological Academy (2019) (left). Located on the Academic Pavlov Street (right). Photo: Irina Engeness

had become difficult and even life-threatening (Gindis, 1998; Van der Veer & Valsiner, 1991). There were first attacks on pedology (the science that combined physiology, defectology, psychology and pedagogy). Some of Luria's works were banned, and the decree of 1936 abolished pedology as a science (Engeness & Lund, 2018). As Haenen (1996) describes, Kharkov was away from the hectic hub of Soviet affairs, and it was a place where the invited scientists could continue their

Fig. 3 The main entrance of All-Ukrainian Psychoneurological Academy (2019) (left), now the Institute of Neurology, Psychiatry and Narcology of the National Academy of Medical Sciences of Ukraine (right). Photo: Irina Engeness

work and remain relatively safe. In addition, at the time, Soviet psychology was divided into several conflicting schools, such as Pavlov's physiology, Bekhterev's reflexology, Kornilov's reactology, and Vygotsky's cultural-historical approach (Haenen, 1996). Kharkov seemed to be a safe harbour where the scientists could pursue their ideas apart from other conflicting schools and the threatening political atmosphere in Moscow.

Galperin and his colleagues took an active part in arranging the move of Vygotsky , Luria, Leontiev, Bozhovich and Zaporoshets to Kharkov (Haenen, 1996). However, Vygotsky, who suffered from occasional bouts with tuberculosis (Vygodskaya & Lifanova, 1996), did not move to Kharkov. Like Luria and Leontiev, he was offered only one room in a communal house and could not bring his family—his wife and two daughters—so he accepted Rubinstein's 1931 offer, to take a position in the Department of Psychology at the Leningrad Institute of Pedagogy. Nevertheless, Vygotsky actively participated in the founding of the Psychological Sector of the UPNA and closely supervised the research of the Kharkov group (Yasnitsky & Ferrari, 2008a).

The account of the internal structure of the psychological sector of the UPNA was presented in Galperin's article "Psychological Sector" in the first collection of the works of the UPNA, published in 1934, in the materials of the First All-Ukrainian Psychoneurological Conference (Galperin, 1934; Yasnitsky & Ferrari, 2008a). In this paper, Galperin presents three main research units: (1) the Department of General Experimental and Genetic (i.e., Developmental) Psychology, headed by Leontiev; (2) the Department of Clinical Psychology, headed by Lebedinskii and (3) the Department of General Psychological Theory, headed by Galperin, which worked on developing theoretical grounds of psychology. Luria was the founder and the first director of the psychological sector of the Academy. Even after his departure to Moscow, in 1934, he was closely associated with the Kharkov group, especially with the Department of Clinical Psychology (Yasnitsky, 2009).

Galperin became acquainted with Vygotsky and his theory in the 1930s, after the Vygotskian group joined the UPNA in Kharkov, and this acquaintance greatly influenced the beginning of his career as a psychologist and his subsequent research (Arievitch, 2008). In the early 1930s, Galperin carried out his well-known experiments on the differences in tool use between human beings and animals and on the appropriation of tool-mediated activity (Galperin, 1936). He also engaged in polemics concerning matters arising from Pavlov's theory. Galperin insisted on keeping physiology and psychology as sharply distinguished sciences, although they have some overlapping areas. Pavlov stated that it was possible to study psychological phenomena using the method applied in physiology, and in general, he was openly sceptical of psychology as a science. Galperin argued that physiology and psychology were essentially different sciences with their own laws that could not be used interchangeably to examine and explain psychological and psychological phenomena. For example, Galperin disagreed with Pavlov's understanding of the development of human consciousness through establishing stimulus–reflex responses, but he suggested the development of human consciousness as

a process of internalisation of external social activity with tools. Such an understanding presents, in a nutshell, the methodological and epistemological approach to studying human consciousness the members of the Kharkov School suggested in the 1930s. Galperin's candidate dissertation presents an accurate summary of this perspective.

In his candidate dissertation, Galperin studied the differences in tool use between humans and animals. He argued that there was a fundamental difference between the tools humans developed and used, and the auxiliary devices animals used that were psychological in nature. Galperin suggested that the tools humans created and used in practical activities enhanced the development of new psychological functions. For example, an ability to engage in learning and human understanding originate in external tool-mediated practices. Such use of tools totally differs from the way animals utilise tools as an extension of their limbs. In addition, as opposed to the animal mind, human consciousness undergoes developmental transformations initiated in tool- and speech-mediated activities.

In the second part of his dissertation, Galperin studied the development of motor skills with children and suggested that such development goes through four distinct phases: (i) trial and error, (ii) alertness, (iii) persistent intervention and (iv) tool-oriented activity (Haenen, 1996). In the first phase of *trial and error*, a child makes random and mostly unsuccessful attempts to use a tool to complete the task. In the phase of *alertness*, the child starts to notice successful attempts of tool use and directs its efforts to repeat the required movements with the target tool. In this phase, the performance of the action slows down as the child uses substantial time to identify the factors that lead to successful tool use. In the third phase of *persistent intervention*, the child repeats the successful tool use. The movements of the child are productive and skilful; however, the pace of the action is slow. In the final phase of *tool-oriented activity*, the child is able to complete the required action with the tool at hand. The movements of the child correspond to the logic of the target tool, and the learner is able to complete the task. In sum, Galperin's research exemplified in detail the unity of external tool-mediated and internal human psychological activities. These findings were influential and gave rise to further research that laid the foundations of Soviet psychology. Galperin successfully defended the dissertation in 1938. Zinchenko (2013) considered Galperin's dissertation of primary significance to the cultural-historical theory, as it demonstrated and scientifically proved the process of the development of human consciousness in practical tool-mediated activities (Zinchenko, 2013).

In 1934, Luria moved back to his family in Moscow (he married Lana Linchina in 1933), and for a brief period, Galperin was the head of the psychology sector of the UPNA. However, as a consequence of the decree of 1936, that banned pedology as a science and the fact that the capital of Ukraine was moved to Kiev in 1935, the Academy lost its funds and was considerably reduced in size. Finally, at the end of 1936 and the beginning of 1937, the Ukrainian Psychoneurological Academy was renamed the Kharkov Psychoneurological Institute (Voloshin, 1994), and its psychological sector was significantly reduced (Haenen, 1989). Several sources indicate that 1936 marked the end of the Kharkov School (Haenen, 1996;

Yasnitsky, 2009; Yasnitsky & Ferrari, 2008b). However, in his autobiography, Galperin reported that he worked as a psychologist in the period 1930–1943 (Stepanova, 2017). In addition to his work at the Academy, until 1936, Galperin was a docent in psychology at the Kharkov Institute of Pedagogy. He was teaching, among others, courses in dialectical and historical materialism, the history of psychology and general psychology (Stepanova, 2017).

Development of Motor Functions with Wounded Soldiers (1936–1943)

After the 1936 decree on pedology, Galperin worked mainly in the psychiatry sector of the UPNA. During World War II, the Germans occupied Kharkov for over three years, and in 1941, the UPNA was reorganised to be the Kharkov Psychoneurological Institute and evacuated to Tumen in West Siberia, where Galperin worked as a neurosurgeon dealing with rehabilitation of motoric functions in wounded soldiers. On 14–16 February 1943, in Tumen, Galperin participated in the Ninth Conference of the Ukrainian Psychoneurological Institute and the Second Conference of Neurosurgeons, where he presented the results of his study entitled *On the Development of Conscious Movements in Rehabilitation Therapy*. His findings demonstrated that a movement that a wounded soldier could not initially perform could be accomplished when the movement became tool-oriented. For example, a person who was initially unable to lift his hand could lift his hand to comb his hair. In sum, Galperin suggested that tool-orientation was fundamental to understanding the nature of human movements. Therefore, the process of rehabilitation required a systematic approach and had to be completed gradually to target both neurological and psychological aspects of human activity. These findings had significant implications for the development of rehabilitation programmes for wounded soldiers that restored movements through a process of meaningful tool-mediated actions. This research was a sequel to Galperin's research in Kharkov, particularly his findings concerning tool-oriented actions with humans, which are central to the cultural-historical theory. In 1943, Galperin moved to Moscow, following Leontiev, who had moved there at the beginning of 1943, and worked at Moscow State University until his death in 1988.

The Study of the Development of Human Mental Activity (1943–1988)

The Department of Psychology was founded at Moscow State University on 1 October 1942, under Rubinstein's leadership (Stepanova, 2017). Until the autumn of 1943, a part of this department, headed by Leontiev, remained evacuated. Upon

Leontiev's return to Moscow, in 1943 and Galperin's subsequent move to Moscow, the latter was appointed as a docent of the Department of Psychology in the Philosophical Faculty at Moscow State University. He was primarily engaged in research activities until 1947, when he also became actively engaged in teaching.

In June 1944, the Department of Psychology at Moscow State University organised a conference on the psycho-physiological issues of rehabilitation of human functions: motor, sensor, and speech. Galperin, together with Ginevskaya (1947), presented a study that reported on wounded soldiers' increased productivity of movements in tool-oriented actions. However, by the end of the 1940s, Galperin had become extremely interested in studying not only tool—mediated actions and their effects on the development of human consciousness, but also how to develop desired actions in humans. For Galperin, the classical approach of observation used in traditional psychology seemed to be insufficient to reveal the conditions and the properties of the developed actions. Galperin suggested that in order to understand the development of human consciousness, researchers should not only study observed actions, but also direct their efforts toward the development of actions under various conditions and with required properties. Such an approach became fundamental to Galperin's further work and manifested itself in the study of the phases of the development of mental actions.

Galperin suggested the study of the development of human mental activity at the beginning of the 1950s, as an approach to improve students' learning in mathematics and languages, and in particular, to develop their ability to solve mathematical and linguistic problems mentally. However, the ideas for this study can be traced to Galperin's work back in the 1930s, during his Kharkov period. For example, in 1931, at the discussion about the situation in psychology held in Kharkov, Galperin indicated that psychology should study the essence of psychological phenomena, such as tool-mediated activity of humans (Stepanova, 2017). Such an approach was highly innovative considering that Soviet psychology in the 1930s–1950s, was greatly influenced by Pavlov's theory (Haenen, 1996).

Between 28 May and 4 June 1950, the conference to discuss the implications and the significance of Pavlov's theory for physiology and other related sciences was organised in Moscow. The main line of the discussion concerned the use of Pavlov's theory to study psychological phenomena. Another conference to discuss the Pavlovian approach to psychology was held in July 1952; over 400 psychologists attended. Galperin contributed to the discussion at both conferences by offering a new method of studying psychological phenomena by examining human tool-mediated actions. This was a revolutionary view on the subject of psychology and the method of psychological research. In the following conferences in 1953 and 1955, which were to discuss the significance and implications of Pavlov's theory for the subject of psychology and the methodological approach to studying psychological phenomena, Galperin gave a talk on his new approach to studying psychological phenomena, which significantly differed from the approach Pavlov suggested. In 1959, at the Conference of Soviet Psychologists, Galperin presented his study *Research on the Development of Mental Actions*. This study was a summary of Galperin's many years of research and the first consistent

representation of his study on the phases of the development of mental actions. In the following years, Galperin's ideas were further developed in the works of Pantina (development of writing skills), Talyzina (development of concepts in geometry), Davydov (development of concepts in mathematics), and others (Stepanova, 2017).

At the beginning of the 1960s, Galperin conducted several studies on the development of human mental actions. In 1962, he became the head of the programmed learning laboratory at Moscow State University. He developed the theory on the development of human mental activity in detail in his doctoral dissertation, which he defended on 28 May 1965, at the Philosophical Faculty of Moscow State University. In his dissertation, Galperin discussed the psychological nature of human activity, the nature of psychological phenomena, and the method of research in psychology. He successfully defended the dissertation and became a Doctor of Psychology on 22 January 1966.

In February 1967, Galperin achieved the position of professor in the Faculty of Psychology of Moscow State University and became head of the laboratory studying human activities in ontogenesis. In 1966, the International Congress of Psychologists was held in Moscow, where Galperin not only presented the study *Methods, Facts and Theories in the Development of Mental Actions and Concepts* but also co-organised the congress together with Piaget and Bruner. At the congress, Galperin discussed the psychological grounds of the development of mental actions with Piaget. He also participated in the 19th International Congress of Psychologists in London, in 1969, where he presented his *Study on Education and Mental Development of Children Five to Eight Years Old.* In 1971, at the age of 69, Galperin became the Head of the Department of Developmental Psychology at Moscow State University, and following a heart attack, he assumed emeritus status in 1984. Galperin never fully recovered from the heart attack, and after a short stay in the hospital, he died on 25 March 1988, at the age of 85.

Galperin's Legacy of Educating Future Generations

Piotr Galperin summarised his fifteen years of research and his scientific contribution in the book *Introduction to Psychology* (Galperin, 1976). The book was initially written at the beginning of the 1970s; however, in 1972, Leontiev gave critical feedback on Galperin's book, indicating that Galperin did not manage to discuss the target concepts in detail or reflect on the fundamental issues in psychology. As Stepanova (2017) mentions, Leontiev and Galperin had a very unpleasant discussion of Galperin's *Introduction to Psychology*. Leontiev suggested that Galperin's theory on the phases of the development of mental actions was a substantially reduced reflection of Leontiev's activity theory. However, as Nechaev indicated, Galperin's theory was not a reduction but on the contrary, an extension of Leontiev's theory and Galperin's theory showed its practical operationalisation in pedagogy, education and other sciences (Nechaev, 2003). In addition, Galperin's

theory had undiscovered scientific potential to be used as a method of psychological research (Nechaev, 2003). Stetsenko and Arievitch (2002) point to the central issues of Galperin's theory: the origins of human consciousness and the nature of the development of cognitive processes. They explain that Galperin approached these issues by studying the process of internalisation of cultural tools as a specifically human form of individual cognitive development. In this respect, Galperin's theory clearly continues the Vygotskian line of thinking and extends Leontiev's theory. Galperin considered Vygotsky a genius, a ray of light in the chaos of the crisis in psychology (Galperin, 1981). He was the first to consider Vygotsky a founder of non-classical psychology. However, Galperin went further in that he operationalised Vygotsky's concepts of cultural tools, mediation, and internalisation by scrutinising the ways in which the specifically human mental activity is developed (Arievitch & Stetsenko, 2000; Arievitch & Van der Veer, 1995; Haenen, 2001). According to Haenen (2001), Galperin extended Vygotsky's notion of the zone of proximal development by including a teaching–learning model of the development of mental actions that integrates the notions of mediation, activity and internalisation. In so doing, Galperin outlined the steps in the teaching—learning process, formulated a set of conditions for the development of mental actions, and showed the teacher's role (Haenen, 2001). Rambusch emphasises that Galperin's approach provides substantial support for situated learning theories and should thus be considered a valuable complement to the theoretical framework of situated learning (Rambusch, 2006). A spiral model, which, according to Arievitch and Haenen (2005), most adequately represents Galperin's development of mental actions, has been introduced. The spiral indicates students' increasing internalisation of an action while passing through the sequence of levels in mastering a given task. The learning process moves forward as gradual improvements in the quality of action, which can be observed in the steadily growing ability of the learner to orient him or herself in the task and propel him or herself forward while mastering this task (Arievitch & Haenen, 2005). Arievitch points out that Galperin's approach contains a unique core component: a conceptualisation of psychological aspects of human mental activity, distinct from its physiological, logical, or sociological aspects (Arievitch, 2003). Galperin specified the unique character of human mental development emerging in social activities and cultural tool-mediated practices, conceptualised the nature and functions of human psychological processes as specific forms of activity by outlining their structure and identifying the subject of psychology in studying object-oriented activity in its ontogenesis, and conceptualised the role and the function of tools as imbued with relevant social experiences and mediating learning activity (Engeness & Lund, 2018). In so doing, Galperin attempted to consolidate the contributions of Vygotsky and Leontiev and extend these contributions by showing how they could be implemented in educational practice and research.

Galperin educated a whole generation of brilliant psychologists who contributed to the further development of his ideas: Davydov, Arievitch, Podolskiy, Nechaev, Talyzina, Zinchenko and Obukhova, just to name a few. According to Arievitch, Podolskiy, Zinchenko and Obukhova, Piotr Galperin was a modest person who did

not seem to realise the significance of his contributions in his lifetime. However, he was a man wholeheartedly devoted to the matter of science to enhance learning and the development of future generations.

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Freedom as a Pursuit in Human Development: P.Y. Galperin on the Historical Psychology of L. S. Vygotsky

Introduction

In this article, we present and discuss Piotr Galperin's speech, *The System of Historical Psychology of L. S. Vygotsky: Analytical Considerations* (1935). This document was stored in the archives for many years. In 2009, it was published for the first time in the Russian language in the *Journal of Cultural-Historical Psychology* (Stepanova, 2009). In a period when Vygotsky's legacy was neglected, Galperin discussed the significance of his theory and outlined perspectives on its further development. At the risk of being superficial in the attempt to convey Galperin's meaning, this article presents the first English translation of Galperin's speech, followed by a discussion of the continuity of the contributions of these scholars and of Galperin's profound understanding of Vygotsky's theory. However, to provide a background of the discussion that follows, we present the historical context of Soviet cultural-historical psychology in the 1930s.

Historical Context

At the beginning of the 1930s, Vygotsky made a thorough revision of his theory of sign mediation, suggesting a new direction for his research, which he defined as the theory of a dynamic system of significance (Zavershneva & Van der Veer, 2018) and the psychology of experience (*perezhivanie*) (Clarà, 2016; Roth & Jornet, 2016). Research groups in Moscow, Leningrad and Kharkov kept in contact to exchange ideas and identify directions in further research. Until May 1934, Vygotsky often commuted between Leningrad, Kharkov and Moscow, and he remained the main connecting link between these research groups (Van der Veer & Valsiner, 1991; Vygodskaya & Lifanova, 1996; Zinchenko, 2013). He not only gave lectures and participated in scientific conferences and seminars, but also studied at the Medical Faculty of the Kharkov Psychoneurological Academy and

organised "internal conferences" for his closest colleagues. At these conferences, new scientific ideas were discussed. However, the transcripts were not publicly available. Only recently have researchers accessed them in private family archives.

Piotr Galperin joined Leontiev and Luria's group when the latter moved to Kharkov in 1932, in an attempt to escape the difficult political atmosphere in Moscow. At that time, Kharkov was the capital of Ukraine, a recognised scientific centre. The newly founded All-Ukrainian Psychoneurological Academy (UPNA) seemed to be a safe harbour for researchers to continue their work (Yasnitsky & Ferrari, 2008). Galperin obtained a position at UPNA, in 1928, and upon the arrival of the Moscow group, he was actively engaged in research and teaching (Stepanova, 2017). In an interview with Haenen (1996), Galperin revealed that he took an active part in organising the move of Leontiev, Luria and Vygotsky to Kharkov, which marked a shift in his career from being a physician to becoming a psychologist (Haenen, 1996). At UPNA, Galperin was Head of the Department of General Psychological Theory, a cross-sectional unit that included scholars from different fields (Yasnitsky & Ferrari, 2008). The main research direction of the department was to examine the development of human thinking and speech through engagement in practical activities and their effects on other psychological functions as well as the deterioration of these psychological functions caused by the dysfunction of the human brain. In one report about the contribution of his department, Galperin offered an impressive list of the currently pursued research directions that were related to numerous areas in psychology (Yasnitsky & Ferrari, 2008).

The outburst of scientific activity by the Kharkov Group occurred during a short period of favourable relationships between the Soviet government and the science of psychology (Bogdanchikov, 2008). During this period, Vygotsky's most influential works were published, such as *Thinking and Speech* (1934), *The Dynamics of the Schoolchild's Mental Development in Relation to Teaching and Learning* (1935), and *Foundations of Pedology* (1934). His publications included collections of the works of his colleagues on child development, such as *Mentally Retarded Child* (Vygotsky & Danyushevskiy, 1935), *Pedology* (Blonsky, 1934), *The Foundations of Psychology* (Rubinshteyn, 1935), the biodynamic works of N. A. Bernshteyn, (1935), and a collection of works by the Kharkov Group (Galperin, 1934). However, the odious decree on 4 July 1936 against pedology (Yasnitsky & Ferrari, 2008) thwarted all future plans. It not only banned some areas of pedology and psychotechnique, but also jeopardised the existence of soviet psychology as a science. The name Vygotsky was removed from scientific research for decades, and his followers were forced to work under the pressure of harsh censorship (Caroli, 2014). The research directions of the consciousness, freedom of will, affect, and personality, which are central in the cultural-historical approach, were deemed ideologically inconvenient, and all scientific discussion and research connected with these themes were either completely banned or modified to the extent that their origins could not be recognised.

Galperin presented his speech a year and a half before the decree against pedology was announced at an internal conference. Mourners gathered on 6 January 1935, in Moscow, in the House of Science, which was dedicated to Vygotsky, who

died at the age of 37 years six months prior to this event (Luria, 2003). In the Luria archive, a so-called "blue notebook" was discovered, which contained a list of conferences held in the period from 1930–1935, including the theses presented at some conferences. In this notebook, Galperin's speech was listed under the title *On Our Psychological System,* which might indicate that Galperin considered himself a proponent of Vygotsky's system. The central ideas of Vygotsky's theory were partially reconstructed (Zavershneva, 2014) and fragmentally reflected in the two final chapters of *Thinking and Speech*, in some late publications of Vygotsky, and in the theses presented at an internal conference on 5 December 1932, which appeared to be a turning point in the development of his theory. The theses presented at this conference were published in Leontiev and Zaporozhet's *The Problem of Consciousness* (Vygotsky, 1997, pp. 129–138), in a publication by Luria (2014), and finally in a publication by Vygotsky (Zavershneva & Van der Veer, 2018, pp. 274–278). Based on the content of the speech presented in this article, we suggest that Galperin was familiar with the earlier version of Vygotsky's theory. Only after the recent discovery of valuable archive materials can we bring together the ideas of Vygotsky and Galperin to retrospectively reconstruct a dialogue between these outstanding scholars. However, first, we present Galperin's speech he made on 6 January 1935.

L. S. Vygotsky's System of Historical Psychology: Analytical Considerations (Theses)

4 January 1935, Moscow

I. L. S. Vygotsky's System of Historical Psychology

Understanding the unique process of human development and the structure of human consciousness is the core of Vygotsky's historical psychology. In fact, every word in this statement requires emphasis and attention. However, I would like to outline the three central aspects of the system.

First is the idea of the development of human consciousness. This idea is central to conducting psychological investigations, and it is of primary importance in understanding the genesis, structure, and purposes of human psychological functions.

Second is the idea that there are two types of psychological development in humans and animals. Correspondingly, we should distinguish two types of psychological processes: lower- natural and higher-cultural and, therefore, two types of consciousness: instinctive and intelligent.

Third is the characteristic feature of human consciousness is its systemic and meaningful organisation.

To examine Vygotsky's historical system, we may proceed from the last item by identifying the systemic organisation of human consciousness, followed by examining its meaningful organisation and, finally, by considering the development of human consciousness by transferring from the outline to a comprehensive understanding of human consciousness.

A. The Systemic Organisation of Human Consciousness

Understanding the systemic organisation of human consciousness requires two main considerations. The first consideration is that *human consciousness undergoes a process of development.*[3] How does this process happen? Vygotsky identified three ways in which the process of the development of human consciousness may happen: (i) metamorphoses, (ii) consistency (cyclic), and (iii) inconsistency. However, metamorphoses and consistent (cyclic) development reflect the general process in humans. Therefore, the process of inconsistent development is of particular importance in understanding the development of a child's consciousness.

Inconsistency in the development of a child's consciousness is characterised by the presence of one *dominating* psychological function in the child's consciousness. Other psychological functions are manifest through this dominating function. Inconsistency in the development of a child's consciousness is reflected in the different psychological functions that are predominant at different periods in his or her development. The sequential order of these functions is the *following*: perception, memory, and thinking. The predominance of different psychological functions manifests the first differentiation and the first independent activity in a child's consciousness, which may affect the development and the organisation of human consciousness.

However, relationships among the functions occur in the development of several psychological functions. The appearance of one dominating function in the hierarchy of existing psychological functions reorganises the existing psychological functions. It should be pointed out that the changes in the relationships among the existing psychological functions and the establishment of one dominant function reflect the process of reorganising human consciousness. In other words, the establishment of a dominant psychological function causes the *reorganising and restructuring* of the existing psychological functions, establishing *their dependency* on the new dominant function. This reflects the second principle of the differentiation and reorganisation of human psychological functions and indicates an approach to developing the systemic and hierarchical organisation of human consciousness.

The second consideration is that *human consciousness as a hierarchical organisation of psychological functions can be developed only in humans and is inherently connected with the human use of cultural means.* These cultural means are operations mediated by signs. Therefore, to trace and understand the process of the development of the systemic structure of human consciousness, we must

[3]The original emphasis in italics throughout the speech is maintained here.

develop our understanding of the (i) origin, (ii) development, and (iii) functional meanings of signs.

Regarding the origin of signs, they first appear in the process of communication among people; the established norms of communication eventually "grow inside" and become psychological functions of a person, which is described and reflected in the processes of mediation, sociogenesis, and the internalisation of higher psychological functions.

The development of mediated actions in *children* happens through the following phases: the natural phase, the naïve-psychological phase, the external phase, and the internal mediation phase. Vygotsky presents this process in his "law of the parallelogram", which includes the four phases in the development of mediated psychological functions in children. These four phases are important because they reflect the considerably late development of mediated psychological functions in older children.

The functional meaning of sign mediation presupposes the existence and the interplay of simple psychological functions. The sign:

- establishes new and changes old connections and relationships among the existing psychological functions.
- becomes a structural and functional centre of newly developed psychological functions.
- establishes new and identifies higher and lower psychological functions.

Thus, a sign becomes a tool for creating the structural and systemic organisation of human consciousness. This understanding allows us *to conclude* that higher psychological functions are nothing else but internal operations that are mediated by forms of communication. The development of higher psychological functions occurs in the process of mediated social communication during the external activities of humans.

The sequential appearance of the predominant psychological functions—perception, memory, and thinking—reflects not only different types of activities that a child can engage in but also the gradual transformation from actual external physical interactions with material artefacts to internal mental activities. This transformation is characterised by distancing from observable situations, and it requires qualitative changes in the existing psychological functions. Therefore, the development of new psychological functions and the sequential appearance of one predominant function occurs through social interactions.

In summary, human consciousness is a hierarchical system of psychological functions. Higher psychological functions as activities of human consciousness comprise a historic phenomenon that can be developed specifically in humans.

B. The Meaningful Organisation of Human Consciousness

So far, we have presented a brief explanation of Vygotsky's system. However, we cannot understand the internal structure of the system without examining its true content. To do so, we must develop our understanding of the reasons that human consciousness develops in the ways described in the previous subsection.

In order to reveal the internal mechanisms of the development of higher psychological functions, we must turn our attention to (i) the tools that are used in the process of the development of human psychological functions and (ii) the internal structure of the mediated action that employs these tools.

The internal structure of the mediated action is determined by two aspects: a task to solve and the tools available to solve it. Previously, we focused our attention on the selection and use of appropriate tools that mediate the action. We believed that the process of the mediation of the action was determined by the selected tools. However, at present, we need to undertake a more thorough analysis of a mediated action as such.

What is a task? This is a problem that should be solved and if something must be solved, therefore, there should be a reason to do so. This means that a task encapsulates a motive as a driving force to solve this task. Therefore, there is a *task and a motive*; however, is there a relationship between them?

A *motive* is usually in the background, hidden inside us, and the task is at the forefront and needs to be solved. A motive is subjective and internal, and the task is something that confronts us and is therefore external and objective. The task is objective simply because it is located in its specific circumstances. The motive is an expression of a need, and the task is something that may satisfy this need. Hence, a task can be seen as the objective expression of a motive. However, a motive can be expressed in several ways. For example, a motive is a child's willingness to play, and the task is the game that the child wants to play.

On the one hand, the motive and the task are interconnected; on the other hand, they are independent of each other, and quite often they oppose each other.

A mean is a sign with the help of which a person can "transmit a message" to another person or a group of people. In doing so, first, a sign has the potential to reflect reality; second, it is a unit of reality. The activity, in turn, can have a double role: (i) as an activity of interaction and communication and (ii) as a part of a broader activity that has the unique function of transferring the meaning of the sign.

In other words, a sign has a double meaning: (i) its original meaning and (ii) the acquired meaning, which depends on the reality in which it is used. The original meaning of the sign can be understood as a generalisation of the reality in the process of communication; therefore, it is a set of internal operations aimed at generalising a reality. The second meaning of the sign is acquired in the process of communication during human social and practical activity.

The relationship between the sign and its meaning can be identified as a complex relationship between the speech (in its individual psychological meaning of ideal form) and the real objective meaning that is being transferred. Similarly, the relationship between the task and the motive and the relationship between the sign and its meaning can vary, so in the process of mastering the ideal form, several transition (ideal) forms may appear.

What we have here is an unstable relationship between the motive and the task and the changing relationships between the sign and its meaning. Finally, the relationship between the task and the mediated action that is aimed at solving the task can also change: the same task can be solved by using different approaches and by applying different mediational tools. Therefore, the characteristics of the signs

used in the activity determine the characteristics of the mediated action in which they are employed.

Therefore, we have four aspects: sign, meaning, task, and motive. These aspects are relatively freely joined links in one chain. However, this freedom remains when these aspects are presented outside the context of a practical activity. When they are employed in the activity, the situation radically changes, and these aspects appear to be integrated into the meaningful activity that is aimed to solve a particular task by the use of consciously selected mediational tools.

A meaningful activity using mediational tools consists of two sides: internal (with the motive and the meaning) and external (with the task and the tools). Moreover, this process happens in time and through several phases. It is important that each sequential phase encapsulates the previous phases in the process.

The unity of the motive, task, signs, and tools constitutes the meaningful activity, *and the enacted unity of these four aspects comprise sense*. Separating one aspect from another may cause the activity to lose its sense. For example, when for various reasons, the child is not able to engage in the activity, the task loses its appeal, and the motive loses its driving force. Therefore, the presence of all four aspects is required for the activity to become meaningful and acquire sense.

To conclude, higher psychological functions are nothing else but the mediated and meaningful actions of a person. The ability of a person to engage in meaningful actions reflects the advanced organisation of his or her inner world and attitude to the external world.

Human consciousness is not an advanced combination of mechanical[4] functions, but a meaningful activity. The systemic organisation of human consciousness has implications for a person's ability to engage in a meaningful activity, and the predominant psychological function reflects the meaningful activity in which the person is able to engage.

Based on these premises, a person's attitude toward the external world appears to us in a new light. The external world, represented in the motive, sign, task, and tools, becomes an integral part of the person's internal world.

Therefore, a mediated action reflects the degree of awareness of the surrounding world and oneself in this world.

Human consciousness differs from animal consciousness not in its individual elements and not in its composition but in its organisation, which presents itself in relation to the external world and to reality.

C. The Development of Human Consciousness

Human consciousness, as a system of meaningful activities, is developed through engagement in meaningful actions. The meaningfulness of an action is expressed in the nature of the task this action is employed to solve, and the tools used in this action. The development of meaningfulness happens by altering the tasks and the tools. However, when we alter the task, we alter the motive and the mediational tools, which affects the meaning of the action.

[4]That is, the psychological meaning of mechanical.

Therefore, the central aspect of the development of meaningfulness of the action are the changes in the motive and the sign.

A motive can be affected by biological factors. However, when the biological aspect is insignificant, a motive can be affected by the meaning of the sign, which reflects the essence of human development. Therefore, meaningful actions are developed through the development of meanings. In doing so, humans develop their understanding of the surrounding world.

The development of meanings in children happens through *the interaction of the ideal form of speech*[5] *with its actual psychological content*. A child interacts with the environment through the accumulation of the meanings possessed by him or her, which *is crucial for the mechanisms and the speed of the child's development.* The development of meanings is crucially important for the child's development. The ideal form of understanding reality should be achieved in the process of this development. Therefore, *the meaning of a sign is simultaneously a generalised reality and a set of internal operations that constitute the meaningful activity*. This approach reflects a pathway of making sense of the surrounding reality and how well the person can master the activities in which he or she is engaged.

The development of meanings is nothing else but the process of the development of meaningful activities. This is the pathway of the development of freedom of human consciousness.

II. Critical Reflections

In outlining my critical reflections, I would like to pursue the following approach. I will distance myself from the system developed by Vygotsky and present it as it might be presented by a very clever and strong opponent.[6] This approach is important in understanding the weaknesses of Vygotsky's system and its potentially unfortunate effects.

What is the central idea of Vygotsky's system? It is the study of a mediated action that creates the foundation of the entire system and separates lower and higher psychological functions. The connection with real life through social communication is revealed in the genesis of a mediated action. Understanding the functional meaning of a mediated action presents the pathway to studying the systemic organisation of human consciousness. Finally, by examining the organisation of a mediated action, we develop our understanding of the meaningful organisation of human consciousness.

What is the role of a mediated action in Vygotsky's system? First, this role can be examined externally when a mediated action starts to play a significant role in the psychological development of a child. At this point, the following duality might be encountered. On one hand, communication is a source of operations with signs

[5]Ideal form of speech in the meaning of inner speech with the self.

[6]Enemy in the original.

and a way to mediate psychological processes. On the other hand, communication is not a psychological process; it is a social phenomenon that may not always be mediated. Therefore, communication cannot be considered a process of mediation of psychological operations. This statement is central in Vygotsky's system.

In the study of the four phases in the development of mediation presented in the law of the parallelogram, true psychological mediation happens in older children. Therefore, the major part of the process of the development of a child does not involve mediated actions, such as the functions of perception, memory, and thinking in the process of maturation. Thus, these functions are developed naturally and not socio-historically. In doing so, the development of higher and lower psychological functions and the distinction between animal and human consciousness lose historical-evolutionary aspects. However, without considering the historical circumstances that explain origin and existence, the distinction between human and animal consciousness might be considered a supernatural and even idealistic phenomenon.

Furthermore, the development of psychological mediation is connected with the intellectual development of a child: first, the psychological functions develop in the process of maturation, and then they become mediated based on the mature intellect. The development of humans is therefore understood as the result of the convergence of two factors: the initial biological factor and subsequently the social factor, which builds on the biological factor and is presented itself in the ideal form. This approach coincides with the biosocial concept of the French sociological school; hence, Vygotsky's system might lose its novelty. Although this approach can be traced in Vygotsky's theory, we do not necessarily have to follow this approach.

To overcome this approach, we must do the following:

(i) Consider that mediation happens in the process of human communication, including the first scream of a child. We have to reemphasise the significance of this phenomenon, which until now has remained underestimated and under-researched. In other words, we have to examine the significance of the role of human speech from the moment of its appearance in the development of human consciousness.
(ii) Re-evaluate the significance of the development of mediation in children and the law of the parallelogram. We have to limit the significance of this law, and in doing so, examine the role of mediated psychological processes *in personal needs* and the significance of individual speech as an important example of mediation.

Next, we have to consider the structure of the mediated action. Communication is a non-psychological social reservoir of mediated operations with signs, from which the latter are derived as external tools to transfer internal meanings.

Vygotsky's system places particular emphasis on the meanings of signs. The meanings may change in the process of a child's development, whereas the signs remain unchanged. However, the link between the sign and its meaning becomes psychologically significant when this link connects the sign with its meaning, thus

making the sign available for use. The link between the sign and its meaning develops over time in a historical process. From the psychological perspective, this link is purely external (as a conditional reflex) and unstructured; therefore, it is constant. Although the meaning of a sign can change, the link between the sign and its meanings is constant and external. Based on these premises, we conclude the following:

1. A meaning is of primary importance, and a sign only symbolises this meaning. Therefore, signs do not take us beyond our consciousness. Mediated actions *do not overcome the subjectivity* of the old psychology; however, they do overcome behaviourism only to return to subjectivity. As a form of meaningful activity, a mediated action is an activity inside human consciousness. Therefore, although a mediated action can be considered a psychological process, it is a purely theoretical activity.

   A meaning is a generalised reflection of reality. However, the process of generalisation as a reflection of reality occurs in the process of communication with people. Therefore, human consciousness is shaped not by the surrounding reality but by societal consciousness—the consciousness of other humans. In Vygotsky's system, it is postulated that education is a driving force in human development. Therefore, societal consciousness influences individual consciousness, and individual consciousness influences societal consciousness. This reciprocal influence is the circle of French materialism: the society influences the individual, and the individual influences the society.
2. The sign as an external object is originally disconnected from its meaning. As an external object, the sign can mediate internal psychological operations and reconstruct them into higher psychological functions. However, as external meaning, the sign does not differ from any other external meaning or tool that does not possess the characteristics of a sign. This naturalistic approach to understanding the mechanisms of the development of higher psychological functions does not provide an explanation of the origin and structure of such functions. Therefore, it is impossible to explain the role of signs in the development of higher psychological functions. At the core of this naturalistic approach is a simplified and erroneous understanding of the structure of higher psychological functions as developed by reorganising and establishing new relationships between the lower psychological functions. This explanation is abstract because it does not account for the characteristic features of the higher psychological functions or the relationships between the higher and the lower psychological (i.e. physiological) functions. The relationship between higher and lower psychological functions is not equivalent to the relationship between psychological and physiological functions. Therefore, it might be concluded that the constant, external, unstructured, and non-psychological relationship between the sign and its meaning, as an essential link in a mediated action, positions Vygotsky's system as being similar to the approach of the French school of sociology. Hence, the system remains unfinished on the "top" and at the "bottom".

The system remains unfinished on top because it presents human consciousness as a hierarchical structure of meaningful activities. However, as the driving force of a meaningful activity, the motive remains disconnected in Vygotsky's system. Moreover, the system is unfinished at the bottom because the sign with its double function of (i) communicating and (ii) transferring its meaning is presented as an independent, autonomous, and external derivative. However, the sign itself cannot explain its functions or origin. Each function presupposes the existence of "something external"; the sign develops as a part of a reality and the sign and its meaning are equally important and interconnected parts of this reality.

Therefore, Vygotsky's system does not include any real actors that are driven by motives and that act in the surrounding reality. In other words, no *personalities with their relationships* act in real space and time. Does this mean that we have to join French sociology? The answer is "absolutely not" because our system is well-developed and viable. *None* of the statements about this system *should be rejected*; *however, they should be understood differently* and in a broader context.

However, we should not underestimate possible dangers. For example, the significance of the reality that is so well-presented in the system is very much one-sided. Based on the existing statements about the system (which at the moment coincide with the system of French sociological positivism), an extended system should be developed. We must further develop Vygotsky's system. We might do so by following these further steps:

1. We have to consider the study of human consciousness as an approach to developing the study of human personality. The key to this approach is *to further examine meaningful activities,* particularly the process of the development of tasks and motives. We have already mentioned that tasks and meanings (signs) determine the structure of the mediated action. However, until now, the entire system has been directed toward studying signs and their meanings. The examination of tasks and motives has not been considered although the former are connected to motives and personalities.
2. *We must examine "the natural origin of signs".* We should not consider their historical origin but their social origin in practical activities in which humans and material objects interact to create a stable, viable, and necessary structure.
3. Methodologically, the most important contribution to the further development of the system is that we have *to make a transfer from the cross-sectional examination of the activities to study the causality of the activities in which humans engage.*

These steps are the directions in which Vygotsky's system should be further developed. The cross-sectional examination of activities informs us about the person's behaviour and the structure of the meaningful activity in which he or she is engaged. By following this approach, the target phenomenon is studied from the inside, surrounded by the borders of the internal world of participating humans. By observing human activities, we might obtain pure facts about what happens in the situation. However, the more important question of "why this happens" remains unanswered.

To identify the reasons and answer the above "why" question, we have to overcome the subjective understanding of reality. We have to examine not the person's subjective understanding of the world but the world that surrounds the person and influences him or her although it may not be fully reflected in the person's consciousness and activities. This approach examines *not the individual* subjective understanding of the word but how *the world* influences the individual.

According to Vygotsky, an ideal form is significant for the child only to a limited extent. Such positioning is pragmatically convenient; however, it is incorrect from the theoretical perspective. The need that makes the person engage in an activity does not present itself in the ideal form. It is never a part of human consciousness or of the activities in which humans engage. When the need is realised by the person, it is not acquired by the consciousness, but it is transformed in the consciousness.

The urge to study the need can be compared with the transition to studying the qualitative properties of chemical elements and their interdependence with their atomic mass (i.e., the contribution of Lavoisier). This contribution led to the discovery of the periodic law of the elements. Mendeleev was not a philosopher; however, he based his law on understanding and explaining the qualitative properties of the elements based on the periodically changing atomic mass of the elements. Therefore, he organised the elements in periods not according to their chemical properties but according to their atomic mass. Only by following this approach could he manage to systematise the periodic changes in the chemical properties of the arranged elements. The atomic mass is not a chemical but a physical property of an element; however, by employing this property (which in fact belongs to the science of physics), the periodic changes in the chemical properties of the elements could be explained.

Similar to this example, in psychology, we have to transfer studying psychological phenomena not only according to their internal psychological grounds but also according to the external need that influences these psychological phenomena.

The main contribution of Vygotsky is the idea of the meaningfulness and freedom of human consciousness. If we accept the contribution of Vygotsky and develop it further, we have to find the need that would ensure the implementation of his theory.

I would like to reemphasise that Vygotsky's system is not complete. Moreover, it is at risk of being subsumed in French positivism. To prevent this eventuality, *we have to transfer from studying human consciousness to studying real people and their relationships from the perspective of the actual needs* that influence and affect them. As Marx reminded us, a person is a conglomerate of social relationships. Therefore, our main task today is to make a breakthrough to Marxism. By considering both the benefits and the limitations of Vygotsky's system, I attempt to outline the ways to accomplish this task.

Discussion: Galperin's analysis of Vygotsky's System of Historical Psychology

Our discussion is structured as follows: *first,* we present Vygotsky's understanding of human consciousness as reflected in his works from 1932 to 1934; *second,* we

direct our attention to Galperin's thorough analyses of Vygotsky's system; *third,* we discuss Galperin's critical reflections on Vygotsky's theory and his suggestions for directions in its further development. In doing so, we attempt to trace and analyse the continuity of the contributions of Vygotsky and Galperin to the cultural-historical psychology to educate conscious, agentic and free citizens of the world.

Vygotsky's understanding of human consciousness as a meaningful relationship to the world (1932–1934)

As rightfully pointed out by Galperin, cultural-historical psychology originated in the principle of the *sign mediation of higher psychological functions*, which was first reflected in 1926 in Vygotsky's personal notes and then in his publications in 1927 and 1928. During that period, a tool-mediated act or an external sign operation were central in examining higher psychological functions, and they were employed as a unit of analysis in scientific investigations. When the *principle of the systemic organisation of human consciousness* was introduced in 1930 in Vygotsky's presentation, *On Psychological Systems* (1930), human consciousness appeared to be a unit of scientific investigation, and the concept of psychological function began to lose ground. By introducing the principle of the systemic organisation of human consciousness, Vygotsky rejected the simplified understanding of a mediated act. He pointed out that a sign was not integrated in human psychological functions, but it changed the relationships between and among human psychological functions and affected the entire system of these functions. During the cultural development, the primary, natural connections between the functions that were established at the beginning of ontogenesis as an undifferentiated unity, break, and under the influence of a sign, a new artificial, flexible, and controlled system of functions appears with one dominating and other subordinate functions. The dominating function is not only positioned at the top of the entire system of human psychological functions, but it is also considered to control and determine how other functions are manifested. Primary connections between and among functions are substituted by secondary mediated. The combination of secondary mediated connections constitutes human consciousness and determines voluntary human behaviour. Secondary connections are eventually substituted by tertiary connections that characterise a person who is able to voluntarily manage interactions with the world and therefore change these connections. Therefore, the appearance of tertiary connections evidences not only a person's voluntary behaviour but self-consciousness, freedom of behaviour, and self-determination:

> We always covertly assumed the person in the mediated processes. Systems are the key to the person. In any case, the person does not consist of functions but of systems: The person has no organic but a supra-organic structure. The organic forces are combined in a synagogical[7] unity of a new sort and a higher order. (Zavershneva & Van der Veer, 2018, p. 141)

[7]Synagogical is defined as developing together and in connection with each other.

At the beginning of the 1930s, Vygotsky concluded that a word is not only a sign among others, and it is not an individual case of mediation related to one psychological function. In his *Pedology of the Adolescent* (1931), he offered a new and redefined understanding of the law of sociogenesis:

> [S]peech, being initially the means of communication, the means of association, the means of organization of group behaviour, later becomes the basic means of thinking and of all higher mental functions, the basic means of personality formation. (Vygotsky, 1998, p. 169)

However, the most fundamental and revolutionary changes in his theory began to appear in 1932 when Vygotsky, in his own words, transferred "from outside inward, from behaviour to consciousness" (Zavershneva & Van der Veer, 2018, p. 275) by introducing the principle of the meaningful organisation of human consciousness:

> [The] systemic construction of consciousness might arbitrarily be called external construction of consciousness, whereas meaningful construction, the character of generalization, is its internal structure…. [G]eneralization acts as a function of consciousness as a whole and not only of thinking alone. All the acts of consciousness are generalizations. (Vygotsky, 1998, p. 278)

According to Vygotsky, the development of the meaningful organisation of human consciousness happens early in children one to three years old. He considered it of primary significance in the early development of a child (Vygotsky, 1998, pp. 261–282). However, Vygotsky did not explicate this understanding in his theory of human consciousness or in his theory of affect. However, he introduced this approach at internal conferences and in lectures he gave in 1933 and 1934.

In 1932, Vygotsky identified meaning as being of primary significance in operations with signs and their internal structure (Vygotsky, 1997, p. 133). This definition was employed by Galperin in his speech exactly as it was introduced by Vygotsky. Meaning reflects the system of higher psychological functions. It is located on the boundary between the external and internal planes and mediates our interactions with the world. On one hand, this location is the pathway from a thought to a word, and it helps to transfer disorganised thoughts into speech. On the other hand, meaning helps to generalise experience and communication with other people; meaning is a unity of communication and generalisation (Vygotsky, 1987, p. 48). However, as a unit of analysis, meaning reflects only communicative (i.e., speech) thinking. Subsequently, Vygotsky concluded that only sense could be employed as a unit of the analysis of human consciousness.

In the last chapter of *Thinking and Speech*, by employing Paulhan's understanding of sense (Paulhan, 1928), Vygotsky specified the following:

> A word's sense is the aggregate of all the psychological facts that arise in our consciousness as a result of the word. Sense is a dynamic, fluid and complex formation that has several zones that vary in their stability. Meaning is only one of these zones of the sense that the word acquires in the context of speech. It is the most stable, unified, and precise of these zones. In different contexts, a word's sense changes. In contrast, meaning is a

> comparatively fixed and stable point, one that remains constant with all the changes of the word's sense that are associated with its use in various contexts. (Vygotsky, 1987, pp. 275–276)

In this understanding, the core of the concept of sense is identified, which reflects the wholeness and integrity of human consciousness. Vygotsky showed that the relationship between the word and its sense is flexible and fluid. Moreover, it is varied, and it always bears the imprint of the speaker's personality. Sense is broader than meaning, and it does not coincide with it:

> Meaning is inherent in the sign. Sense is what enters into meaning (the result of the meaning) but is not consolidated behind the sign. The formation of sense is the result, the product of meaning. (Vygotsky, 1997, pp. 136–137)

Sense comprises several meanings, and a meaning is a stable form of sense that is reduced to the norms and common rules of word use in communication, which enables people to understand each other. Sense is more hermetic, idiomatic, and individual than meaning is, and it is more closely connected to motives and the core of the personality:

> The sense of the words is changed by the motive. Therefore, the ultimate explanation lies in motivation. (Vygotsky, 1997, p. 136)

Sense reflects the dynamics of the development and transformation of thoughts, feelings, and motives, which cannot be reflected in a "frozen" meaning. Sense develops in the process of ontogenetic and micro genetic transformations through the primary affect in the undifferentiated psychological system to initiate the process of development. Hence, the sign ruptures the initial undifferentiated psychological system, and by creating the differentiation of psychological functions, it develops a new complex and hierarchical system of psychological functions with secondary connections. Most importantly, a sign initiates the differentiation of the primary affect into motive, thought, and feeling. Vygotsky elaborates this differentiation in the metaphor of a chain in the last chapter of *Thinking and Speech*: affect (motive)—sense—meaning—utterance (action). The development of these processes in adults happens primarily in inner speech. Based on these premises, Vygotsky introduced the definition of sense as a unit of the analysis of human consciousness.

The meaningfulness of the consciousness is characterised by a person's attitude and his or her relationship to the world (Vygotsky, 1997, p. 137). The world, both internal and external, becomes accessible by the consciousness as a system of interconnected events. As a system of meanings, speech is used to conceptualise and structure the internal and external worlds and helps to explore them. According to Vygotsky, the interconnectedness of our ideas about the world and the ability to act in it are determined by the level of the development of speech and thinking. Moreover, the complex system of meanings comprises the entire diversity of world phenomena and the human ability to act in the world not only reasonably but also freely.

In discussing the development of humans, Vygotsky indicated that freedom was both a necessary condition and the outcome of the process of development:

> Freedom: the affect in the concept..... The grandiose picture of personality development: the path to freedom. (Zavershneva & Van der Veer, 2018, p. 209)

Freedom is a distinctive characteristic of humans: its increase is associated with development, and its loss is associated with the decay of human consciousness. Drawing on the ideas of Marx and Spinoza, Vygotsky presented a similar position in his model of a free and meaningful action, in which he attempted to relate affect, intellect, and practical action (Vygotsky, 1993, pp. 220–240).

According to Vygotsky, consciousness does not exist in isolation from the world, and it does not possess inherent and immanent laws of development. Therefore, in his lectures on developmental psychology, Vygotsky suggested the new unit of experience (*perezhivanie*) as a unit of the analysis of the relationship between the person and the world:

> On one hand, in experience, environment is given in its relation to me, how I experience this environment; on the other hand, features of the development of my personality have an effect…. [T]he forces of the environment acquire a controlling significance because the child experiences them. This mandates a penetrating internal analysis of the experiences of the child, that is, a study of the environment, which has to a significant degree been absorbed by the child himself and is not reduced to a study of the external circumstances of his life. (Vygotsky, 1998, pp. 294–295).

However, Vygotsky's works on experience are largely fragmented. Therefore, developing this concept remains one of the challenges in contemporary psychology.

In summary, in 1932 and 1934, Vygotsky outlined the principles of the systemic and meaningful organisation of human consciousness and its developmental nature. He introduced the following units of analysis: (i) meaning—to examine verbal thinking; (ii) sense—to examine human consciousness; (iii) experience (*perezhivanie*)—to examine human personality and its interactions with the world. He concluded that *freedom* was a distinctive characteristic of human consciousness and *the summit of human development*.

We will now highlight the central ideas of Vygotsky's approach as identified by Galperin to reconstruct his theory of human consciousness. In the discussion that follows, we support our analyses by providing extracts from the *Lectures in Psychology* included in this volume to exemplify how the ideas of Vygotsky have been addressed and further developed by Galperin.

Reconstruction of ideas of Vygotsky in Galperin's speech

In the first part of his speech, Galperin reflects on Vygotsky's understanding of *the systemic organisation of human consciousness,* emphasising the developmental nature of human consciousness and pointing out that the process of inconsistent development is of primary significance in understanding the development of the child's consciousness. Inconsistency in the development of the child's consciousness is explained as the appearance of one predominant psychological function in the periods of a child's development. These functions are in the sequential order of perception, memory, and thinking. These predominant functions affect the

development and organisation of human consciousness and cause the reorganisation and restructuring of the existing psychological functions, thereby establishing the dependency of all existing functions on the new dominant function. Such an organisation reflects the systemic and hierarchical organisation of human consciousness. In Lecture 4, Galperin emphasises the following:

> A phenomenon is a special form of very economical work because you are not dealing with the parts of the process; instead, it is presented to you as a sum of the parts and as a phenomenon as a whole. If the phenomenon appears to sit at the top of a pyramid of well-established and thought-through connections, its positive value is the greatest. (Lecture 4)

He continues this argument by indicating that the hierarchical organisation of psychological functions can be developed only in humans, and it is inherently connected to the human use of cultural means. Cultural means are defined as operations that are mediated by signs. Therefore, the systemic structure of human consciousness is connected to the origin, development, and functional meanings of signs. Importantly, signs first appear in the process of communication among people, and operations with signs are internalised to become the psychological functions of a person. This pathway reflects the processes of mediation, sociogenesis, and the internalisation of higher psychological functions.

In describing the process of mediation, Galperin refers to Vygotsky's law of the parallelogram, which includes the four phases in the development of mediated psychological functions in children. Galperin comments that these four phases are important because they reflect the considerably late development of mediated psychological functions in children. In his research, he returned to this statement. By applying the phases of the development of mental actions, Galperin showed that the development of conceptual understanding could be achieved in much younger children than suggested by Vygotsky:

> It turned out that the school concepts that were intended to be developed in 11 and 12-year-old students could be developed in children 7 and even 6 years old. (Lecture 5)

Galperin summarises the functional significance of the sign mediation by (i) establishing new psychological functions and reorganising existing psychological functions; (ii) placing it at the structural and functional centre of newly developed psychological functions; (iii) separating lower from higher psychological functions. Thus, a sign becomes *a tool* for creating the structural and systemic organisation of human consciousness. Galperin concludes that the higher psychological functions are nothing else but internal operations mediated by forms of communication, and higher psychological functions are developed in the process of mediated social communication during the external activities of humans. In Lecture 4, Galperin explicates the following:

> [T]he initial appearance of a thought is nothing else but a transfer of the action with objects to the human mind and its being processed there…. Mental activity is a type of work, like any other work performed by people. This work has to be mastered and resourced by proper tools. (Lecture 4)

Although Vygotsky shared these ideas, this clear conceptualising is missing in his works. Therefore, the precise definition offered by Galperin contributes to extending Vygotsky's legacy.

Galperin draws on Vygotsky's law of the parallelogram to emphasise that the sequential appearance of the dominant psychological functions of perception, memory, and thinking reflects the gradual transformation from actual external psychical interactions with material artefacts to internal mental activities. Therefore, the development of new psychological functions and the sequential appearance of a predominant function occurs through social interactions. This profound understanding of Vygotsky's legacy was taken further by Galperin in considering his phases of the development of mental actions (Lectures 1–5) as the gradual transformation of an external activity with material or materialised tools (materialised action) through social communication (communicated thinking) and individual speech (dialogical thinking) to a mental activity (acting mentally). The transformation from materialised action to communicated thinking happens during learners' interactions with material or materialised objects and in making sense of these objects in speech. The activity is directed outside, and it connects the learner with external objects and the outside world. The transformation from communicated thinking to dialogical thinking happens by substituting the externally oriented speech by its image. In dialogical thinking, the activity is directed inside the learner in establishing communication with himself or herself (as another person). The learner's ability to perform an activity in the form of dialogical thinking reflects the pathway the activity has undergone from its materialised form to its dialogical form (Engeness & Lund, 2018).

> To master a new mental action means to ensure the formation of this action in its highest mental form. In order to do so, we need to trace the path of its development from the beginning. (Lecture 3)

Galperin concludes that human consciousness is a hierarchical system of psychological functions and that higher psychological functions are activities of human consciousness, which are a historical phenomenon that can be developed specifically in humans.

In the second part of the discussion on the *Meaningful Organisation of Human Consciousness*, Galperin attempts to analyse Vygotsky's explanation of the mechanisms of the development of higher psychological functions in humans. To do so, Galperin turns his attention to (i) the tools and (ii) the internal structure of mediated actions that employ these tools.

Galperin notes Vygotsky's particular attention to the selection and use of appropriate mediational tools, indicating the need to extend this focus by undertaking a thorough analysis of a mediated action. He defines a mediated action as consisting of a task and a motive that is a driving force in solving this task. In doing so, he defines a task as the objective expression of a motive and discusses the connection between the task and the motive. These ideas were developed in detail in the works of Leontiev (1978). By engaging in this discussion, Galperin might have identified the directions of further development of Vygotsky's legacy.

Galperin employs the terms activity, action, and operation to convey the meanings that were developed and explored in the works of Leontiev (1978). Galperin defines the double role of an activity (i) to interact and communicate and (ii) to transfer the meaning of the sign. Based on these premises, a sign has a double meaning: (i) its original meaning and (ii) its acquired meaning, which depends on the activity in which it is employed (sense). Galperin's explanation of the original meaning of a sign is in line with Vygotsky's understanding; that is, the sign can be understood as the generalisation of the reality in the process of communication. A sign acquires its second meaning (sense) in the context of a specific practical human social activity.

The relationship between a sign and its meaning is compared with the relationship between speech (individual psychological meaning) and the objective meaning that is being transferred. This relationship is unstable and variable, and it is similar to the relationship between a motive and a task. Galperin makes a connection between the characteristics of signs and the characteristics of the mediated activities in which they are employed. In discussing the interrelationships among sign, meaning, task, and motive, Galperin enters an important discussion about *meaning and sense* (Cole, 1998; Penuel & Wertsch, 1995; Wertsch, 1997). A meaningful activity that is conducted with mediational tools is not presented as consisting of an internal part (motive and meaning) and an external part (task and tools). Instead, it is a process that happens over time in several phases, where each sequential phase encapsulates the previous phases of the process. This understanding is further developed in Galperin's phases of the development of mental actions (Lectures 1–5):

> To master a new mental action means to ensure the formation of this action in its highest mental form. In order to do so, we need to trace the path of its development from the beginning. We can do it through six consecutive phases. (Lecture 3)

Sense is conceptualised as the enacted unity of the motive, task, signs and tools in a meaningful activity. Galperin emphasises that separating one aspect from another may lead to the activity losing its sense; moreover, the presence of all four aspects is required for the activity to become meaningful and acquire its sense. In accepting Vygotskian understanding of sense as comprising the relationship between a motive, a sign, and its meaning, Galperin extends it by introducing the concept of a task. However, this addition does not contradict Vygotsky's approach, and it even resonates with a remark he made at the conference on 5 December 1932:

> The thought strives, fulfils some function and work. This work of the thought is the transition from the feeling of the task—via the formation of meaning—to the unfolding of the thought itself. (Vygotsky, 1997, p. 134).

On one hand, this approach allows Galperin to conclude that higher psychological functions are mediated and the meaningful actions of a person reflect his or her attitude to the external world, the degree of awareness of the surrounding world, and the self in the world:

> Some important aspects of the formation of individual actions, the success of their application and generally their significance in the life of an individual depends on the quality

> of the orienting part of the action. It is the orienting part and not the action itself constitutes the focus of psychology. (Lecture 1)

This understanding is of primary significance in clarifying Vygotskian ideas about higher psychological functions, and it connects the legacy of Vygotsky with the later contributions of Galperin and his followers (Arievitch & Haenen, 2005; Arievitch & Stetsenko, 2000; Stetsenko, 2017; Stetsenko & Arievitch, 2002). Galperin not only summarises but also engages in a thorough analysis of Vygotsky's system, extending it without changing its essence. This analysis may be considered an attempt to bridge the cultural-historical legacy of Vygotsky with activity theory although it was not fully developed at that time and existed as a polemical debate between Vygotsky and Leontiev (Leontiev & Luria, 1999; Zavershneva & Van der Veer, 2018).

On the other hand, according to Galperin's approach, sense may be a general characteristic of human activity, not consciousness. This understanding may not fully reflect the dynamics and unstable nature of sense, and it may not account for the possible variety of senses, which are termed a "field of significance" (Vassilieva & Zavershneva, 2020). However, Galperin's understanding of sense as the flexible unity of the four components (i.e., motive, sign, meaning and task) coincides with Vygotsky's line of reasoning. In *The Problem of Mental Retardation,* Vygotsky described a series of experiments in which sense was used as the main controlled variable (Zavershneva, 2014). All four components introduced by Galperin were clearly present in the work of Vygotsky, where similar to *Thinking and Speech,* sense was introduced as an integral characteristic of human consciousness and as a person's relationship to the world. To conclude, the unity of a motive, sign, meaning and task is essential in Galperin's understanding of sense, which is a logical continuation of Vygotsky's ideas.

Galperin's elaborations of (i) human consciousness as a meaningful activity and (ii) a systemic organisation of human consciousness have implications for a person's ability to engage in a meaningful activity. Moreover, they are of primary significance in moving beyond the legacy of Vygotsky to connect the individual with the external world and the reality:

> [T]he ideal in nothing else but the material transferred to the human head and transformed in it. Let us consider this statement as a starting point. (Lecture 1)

Galperin's legacy may therefore exemplify the attempt to operationalise Vygotsky's ideas and extend them by (i) emphasising the need to develop meaningful actions with the desired properties and (ii) conceptualising his ideas in a study on the development of human mental activities (Lectures 1–8).

The third part, *The Development of Human Consciousness,* discusses the approaches to developing meaningful actions. Galperin indicates that the meaningfulness of an action is expressed in the nature of the task that this action is employed to solve as well as the tools used in this action. Therefore, the development of meaningful actions happens through the development of meanings. In doing so, humans develop their understanding of the surrounding world.

The discussion of the development of meaning resonates with Vygotsky's ideas about the development of concepts (Vygotsky, 1987) which were extended and elaborated in the contributions of his followers (Galperin, 1976; Leontiev, 2000) and presented in detail in Lectures 1–5 in this book. Vygotsky emphasised that the development of meaning is crucial in a child's development. Galperin defines the meaning of a sign as a simultaneously generalised reality and a set of internal operations that constitute a meaningful activity. The pathway of the development of meaning reflects the pathway of understanding of the reality that surrounds the child. The elaboration of these thoughts is visible in Galperin's conceptualising of the creation of meaningful activities. He argues that efforts should be directed at developing activities that have the desired properties:

> [W]e need to define in advance the properties we would like an ideal action to have. We should also choose the system of conditions that will ensure the formation of these desired properties. *(Lecture 2)*

Galperin concludes that the development of meanings is the process of the development of meaningful activities and is a pathway to develop freedom of human consciousness. This elegant conclusion reveals the essence of Vygotsky's legacy for educating independent and conscious learners who possess a profound understanding of the process of learning and the agentic capacity to learn. These learners are able to engage in interactions with the constantly changing world, develop their understanding of this world, and make meaningful contributions to it. Such learners are conscious, independent, and free citizens of the world in which they live.

To summarise, in providing a thorough analysis of Vygotsky's system, Galperin outlines the central ideas in Vygotsky's legacy:

(i) The idea of the developmental nature of human consciousness as of primary importance in understanding the genesis, structure, and purpose of human psychological functions, which is central in conducting psychological investigations.
(ii) The idea of the meaningful organisation of human consciousness, which explains the difference between psychological development in humans and animals, lower- natural and higher-cultural psychological processes, and the two types of consciousness: instinct and intelligence.
(iii) The idea of the systemic organisation of human consciousness.

Critical reflections

We begin by outlining the critical reflections presented by Galperin in his speech.

(1) *Communication.* According to Vygotsky, communication is a process that mediates psychological development. However, Vygotsky did not present communication as a mediated process; instead, he offered a sociological

understanding of communication as a process of the development of signs. Indeed, Galperin addresses a controversial issue in Vygotsky's approach, which does not focus on examining the process of communication but emphasises the process of generalisation. Hence, Vygotsky's understanding of the development of humans as a unity of communication and generalisation remains unfinished. In Lecture 4, Galperin discusses the double role of communication as a verbal action and as a message about the performed action:

> When you remove the material support, the action will not be immediately transferred to the mental plane. First, it is transferred to the plane of externalised social speech…. This speech is aloud, not only in its form, but more importantly in its function as speech directed to another person. It is important that this is both a verbal action a nd a message about the performed action. (Lecture 4)

(2) *Intellect as mediation of psychological development.* Galperin criticises Vygotsky's understanding that psychological development and mediation depend on a matured intellect. Therefore, the initial phases of ontogenesis, in which the intellect is not dominant, cannot be examined either theoretically or empirically. Neither can they be explained by the cultural and historical development of humans, but only by human natural development. This understanding indicates that Vygotsky's approach was intellectual, which he acknowledged in his critical reflections in the early 1930s. Vygotsky made a considerable effort to overcome intellectualism in his theory by introducing the unity of affect and intellect although these ideas were not fully developed in his works. In Lecture 5, Galperin responds to Vygotsky's position:

> For a long time, it was considered that the development of conceptual understanding is only possible with 11- and 12-year-old students. Such an understanding resulted in the idea that learning concepts before the ages of 11 and 12 was not recommended and even forbidden. It was considered that children develop so-called quasi- and pseudo- concepts, as they are unable to develop their true understanding of the target concept. Therefore, teachers must introduce incomplete concepts or the "simplified" version of a concept. (Lecture 5)

However, Vygotsky's understanding of the human ability to think through speech, which became central in his theory in the 1930s, was identified as a specifically human characteristic: moreover, this ability had practical and methodological implications. A person who is able to think conceptually and independently using language to mediate his thoughts, express emotions, and control motives was considered to reflect a target in human development. When the significance of speech mediation came to the fore (see the law of sociogenesis in the *Pedology of the Adolescent*), Vygotsky's understanding of psychological development also changed. In the 1930s, he argued that speech affects human consciousness as a whole and not its individual components (Vygotsky, 1997, p. 137). He indicated that human consciousness did not depend on the matured intellect, but the sequential replacement of one dominating psychological function starting with a diffuse affect determined the process of the development of humans. Vygotsky concluded that

non-intellectual mediation occurs before the intellect matures and becomes the leading psychological function in the psychological system of an adult. Vygotsky's position might serve as a reply to Galperin's critique.

(3) *The idea of considering that mediation occurs at the very beginning of the process of the development of children.* This idea, which is linked to the issues of communication and intellect, was not elaborated in Vygotsky's works. The idea of considering that human development occurs through speech mediation was useful in introducing the phenomenon of communication to cultural-historical psychology. However, this potential application of communication was not revealed in Vygotsky's works. Vygotsky considered that the development of a systemic and meaningful structure of human consciousness occurred in older children. Therefore, in forming his theory, he did not include infancy as the period in which the development of meaning takes place. Galperin rightfully criticises this understanding by pointing to the importance of examining the role of speech mediation starting at the first scream of a child. However, Vygotsky's personal notes during the period 1932–1934 reflect his thoughts on "consciousness without a word", including the initial stages of ontogenesis and micro genesis (Zavershneva & Van der Veer, 2018, pp. 271–274). These ideas were first expressed by Vygotsky in 1930 in his description of the development of sense as an intentional act triggered by a sign (Zavershneva & Van der Veer, 2018, pp. 119–120). Therefore, the development of an infant happens through engagement in communication with an adult. This development happens within their co-constructed field of significance (Vassilieva & Zavershneva, 2020). It does not follow a natural scenario but a socio-historical scenario, unfolding inter-psychologically and relying on their shared intentionality (Tomasello, 2008). Communication in infancy is an affect expressed by voice and intonation, which Vygotsky termed a musical component of speech (Luria, 2014, p. 83), reflecting the child's attitude toward the world and the contribution to the development of sense. However, even extended ideas about "consciousness without a word" do not close all gaps in his theory. One of these gaps is the absence of "manual thinking" in the development of the meaning of objects. This direction was developed in detail by Galperin in his lectures on the phases of the development of mental actions (Lectures 1–5).

(4) *The shift from the theoretical emphasis on sign meaning to the emphasis on the developmental function of sign meaning.* Vygotsky suggested that a child acquires the meaning of the word from an adult. He or she *"finds it ready-made, classified by a common word or name"* (Vygotsky, 1987, p. 145). This position was not confirmed in observations of children who developed their language creatively by engaging in play or in the research of contemporary linguists who argued that a language is not a stable classification, and its structure cannot be completely explained by a set of rules (Eko, 1998). Galperin criticised Vygotsky's ideas about the natural development of language, which is

reflected in his works, such as *Studies on the History of Behaviour* (Vygotsky & Luria, 1993). In his candidate dissertation, Galperin (1936) elaborated the significance of the development of sign meaning in children.

(5) *Theoretical and practical limitations of the concept "ideal form"*. The most detailed elaboration of the concept of the ideal form was offered by Vygotsky in *Foundations of Pedology* (1934):

> The child speaks in one-word phrases, but his mother talks to him in language, which is already grammatically and syntactically formed and which has a large vocabulary, even though it is being toned down for the child's benefit. All the same, she speaks using the fully perfected form of speech. Let us agree to call this developed form, which is supposed to make its appearance at the end of the child's development, the final or ideal form … ideal in the sense that it acts as a model for that which should be achieved at the end of the developmental period…. The greatest characteristic feature of child development is that is achieved under particular conditions of interaction with the environment, where this ideal and final form … is not only already there in the environment and from the very start in contact with the child, but actually interacts and exerts a real influence on the primary form, on the first steps of the child's development. (Van der Veer & Valsiner, 1994, pp. 348–349)

Vygotsky's statement about the interaction of ideal and real forms is controversial, considering his unacceptance of dualism. We might suggest that if Vygotsky had lived longer, he would have clarified his concept of the ideal form. However, in 1934, this concept was relatively new in psychology, and it carried an important function in the development of peak psychology (Vygotsky, 1997, p. 137), which implemented the idea of a reverse method, as suggested by Marx, which offered to take the best abilities that could be developed in learners as a reference point for the target development. Galperin suggested that the limitations of Vygotsky's ideal form could be overcome by examining not the individual's subjective understanding of the world but how the world influences the individual:

> [I]f you study the formation of actions in its final form and trace the unfolding all the way from the material to the ideal form, then you might develop an understanding of how an exquisite psychological phenomenon such as an individual thought is formed.
>
> This is very important because it opens up a new direction for the study of mental processes. (Lecture 4)

(6) Galperin's idea that *it is impossible to develop a theory of consciousness per se* is an important methodological point that Vygotsky made in his late works. Consciousness is essentially a boundary phenomenon, and if it exists in the form of speech in which a person expresses his or her relationships with the world, then such relationships should be examined not only as generalisation and communication but also as the unity of affect and intellect. However, even in *Thinking and Speech,* Vygotsky did not elaborate this matter, and Galperin rightfully points that out that a learner is presented as a "theorising subject" who develops consciousness but does not communicate and does not interact with the world:

> [I]f we assume that any psychological process is purely subjective, then it becomes impossible to investigate the process. (Lecture 4)

(7) The next argument put forward by Galperin is that *the system of cultural-historical psychology is not closed from above by motives*. Without including the reasons to why Vygotsky did not manage to develop the theory of affect and the steps that he pursued in that direction, we would like to mention his fruitful dialogue with Kurt Lewin. The approaches of Vygotsky and Lewin were complementary, and they were central in the development of theories of affect and intellect. By applying the foundations of dynamic psychology, Vygotsky, in collaboration with his research group, modified Lewin's experimental methodologies to apply them in clinical practice. In one of the studies published after his death, which considered the analysis of dynamic meaningful systems in Peak's disease (Samukhin et al., 1934), Vygotsky attempted to trace how individual features of character affected the trajectory of the pathological process in different patients. The findings indicated that as their consciousness deteriorated, the patients showed decreases not only in the level of generalisation, the dynamic nature of the inter-psychological system, and deterioration in the field of significance but also reduction in freedom. A similar tendency was observed concerning the affect system; the patients demonstrated increased simplicity, structural and dynamic degradation, distortion of personal boundaries, and changed interactions with the world. All these symptoms could not be justified by the diagnosis but by the personalities of the patients. The suggestion about the unity of structural-dynamic aspects and the types of activities that employed them, which were introduced in that study, strongly affected the ideas of Lewin. In addition, such results were described in the cultural-historical approach to explain the structural similarity between the cross-sectional research of the action, affect, and thought and the activity approach. However, Vygotsky was not completely satisfied with this solution, and the final lines of the speech introduce the central idea in Galperin's critical reflections: the need to shift from cross-sectional to causal investigations:

> [O]ur first conclusion concerns the method of psychological research. We do not dismiss the method of self-observation; we use it and accept it. Self-observation can describe a mental phenomenon. However, this is only a description of the phenomenon and nothing else! What lies behind this phenomenon? We can only discover this when we are creating the phenomenon and shaping it in a controlled process. (Lecture 4)

This direction, which was identified by both Vygotsky and Galperin, is important in contemporary psychological research, in which cross-sectional, correlational, and often sociological investigations prevail. Instead, attention should be given to design based research aimed to examine the target phenomenon by constructing it instead of observing.

In summary, the critical reflections Galperin outlines in his speech resonate with the ideas that Vygotsky developed in 1933 and 1934, which reflect a dialogue in time between these outstanding scholars. However, Galperin went further by outlining the directions of the development of Vygotsky's theory: (i) to consider the study on human consciousness an approach to developing the study of human personality. The key to this approach is to further examine

meaningful activities, particularly the process of the development of actions and motives; (ii) to examine "the natural origin of signs" during practical social activities in which humans and material objects interact to create a stable, viable, and necessary structure; (iii) to transfer methodologically from the cross-sectional examination of activities to study the causality of the activities in which humans engage. In another study (Engeness & Lund, 2018), we found that Galperin's contribution to cultural-historical theory was as follows: (i) specifying the unique character of the development of human consciousness emerging in social activities and cultural, tool-mediated practices; (ii) identifying the role and the function of tools as imbued with relevant social experience and mediating learning activity; (iii) conceptualising the nature and functions of human psychological processes as specific forms of activity and by outlining its structure and identifying the subject of psychology in studying the ontogenesis of object- oriented activity. It is difficult to disagree with the similarity between the steps outlined in the speech and Galperin's scientific legacy.

Concluding Remarks

Surprisingly, many similarities may be observed in the ideas put forward by Galperin and the directions identified by Vygotsky in his works from 1932–1934 (Zavershneva & Van der Veer, 2018). Galperin's speech exemplifies his subtle and profound understanding of Vygotsky's theory. A similar understanding has not been achieved by any of Vygotsky's followers. The speech is a unique historical document that makes a considerable theoretical contribution by presenting a concise and consistent summary of the theory of consciousness outlined by Vygotsky at the end of 1932. We believe that Galperin's speech is of particular significance for contemporary research in light of the predominant trend to oversimplify, fragment and distort Vygotsky's ideas. The speech may be considered the missing piece of a jig-saw puzzle that bridges cultural-historical and activity theories. The divisions between these theories have not been overcome in the unified version of cultural-historical activity theory (CHAT) (Nussbaumer, 2012).

Galperin did not work closely with Vygotsky. He entered the field of psychology in 1932, in the move of the Moscow group to Kharkov. However, Galperin assumed the task of providing a thorough analysis of Vygotsky's system in his speech in 1935. By identifying the central concepts in Vygotsky's legacy, Galperin reveals the connections and the interplay among these concepts to create a system that was not finally developed by Vygotsky. Even though in his later works, Vygotsky indicated that the ontological foundations of his theory were aimed to conceptualise human development as the gradual development of consciousness and human freedom, this emphasis was not pursued by any of Vygotsky's followers except Galperin. Paradoxically, Galperin was not a student of Vygotsky, and very few overviews of Vygotsky's legacy have presented Galperin as his follower (Arievitch, 2003; Haenen, 1996).

To conclude, *first,* Galperin's speech not only represents a valuable overview of Vygotsky's system and outlines his critical reflections, but also provides thorough analytical considerations of the approaches pursued by Vygotsky. Galperin offers clear descriptions of the ideas that are central in Vygotsky's legacy, many of which remained vague and underdeveloped in the works of the latter.

Second, Galperin's speech not only offers critical reflections but also demonstrates a subtle and profound understanding of Vygotsky's original ideas and outlines ways to enrich and extend these ideas to further develop the cultural-historical approach. Several of these ideas are elaborated in Galperin's lectures included in this book and which offer valuable examples of productive critical reflections. They are a rare illustration of the high standard to which researchers should strive to achieve. In his speech, Galperin is not harshly critical, nor does he attempt to attribute his own ideas to Vygotsky or make any additions that could interfere or distort Vygotsky's ideas.

Third, one of Galperin's most significant contributions was to explain internalisation as the transformation of a learning activity from the external (social) to the (individual) internal plane. This transformation was described by the measure of its acquisition by the learners engaged in the activity. It was conceptualised in outlining the dialectically developing forms of this transformation: (i) motivation, (ii) orientation, (iii) materialised action, (iv) communicated thinking, (v) dialogical thinking and (vi) acting mentally (Engeness & Edwards, 2017). These phases might be considered as Galperin's re-evaluation of Vygotsky's law of the parallelogram, which he mentioned in his speech and which was not fully developed by Vygotsky.

Finally, Galperin offers the following elegant conclusion:

> The main contribution of Vygotsky is the idea of the meaningfulness and freedom of human consciousness. If we would like to accept the contribution of Vygotsky and develop it further, we have to find the need that would ensure implementing his theory.

Galperin's study of orientation, particularly the third type of orientation (Engeness, 2020; Engeness & Lund, 2018), extends Vygotsky's ideas and shows how the freedom and meaningfulness of human consciousness can be achieved in education. Galperin emphasises that the third type of orientation reveals the essence of learning, promotes abstract thinking and offers a unified approach to learning by creating links between the sciences and the approaches to studying them. By applying the third type of orientation, learners master the essence of learning through studying a phenomenon, which carries a new function not as a studied *object,* but as a *tool* for studying the *essence of the learning and how to go about it*. In so doing, learners develop their understanding about the nature of learning across contexts and subject areas, thus enhancing their agentic capacity as independent and conscientious learners. This approach is incredibly useful now in the age of fast-developing technology and advances in knowledge, "fake" news, and unstructured streams of information. Galperin argued for the need to make a transfer from studying human consciousness to studying real individuals and their

relationships with the surrounding world. His scientific legacy is an extraordinary example of this pursuit, in which Galperin transferred the legacy of Vygotsky from the ideal plane to the real world.

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Contents

Chapter 1
The Development of Mental Actions and the Orienting Basis of Actions

Outline of Lecture 1

This lecture introduces the Study of the Development of Human Mental Activity. Galperin argues that to plan an action, it is necessary to create an *image of an action.* Any human action (both real and ideal) has a binary structure comprised of *orienting* and *executive* parts. Therefore, planning an action should include the creation of both its orienting and the executive parts. The *orienting part* comprises two subsystems, *motivational* and *operating*, the latter of which consists of four components: (i) constructing an image of the present situation; (ii) revealing the potential of the individual components of the present situation to the learners; (iii) planning the future action; (iv) facilitating the action in the course of its execution. These four components are not only complex but also different. However, they are similar in the presence of *images* of one kind or another: an image of the present situation, an image of the plan of action, or an image of the action that is being executed. In summary, there are two types of images: *images of the surrounding reality* and *images of ideal actions*. These two types of images constitute the two main components of human orienting activity.

Galperin proceeds to discuss the formation of ideal actions. He bases his logic on Marx's premise that the ideal is the material transferred to the human mind and is transformed in it (*the first premise*). Therefore, ideal actions are nothing more than real, substantive, and external actions with material objects. However, ideal actions do not appear by themselves; they have to be created, and it is important to find or create a material action from which an ideal action could be derived (*the second premise*). *The third premise* is that not all actions can be transferred to the ideal or mental plane; motor skills are an example. However, some actions can be transferred completely to the mental plane, such as mathematical calculations. Galperin explains the difference between the ideal and mental plane as follows: *the mental plane* belongs to the person reflecting the surrounding reality, and *the ideal plane* might comprise a person's reflections and perceptions. Based on the difference

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between the mental plane and the ideal plane, Galperin proceeds by investigating the actions that can be completely transferred to the mental plane of a person. He argues that the development of actions that can be transferred to the mental plane is of primary significance in overcoming the present situation in pedagogy, where teachers educate learners by simply explaining target concepts. By following such an approach, the entire process of learning remains "behind the wall" and invisible to learners. Instead, Galperin argues that the process of *learning should be deployed and revealed to learners* by identifying the following two steps:

1. The *qualities* and requirements of the future learning process should be accurately identified. These qualities of the action can be used as criteria for the assessment of the action. The *desired learning outcome* of the action should also be identified.
2. A *system of conditions* to ensure the desired properties of the action should be selected under which students cannot help mastering the action and, in doing so, learning how to complete or solve other tasks. This system of conditions is labelled *the phases of the development of mental actions*, and it ensures that the designed action acquires the required qualities. However, this system of conditions includes *three* large and interrelated *subsystems*: (i) a subsystem of the conditions necessary to design an action; (ii) a subsystem of the conditions necessary for the acquisition of the desired properties; and (iii) a subsystem that transfers the action from the external to the internal mental plane of the learner.

In *the first subsystem* of the conditions necessary to design an action, its final product or outcome should be identified according to its desired characteristics, such as the size, the speed of execution, and so on. In addition, the elements (units) of this product, the order in which they should be constructed, and the operations necessary to create each unit should be specified. What then follows is the reference to the *tools* that learners can use: natural or artificial, material or materialised. Finally, an *operational scheme of thinking* should be constructed to indicate how to perform the action. Galperin describes how an operational scheme of thinking can be constructed by referring to a case study in which learners were taught to analyse Russian Orthodox churches. In summary, the first subsystem facilitates the construction of a new action. *The second subsystem* facilitates the acquisition of the desired properties of the action. Galperin's detailed elaboration of the second subsystem to achieve the desired properties of the action are the topic of lecture 2.

Lecture 1

Today we begin the study of the formation of mental functions. As long as the mobility of animals creates unique and non-repetitive situations it is impossible to manage an action without creating an image of this action. As you know, any action of an animal or a human consists of two main parts: orienting and executive. These two aspects are important because normally when we are talking about an action we have in mind its executive part only. Of course an action cannot exist without its

executive part. What can exist without an executive part—is only a plan of actions, a scheme of the future. However, we usually have in mind only the executive part of an action and forget about the fact that every performance critically depends on the orientation of a person or a learner while performing this action, we simply forget about the orienting part. In fact, we should regard orienting as an aspect of managing the action. As you will see later, some important aspects of the formation of individual actions, the success of their application and generally their significance in the life of an individual depends on the quality of the orienting part of the action. It is the orienting part and not an action itself that constitutes the focus of psychology and therefore, in what follows we will consider the focus of psychology as the orienting part of an action.

In examining orienting, one can distinguish several systems, but above all there are two large systems—a motivational system and an operating system. The operating system comprises the elements of the action. We are not going to introduce the motivational system now, not because it is not worth doing so, but because it will be presented later. Now we will focus on the operating system as elements in the orientation of the action. In the operating system we can distinguish at least *four main components*.

The first component—is constructing an image of the present situation, describing the location of the things we will need to act with. It may not necessarily be a totally new situation, but a situation that needs to be clarified or, at least, confirmed that it is the same situation learners have been exposed to before. We should either confirm this, or add something, or describe in detail a totally new situation. So, the first component is building or updating the image of the present situation.

The second component of the operating aspect of orientation is clarification of the potential of the individual components of the present situation for the interests of the acting subject—a learner. This clarification is the primary purpose, because there are other functions of these components: as a tool to perform an action or create additional conditions for the action. However, it is important to identify the potential of the individual components for the primary, the actual, need of the learner. Alexei Leontiev describes this need in the lofty term of 'a personal meaning'. Of course, this is correct in relation to a person, although it is not always so lofty. In general, we are talking about the significance of the individual components for the needs of the learner.

The third component is planning future actions. Animals do not create plans, but they identify the way to reach the desired objective, or, the opposite, the way to retreat from the objective if it is dangerous or undesirable.

Finally, *the fourth component* is very complicated: it is the further orientation of the action during its execution. We call it: facilitation of the action in the course of its execution. This facilitation comprises two major parts: (a) actual control over the process of execution of the action; and (b) correction of the observed deviations.

As you can imagine, each of these four major components of the scheme[1] that comprises the orienting part of an action and especially the last component, can grow

[1] Galperin gives more details on thescheme later in the lecture.

into a large independent field of study. For example, the construction of the image of the present situation, in fact, can become a form of a cognitive activity and so present a separate scientific area of study with all its ramifications.

However, I would like to warn about the following: the fact that the process of the development of cognition can grow into an independent area of study, does not mean that at the beginning of ontogenesis, we can say that a baby is able to conduct a very small cognitive activity on a reduced scale. A cognitive activity, being a particular type of human activity, is qualitatively different from the type of activity a baby can perform. The orienting activity of a baby is closely related to and is marked by its immediate practical implementation. So, the difference between the cognition of a baby and an adult is qualitative rather than always easily measurable.

Similarly, an understanding of the potential of the elements in the present situation for current needs happens differently with small children and with adults. In an adult, this understanding may present ethical problems with their ramifications. The potential of the objectives in a situation is not always clear in relation to someone's actual needs. Therefore, clarification of the potential of the elements in the present situation for the current needs of the learner can be seen at the very beginning of all human actions.

Each of these four components can turn into an independent area, with its particular significance. However, even being in a simple form and inseparable from each other, these four components are always present in orientation—in humans and in animals. Another thing is that for an animal, it is natural that objects possess useful potentials which an animal is already aware of. This is because an animal lives in the world of instinctive relations and a significant feature presents itself immediately as an unconditioned stimulus that evokes positive or negative attitudes to it. Hence, each of these complex four components can be identified in any orienting activity.

These four components are not only complex, but they are different too. To begin with, we would like to start with some simple ideas: the two main components in the managing aspects of orientation. These are always images of one kind or another (either it is an image of the present situation, or an image of the action plan, or an image of an action that is being executed that merges at some point with its plan, or an image that has a kind of scattered potential—something matters, but something does not matter, etc.). So these are images, different, but images. In addition, there are always actions that are performed in terms of these images. Well, let us say we make a visual estimation of the distance from ourselves to an objective. This is an action in terms of images, because we deal with perception, we do not do anything with hands; if we move our eyes, which is only of secondary importance, this does not represent the way we estimate the distance, because sometimes we do it even without moving our eyes at all. Hence, we perform an action: estimating the distance in the visible field, but without performing material actions. This is an ideal action of which there are many, including those that are performed in mind. There are many other activities that are carried out by us on the ideal plane either in terms of perception, or mentally, but, anyway, these are ideal actions. They differ in purposes, but they are all defined as ideal actions.

So, we have two main components of any orienting activity—these are images that represent the reality around us (images as such, with their potential, as a plan or as a real ongoing process), and then, the actions that we perform in terms of these images which are ideal too. Therefore, our task today is narrowed to the two main elements of orientation: images and ideal actions in terms of images. Having identified the two main components, the question is: which of them do we start with?

Any ideal action takes place in terms of images and therefore, it presupposes the existence of these images. On the other hand, images themselves are the products of the actions, and the actions that are not only ideal, but above all in their original form—real actions with objects, which are later presented for us as images. So, images themselves are the products of the actions with objects represented in images. Strictly speaking, these are two inseparable elements, but we would like to start with the one that we could use as a clue in our study of these complex phenomena. That is why we choose the development of ideal actions as a starting point of our investigation and, as you see, images are needed, in fact, to enable us to perform these actions; while images themselves are the products of actions (material and ideal).

So we start with the formation of ideal actions. In this endeavour, we cannot begin as if we were the first humans on earth, because there are certain premises we need to start with. *The first premise* of the formation of an ideal field in general, and specifically the formation of an ideal action, is the famous statement by Marx in his foreword to the second edition of the first volume of "Capital". Marx contrasts his method to the method of Hegel, saying that for Hegel ideal is a demiurge, the initial motor of the entire universe, and for him, for Marx (his exact words), "*the ideal is nothing else but the material transferred to the human head and transformed in it*". Let us consider this statement as a starting point.

Based on this premise we can consider ideal actions, which we produce in the field of perception, in terms of speech, or mind, as derived from external subjective, material actions, which are then transferred into a human head. During this transferring and further functioning in the human mind these actions undergo regular changes, becoming what we discover later as ideal actions.

These ideal actions are nothing more than real, substantive, external actions in their origin, content and primary function. But for us it is very important (and here comes the second premise), that these material actions should be also created. We say that ideal actions derive from material actions, which do not appear by themselves in their final form, but have to be created. Hence, *the second premise,* is to find or create a material action, which an ideal action could be derived from. This is a very difficult task, because usually we get so separated from the material in our mental activity, that we cannot find its roots, its origin. This is a particular challenge. Every time we would like to investigate the formation of an action, we need to find an appropriate material action, create this action in this form, and then transfer it to the human head, and transform it into an ideal action.

The third premise is that not all actions can be transferred to the ideal or mental plane. Well, let's say, such actions as you are busy with now, writing. Your writing remains on the paper: if you do not write, there will not be any notes. So, writing, in its executive part, is an external action. It has its orienting part which is found with

children who are learning to write and then gets reduced and transfers to the internal plane. The same happens, for example, when you learn a foreign language. In order to construct a proper phrase or a sentence, you have to get a detailed orientation to the relevant parts of grammar, phonetics, lexicology, and then, when you master this language, it seems that you just speak it. So, the speech as an external (oral or written) action remains external, while its orienting part undergoes changes, is transferred to the internal plane and is transformed there. Not every action can be transferred to the mental plane. There is a very wide range of what are traditionally called motor skills, which remain in the external field, in the field of material objects, while their orienting part transfers to the internal plane. On the other hand, there are actions that can be entirely transferred to the mental plane and they can be performed on both the external and internal planes. Imagine that you are studying maths. You can perform mathematical calculations in writing, externally, and you can learn to execute them in your head. When you perform calculations mentally, the whole action is transferred to the internal plane. For research purposes, for instance, it is very advantageous to select the forms of activities that can be completely transferred to the internal, mental plane. I would like to emphasise that this is not just an ideal plane, but a mental plane, because not every ideal plane is internal and mental. For example, the field of perception. Perception is a psychological concept, however it is different from imagination, although it belongs to the ideal plane. This plane has one very important feature that has been identified in psychology: the subject himself separates this ideal plane from the plane of external things.

There are very many phenomena that are considered to be on the internal plane, but psychologically, strictly speaking, they refer to the external plane: for example, hallucinations. A hallucinating person believes that what he hears, sees or feels really exists. The same false sense of reality of what is perceived differentiates hallucinations from illusions. Therefore, a psychological plane—is an external plane! Hallucinations might be an indicator of poor health, but psychologically these perceptions refer to an external plane. Importantly, it is not what someone sees or hears, but that someone has mixed reality and the internal plane. There are some very beautiful (in the psychiatric sense "beautiful") hallucinations described by a famous Russian psychiatrist Kandinsky and, thus, called "Kandinsky hallucinations". They are very bright, and projected to the outside world, but one is absolutely sure that these are hallucinations, not reality. This means that a person's confidence in objectivity does not correspond to the vividness of the images. One might see a very vivid picture and be sure that this is one's imagination. Alternatively, psychiatric patients may listen carefully to some voices, which they cannot make out, but they are completely sure that these are real voices and someone is whispering something to them, usually something unpleasant. What is important is that the patient is convinced about the existence of these voices. He might not make out words, but the person has no doubts that these voices are real.

What I have just described constitutes the difference between the mental plane that belongs to an individual and the ideal plane that might comprise a person's reflections and perceptions.

Based on this difference between the mental and ideal plane, we will start investigating the actions that can be completely transferred to the internal, mental plane. But here we need to establish a few preliminary conditions; otherwise we can easily slip into the situation in which psychology and pedagogy have found themselves. We cannot, if we are researchers, (if we are teachers and we have no time for research, this is another matter) behave in the same way as people who educate others with regard to creating mental actions. We cannot just explain something. Imagine that we explain an arithmetic rule of addition or the identification of sounds in a word to a child. These are basic things that are taught in school. How is this usually done? A child gets an explanation of the action itself. Sometimes a teacher shows how this should be done. Then the most capable child is asked to repeat what has been explained and he does so. Then the teacher assigns homework to practise undertaking the action. When the children are back in school, they are tested to ascertain if they have mastered this action. So, the whole process of learning takes place, in fact, beyond any control and it happens as if by itself. We just evaluate skills demonstrated by students by awarding grades. One student is performing well, another very well, the third is mediocre, and very many perform, in fact, poorly. If students still cannot perform the action, we repeat the instructions, ask students to practise more, but if someone still cannot do it, we say, removing all the responsibility from us that he "lacks some cells in his head" and we blame the child.

We are not going to discuss how this happens in detail. What is important is that the whole process of learning remains "behind a wall" and is not visible for us. In this case there is nothing to study and nothing to research. Of course, this approach can be used in educational practice, if practitioners cannot offer anything better they cannot be blamed for that. However, if we would like to study this learning process, we must reveal it, but how? To start with, we cannot limit ourselves to observing only what actually happens, it may then seem that the learning process gets started and then proceeds as if by itself and we evaluate only the final outcome. I do not believe this is the right way to go about things, but how can we manage and control the whole process of learning?

Firstly, we must accurately identify the qualities of the future learning process. For example, if we would like to teach a child how to break down words into sounds, it is necessary to identify the requirements this skill has to meet: should a child be able to break down words in fast speech, a speech of another person, whether he should do it out loud or learn to perform it silently, and so on. When we design for an action, and above all if this action is going to be assessed, we should identify the qualities of this future action, which will be used later for the assessment. What is more important is that an action always leads to some result or an outcome which should be achieved under certain conditions. If you would like to examine how students learn in a planned activity, you need to describe in detail the conditions and the way the activity should be carried out and identify its expected outcome. Hence, you should describe in detail the qualities of the action you are designing for.

Secondly, you have to select the system of conditions to ensure the desired properties of the designed action. This does not mean you should only highlight what is present already. Very often these conditions must be created and likewise, you should

also identify potential pitfalls in the designed action. This is, actually, just the opposite of what an ordinary teacher normally does. Usually a teacher explains the task, emphasises why it is important, and shows how to complete or solve the task. Then he asks students to learn everything that needs to be learnt by solving other tasks; however, how the students learn remains out of the sight of the teacher. The teacher just assesses the final outcome. I would like to suggest another approach: not to delegate our duties to students, but to find a system of conditions under which students *cannot help mastering the action and, in doing so, learn how to complete/solve other tasks.* Above all, the action needs to possess the desired properties that have been identified previously and hence, we have to employ a rigid system of conditions under which students will definitely master the action with its predetermined properties.

Yesterday, I read a study. The author reported that using a system of certain conditions, even children with learning difficulties can learn things which they would never be able to learn under usual teaching. A task should be broken down into such small units of the kind, that we would never use for ordinary children, because such small steps represent something very painful and disturbing, as any division hinders and delays learning. So, what is negative for an ordinary child, can be beneficial for a child with learning difficulties. It turns out that if you break down an action into smaller chunks, then even a child with disabilities can master this action. However, there is another very interesting aspect of this matter, but I will tell you about it later. Hence, it is important that we do not just set a task for a learner by saying: I have explained everything to you and now you have to solve it yourself; but instead we select a set or a system of certain conditions that would assist the child in solving this task.

This system of conditions is labelled the phases of mental development and ensures that the action being designed for will possess the predetermined qualities. This is a very narrow label, however. This system of conditions includes three large, though interrelated and intertwined, subsystems: the first—is a subsystem of conditions necessary to design an action; the second—is a subsystem of conditions necessary for the acquisition of this action and its desired qualities; and the third—is a subsystem, so-to-say, "transferring" the action from the external plane into the human mind.

Let us explore each of these subsystems. The first—is a subsystem of the conditions necessary to design a particular action. When identifying these conditions, we have to recognise that every action is characterised by what it produces—its product or outcome. All actions have an outcome; even those that seemingly do not have one. For example, gymnastic movements, what product or outcome do they have? The outcome is a particular form of an action, which is desired to be achieved and which, as you know, can be achieved only with great effort, because it is one thing—just to perform a movement, and another—to perform the movement with its predefined qualities. Of course, you are aware that this requires considerable effort and those who engage in sports or gymnastics know how difficult it is to perform floor exercises.

So, every action has its own outcome and is characterised by this particular outcome. An identification of the final outcome with its distinctive characteristics is the first point to be considered when designing for an action. For example, if you would like to design a writing activity, then you will need to teach explicitly how to

write fast and clearly. Well, perhaps most of the students in this room do write more or less fast, but whether they write clearly—this is very doubtful.

As I have already said, the starting point in the design of an activity is identification of its final product with its desired characteristics. Usually these characteristics are: the size, the speed of execution, etc. The second point is that we identify the units of this product in the order they need to be constructed, in other words we specify the parts of this product in the order of their execution. This order may not match the sequence in which these units appear in the final product or outcome, however, you need to specify those that make up the final product in the order of their execution, and each unit should have its specific characteristics. When you have identified the characteristics of all the units to be created, then, in the third step you specify the operations necessary to create each unit, which sometimes may require several operations, and you specify them: (i) in the order of their performance and (ii) the desired qualities of these operations in terms of speed, sequence, size, etc. (We will talk about this in detail later.)

Hence, it is necessary to introduce the order of all the operations that constitute each unit. Of course, this should include the initial material you are working with or the starting point. After all, an action will lead to the final product, which comes from the existing initial material. The characteristics of the initial material of an action are also important and they are included in the same description.

What then follows is the reference to the tools learners can use. Almost all human actions are performed with various tools. These tools can be natural in origin, for example, their own bodies, or they may be artificial. Even when writing, you use a pen, which has to meet certain requirements (often we are unhappy with the quality of pens), paper, which also has to be of certain quality, etc. Hence, there are tools that we use, but there are also other tools. For example, when we study a foreign language, we have to learn to pronounce its sounds correctly with the help of another natural tool—the larynx. We force our poor larynx to speak the way it has not been used to from childhood—in a foreign language, based on other principles of intonation. You know this is one of the most difficult tasks—to learn the proper intonation, the phonetics of a foreign language; however, this is absolutely necessary. In the descriptions of how to perform physical exercises it is pointed out clearly how to teach our limbs to move, not the way we move them in everyday life: for instance, sometimes how some people walk looks awful. In the military, soldiers are taught different types of marching or steps, and not only in the military, but in ballet schools too. If you at some point meet a person who can walk properly: you will envy this person and will also try to walk, not anyhow, but in a way that means that you would be looked at and admired. Hence, everything needs to be learnt, and we must teach our own body movements to meet these specific requirements.

Tools can be of all sorts. If you take the production of material things, then these tools are machines, cutting, assisting, measuring instruments—all these instruments should be linked into a single, interconnected system.

There is another very important point, which I introduced only in a general, very descriptive way and now I would like to present it as a separate part of the system. A learner, and we consider a learner any person who is learning, if he is an

academic—he is still a learner, if he is to learn something, he has to be presented with the overview of the whole activity. Previously, we said that the fourth component item of the scheme, which we label the scheme of the orienting basis of an action, is the representation of the scheme of action as a whole. Consequently, a person has to follow this scheme when he begins to perform a new action. Now we can clearly specify this last component as *an operational scheme of thinking*. This is a very important point, which shows the difference between a machine and human approach to an action: a machine does not need this operational scheme of thinking, everything else can be supplied to the machine, but not this scheme. This is a general scheme of action. If the system of instructions is very difficult or when students have to act without any visible cues, then we need to offer the learner the general operational scheme of thinking in addition to a list of the order of operations to be performed.

Let me give you an example of one very beautiful operational scheme of thinking. The students in the 3rd–4th grades were taught to analyse the monuments of ancient Russian architecture (mostly churches). Generally, Orthodox Churches are complex buildings: they have a lot of different elements, they are characterised by different parameters, and there are different schools: Moscow, Vladimir, Novgorod, Kiev, etc. These schools have their own well-defined features. In addition, within each school, churches of different types were built: some of them—strictly monumental, others—solemn, and others—festive. There were churches, so-called, for home use, which were more intimate, etc. So, the students were to learn to distinguish which church belonged to which school according to clearly defined criteria. One of these criteria used in the analysis, was the structure of the churches. This structure was analysed, starting from the foundation (Fig. 1).

Then the main box (Fig. 2).

Then the roof (Fig. 3).

Then the drum (Fig. 4).

Then comes the head that finishes everything (Figs. 5 and 6).

Fig. 1 The foundation of the church building

Fig. 2 The main box of the church building

Fig. 3 The roof of the church building

Fig. 4 The drum of the church building

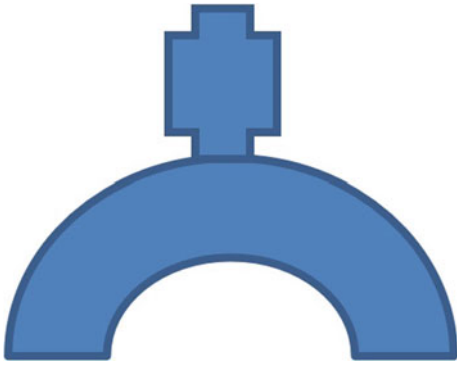

Fig. 5 The head of the church building

Then the doors (Fig. 7).

Then the windows (Fig. 8).

Then other auxiliary buildings (Fig. 9).

In addition, each of these elements has a number of specific items. For example, the foundation: which materials it was built from and according to which plan, etc. Each of these elements contains 6–7 such items. For instance, the main box could be cubic, rectangular, hexagonal, or octagonal. All this requires a detailed analysis. It turned out that when the children were given a card with the scheme, this card appeared to be very complicated (Table 1).

The children could use this scheme by moving from one item to the next one, analysing and drawing conclusions about the type of construction. However, it was

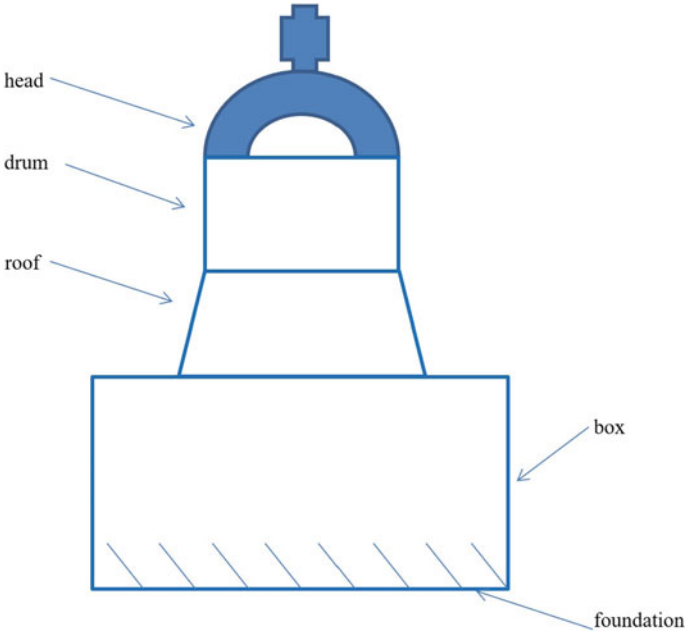

Fig. 6 The structure of the church building

Fig. 7 The doors of the church building

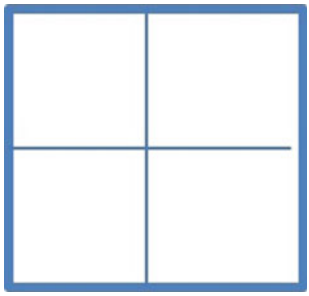

Fig. 8 The windows of the church building

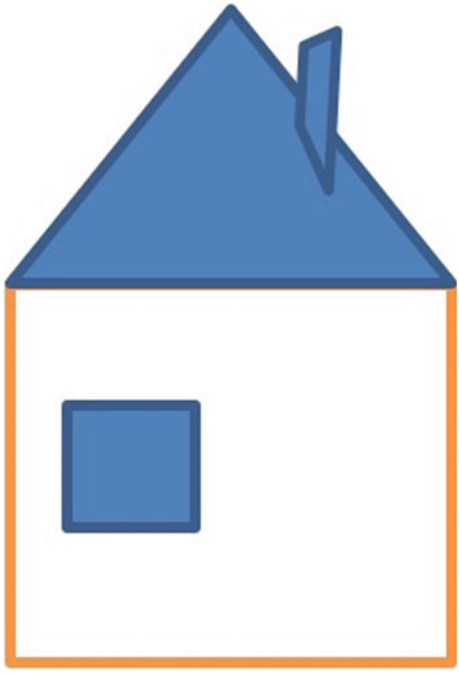

Fig. 9 Other auxiliary buildings

very difficult to transfer such a complex scheme to a mental plane. As soon this scheme was taken away from the children, they appeared to be helpless. Meanwhile to teach—means to develop the capacity with learners to analyse independently, on their own, rather than using this card. In order to do so, children should be given an operative scheme which surprises them because of its emptiness; but also because of its usefulness (Fig. 10).

The analysis proceeds from the foundation of the church to the box from the box to the roof, from the roof to the drum from the drum to the head, and then it turns to the door, then to the windows, and then to other buildings. So, in addition to a huge list, another scheme is needed. But what does it actually add? After all, it is empty. This scheme provides the general division of the object into its elements and

Table 1 The scheme for the analysis of church buildings

Main elements	Points
Foundation	1._____ 2. _____ 3. _____
Box	1._____ 2. _____ 3. _____
Roof	1._____ 2. _____ 3. _____
Drum	1._____ 2. _____ 3. _____
Head	1._____ 2. _____ 3. _____
Windows	1._____ 2. _____ 3. _____
Other buildings	1._____ 2. _____ 3. _____

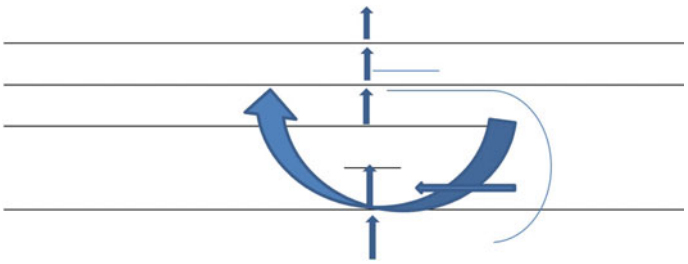

Fig. 10 The operative scheme of thinking

also the procedure for the analysis, which guides the analysis of the object. This is a very interesting thing. You see, this is exactly what a machine does not need because it follows the uploaded scheme or programme and produces an answer. A machine does not need this special operative scheme. Schemes of this general nature are operative and have special relation to the way we learn. Earlier we used to think if you have some knowledge—good, if you do not—bad. It may happen that you have knowledge, but may not be able to operate with it, if you do not have an operational scheme which forms a so-called meta-understanding of how knowledge is created within a particular subject.

This is what the last point of the scheme of the orienting basis of an action should be (we call it a scheme because the action has not happened yet and when the action happens, then the scheme will turn into the orienting basis of the action). In addition to this scheme, there should be an operational scheme of thinking regarding what a person should do. If the scheme of the operating basis of the action is relatively simple, if the movement from one item to another is enough to perform the action, then we do not need to identify an operational scheme as a separate item, but psychologically this operational scheme is still being identified by learners. However, if the scheme of the orienting basis is complex, then the operational scheme has to be introduced separately.

What also seems important is that the division of the action into individual steps should take into account how well the learner is prepared for these steps: if a learner is well-prepared, then the steps will be larger; and if a learner is less prepared, the steps should be smaller, fragmented. There is, of course, a limit for this fragmentation; because if learning is divided into very small chunks then it is always necessary to make sure that the preliminary knowledge and skills have been mastered by students. The prerequisite for mastering new knowledge is very important for a student who, for example, is not able to learn even the simplest component of the new knowledge on his own. Therefore, it is important to distinguish between the general division of the desired action and the student's individual and psychological needs. Equally, it is necessary to distinguish between the units of the action and the individual steps of a student in this scheme. A learner starts with the steps he can do himself and then the steps should increase, although the general structure of the action remains the same. After a while the learner is able to proceed in bigger steps, which is one of the most important tasks—to increase the size of the steps of the action while it is being performed. In the end, the action turns into one continuous stream, into one single step. Sometimes it happens that individual actions merge and form steps that exceed the size of these individual actions. Objectively, they are a chain of actions, but for a learner they are merged into one continuous stream. This should be pointed out very clearly, because one thing is what you need to master, and another thing is that while mastering it you modify the way you perform the action, and, accordingly the way this action appears to you—as integral or divided.

There is one very characteristic signal that indicates whether the scheme of the orienting basis of an action is complete. After all, you can create this scheme based on your own premises, but a student, following the outline of your scheme may not always perform the action. Who is to blame in this case? You! If a learner has all the necessary prerequisites and if you have created the complete scheme, then the indicator of this is a paradoxical situation that, following the outline of this scheme, a student who has been unable to perform the action without the scheme, can perform it correctly from the first attempt and repeat this performance correctly every time afterwards. A learner is not able to perform the action without the scheme that you have created, but using it, he performs the action step-by-step. When the scheme has been constructed properly, then the student will inevitably achieve the desired result. This circumstance is somewhat paradoxical at first glance, but it is absolutely clear that a learner, who was previously unable to perform the action, by following the

scheme of orientation, now performs the action correctly from the first attempt and every time afterwards. If this is the case, the learner's performance indicates you that you have created a plan of action correctly. However, if a learner follows your plan (if he gets distracted, this should not be taken into account), performs one step after another and does not reach the desired result, this might indicate that the scheme is incomplete and you have missed something. Then look for these missing parts! This has always been very important to us and that is why we have spent over 20 years investigating possible scenarios, since it is not an easy thing to construct the scheme of the orienting basis of an action.

Therefore, the scheme of the orienting basis of an action is presented as a sequence of steps. It is often called an algorithm, but this is not an algorithm in its proper sense, not a mathematical algorithm. It is an algorithmic prescription, and it differs from the mathematical algorithm that a machine follows without any understanding. It is quite the opposite. You always make a prescription in such a way that it would be understood by a learner. This can be a very small prescription, for example for the child with learning difficulties that I told you about previously, but it should be oriented towards the child's understanding because, even within a very short operation, the child should be able to manage his action on his own. An action does not happen by itself, it has to be managed. So, contrary to what is required for the computer, we, from the very beginning, rely on the learner's understanding of the element or a step of the action that is being performed. In addition, there are also the characteristics of the product, the characteristics of its components and the characteristics of the existing material. A machine does not need any information about these features, but a person does. This operational scheme is always needed for a person, although it is not always presented as an individual resource, but psychologically it accompanies any action. A person will always identify it himself, or the scheme can be supplied to the learner, which will certainly make managing the task and the action in general easier. This is *the first subsystem*—the subsystem that facilitates the construction or formation of a new action.

The second subsystem—is a subsystem that facilitates the acquisition of the desired properties of the action. We have come to the point when a learner is able to perform a new action, using the scheme of the orienting basis, but how do we ensure that the action acquires the properties we would like it to have? And actually, what properties do we want this action to have? This is in the next lecture.

Chapter 2
The Phases of the Development of Mental Actions

Outline of Lecture 2

The focus of lecture 2 is the *executive part* of the action, which comprises *three subsystems*: (i) the conditions for constructing the action (*a scheme of the orienting basis* of the action); (ii) the acquisition of the desired properties of the action; and (iii) the transfer of the original external action to the mental plane of the learner and the transformation of the action into a new psychological process. Galperin elaborates in detail the first and the second subsystems of the executive part of the action.

Galperin points out that to create *a scheme of the orienting basis* of the action, the action should be visualised, and *the outcome of the action* with its particular characteristics should be identified. The desired outcome of the action should be divided into the elements (units) presented in the order of their execution or performance. The properties of each individual unit and its intermediate outcomes should be specified. In the process of the development of the action, these units eventually become combined into a single step, and the action is performed in a single, continuous, and indivisible process. Galperin emphasises the *properties of the initial materials* and the tools of the action, which can be divided into primary tools, auxiliary tools, and control tools. The control of the action can be performed against previously identified, critically important indicators of the action—the criteria of control.

Galperin describes the *operational scheme of thinking* as a complete generalised scheme of action and shows how such a scheme may be created to solve problems in physics, for example. Drawing on Piaget's experiments, Galperin discusses how to facilitate a general change from children pre-scientific, naïve, and egocentric thinking to scientific thinking by identifying the generalised essence of the target phenomenon and its characteristic features.

In the *second subsystem of conditions*, the desired properties of the actions should be identified. These properties are as follows: (i) *rationality*—the learner focuses on identifying the action's objective and significant relationships; (ii) *generalisation*—the learner is able to identify the significant conditions among the variety of

I. Engeness, *P.Y. Galperin's Development of Human Mental Activity*,
Cultural Psychology of Education 14,
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conditions in which he or she operates; (iii) *consciousness* of the action—the learner's ability to give a verbal report of the action; (iv) *criticality*—the comparison or verification of the selected criteria for an assessment of the action in relation to reality; (v) *measure of the mastery of the action*—whether the action can be performed by the learner using the initial material resources or whether it can be performed verbally in symbolic form, or mentally and how quickly it can be performed.

Galperin then turns his attention to the *primary properties* of any action: (1) The nature of the object with which the action is performed. These objects can be material, materialised, or verbal. The differences between the objects with which the action is performed can be described as levels of the action: the starting level is material, the intermediate level is verbal, and finally, the mental level. Galperin summarises that these main levels of action can be considered gateways through which the action can be developed from the material level to the level of speech and then to the level of acting mentally. (2) In designing an action, each unit should be carefully developed. In some cases, several units of the action can be skipped, and the action is always performed with a certain degree of completeness: it can be deployed to a lesser or greater degree or deployed differently in its different units, but the original completeness of the units is a mandatory property of the action. (3) The measure of the differentiation of the action is characterised by (i) separating the essential from the non-essential and ii) resistance to what is inessential and may interfere in the action. (4) The timely parameters of the action are tempo and rhythm. (5) The power characteristics of the action are the size and the distribution of the effort of the learner engaged in the action. Finally, Galperin poses a question about how to develop the desired properties of the action. The detailed answer to this question is the topic of lecture 3.

Lecture 2

I will start with a quick overview of what I was talking about in my previous lecture. I said that we would begin the study of the formation of mental actions with the development of ideal actions because it is the ideal actions that form the basis of all mental processes. I also said that in this endeavour, we would take Marx's statement as a starting point that the ideal is nothing other than the material, "transferred" into the human mind, and transformed there. In this lecture, we are going to trace this process.

To start with, we need to find out how actions are first formed as external actions with objects, and then transferred to the ideal plane. As a result of this transfer, external actions undergo changes, which make them totally unrecognisable and they begin to look like mental processes.

We will examine the formation of an action by starting with some pre-defined indicators. Such an approach will allow us to establish a causal relationship between the properties of the action and the conditions that lead to the formation of these properties. The whole of school practice, and life in a broader sense demand that

some actions should be performed not physically, but ideally. For instance, when you cross the road, you estimate the distance and the speed of vehicles and evaluate whether you are able to move faster than the approaching vehicles and cross the road safely. In doing so, you perform an ideal action in the field of perceptions, and very often life teaches us how to perform these ideal actions in the surrounding environment. If we do not set ourselves the task of creating an (ideal) action with certain properties, but instead go about it in the usual way, (for example, first the action is explained, then it has to be learnt, and then it is checked or tested), then different people under different circumstances, perform this action in totally different ways and correspondingly get different results. This way of working makes it very difficult to understand why and how the results achieved by learners are so different.

To avoid such a situation, we need to define in advance the properties we would like an ideal action to have. We should also choose the system of conditions that will ensure the formation of these desired properties. This system of conditions is divided into three subsystems. I'll name them first, and then we will look at each of them in detail.

The first subsystem contains the conditions necessary to construct a specific action or create a scheme of the orienting basis of the action.

The second subsystem ensures the acquisition of the desired properties of the action. The same action can be performed with different indicators that may serve as a measure for evaluation of the action: e.g. speed, the degree of dependency on certain conditions, etc.

The third subsystem transfers the original external action with objects to the ideal plane of the subject and transforms this action into a new psychological process.

In my previous lecture, when talking about the first subsystem, I said that it comprised the conditions the subject should take into account when creating a totally new action and learning how to perform this new action. First of all, you should specify a so-called "model" of the action. To achieve this, we have to visualise the future action—how it should be performed. An action, as you remember, is characterised primarily by what it produces—its outcome.[1] Therefore, you should also specify the outcome to be achieved with its particular characteristics and the action that creates this outcome. Such an approach represents a clear idea of what needs to be achieved (outcome) and how this can be achieved (process—action). However, since any process happens in time and the desired outcome cannot be achieved immediately, then the outcome should be divided into elements, which are presented in the order of their execution. This may not be the order in which these elements appear in the final outcome, but this is the sequence in which the elements, that constitute the final outcome, should be produced. So, we divide the desired outcome into elements in the order in which they have to be created and correspondingly we divide the action into individual units in the order of their performance. We should specify in advance the properties of each of these individual units of an action and their intermediate outcomes. I have previously emphasised that we should distinguish between a unit of an action and a step that a learner is able to perform which can, in fact, differ

[1] An outcome can be also understood as a learning outcome.

from the unit of the action (in this case the unit should be divided into steps that are manageable for the learner). What usually happens in the process of the formation of an action is that these units eventually become combined into one single step and the action is performed as a single, continuous, indivisible process. It is therefore important for us to separate the objective units of an action from the ability of a learner to perform these units (either in smaller steps, or in the steps of the size of the actual unit, or perhaps in larger steps).

The next point to be taken into account is the properties of the initial material that the action "deals with". Such material is always present, even when it is not visible and, as I have already told you, it is present even in the movements of free gymnastics: it is the ability of a person to perform the physical movements, their muscles and how well they can use them. So, the level of a person's physical development when learning these free movements is the initial material he is going to work with. In this case, it may seem that no initial material exists in the external field; however, in other cases such initial material can be recognised. In physical labour the initial material is the "raw" material we begin to work with. In mental work the initial material is the numerous sources we collect in order to do the work, for example, examining a problem and drawing a conclusion. So, there is always some type of initial material.

It is also very important to organise the initial material beforehand and not, as often happens, move immediately into the action without forethought. Organising the initial material ahead of acting is a very big task. Firstly, we need to verify whether the initial material is sufficient and suitable for the main purpose of the action. However, even if the initial material turns out to be suitable, it is still necessary to organise it in such a way that it can be used by learners in the corresponding individual units of the future action.

Then there are the tools of an action. Here we must clarify something I have been confused about myself for a long time. You see, tools can be used in the executive and in the orienting parts of an action and these tools are different. The tools of the executive part are quite obvious—these are tools used in an action as an external objective process. I will elaborate in detail on the tools of the orienting part a bit later.

Tools can be divided into groups: primary tools, auxiliary tools and control tools. This is a very important point, because you know how hard it is for a person undertaking intellectual labour to be in the position of controlling what he has done. Sometimes, it is necessary "to leave" the product for a while and to distance oneself from it. This distancing may involve a long wait time, which is not always possible. Therefore, it is very important to have some objective tools of control, especially in intellectual, mental forms of activity, where control has to be particularly precise and sensitive. Nevertheless, generally speaking, this type of control is not different from control in any other types of activity.

Control, although it may seem to be quite straightforward, should also be organised. Organisation of control comprises the identification of some of the points of control, because you cannot control absolutely everything. You can control an action as a process, and its outcome, in relation to some of the critically important indicators, which together with the means of control may serve as criteria of control. These

criteria can be of any nature, but they should be objective. We also have to describe how these criteria will be used. So control, as you can see—is quite a complicated matter.

What follows after control (and this also should be planned in advance in the scheme of the orienting basis of an action) is the correction that may be necessary if some deviations (in the outcome or the process) have been identified.

Finally, in my previous lecture, I made a point about presenting a complete generalised scheme of an action. However, you may wonder what is "a complete generalised scheme of an action"? I have always considered this complete generalised scheme important as it highlights the difference between a human and a machine. A significant part of work (if it is very complex) could and should be transferred to a machine. However, there is something that cannot be transferred to a machine and this is the point we are discussing. A machine does not need to have an overview of an action as a whole. It operates according to some selected indicators: it reads the indicator and performs the operation. A machine does not require anything else because it, actually, cannot think. That is why, as you know, a mathematical algorithm that contains instructions or prescriptions can be performed without understanding, but when we deal with a human, a learner, this is another matter. In addition to ensuring that each instruction can be understood by the learner, we have to create an understanding of the complete generalised orienting scheme of the action as a whole.

Therefore, the last point in the scheme of the orienting basis of an action is, strictly speaking, a complete generalised scheme, presenting an action as a whole, or, as we have come to call it in recent years, an *operational scheme of thinking*. This scheme may be of various types: it can be, for example, quite specific, as it was in the analysis of the structure of church buildings mentioned in the previous lecture. However, back in I960, L.F. Obukhova used a similar scheme for solving problems in a physics course in secondary schools, such as the problems of the pressure of solid objects, and indicated that this scheme could be applied to a whole range of tasks. We did not recognise the significance of the operational scheme of thinking at the time; we thought it was only an auxiliary tool of low importance. It turned out that this scheme was of very high importance for human actions.

Imagine, for example, a carriage with four wheels (Fig. 1). It is loaded with boxes; each of which has a certain weight. Your task is to calculate the pressure exerted by

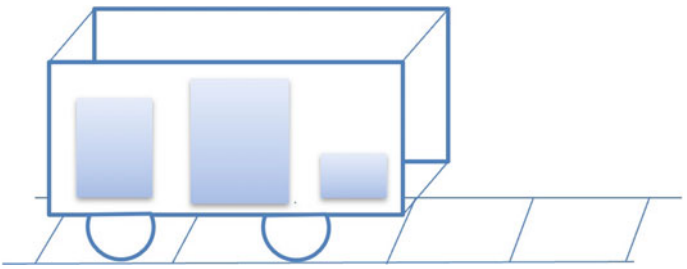

Fig. 1 A Carriage with four wheels and loaded with boxes

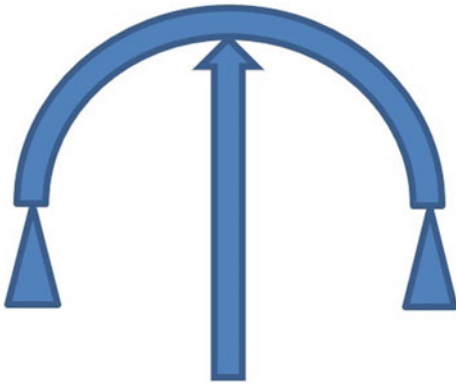

Fig. 2 The scales with two cups

these boxes together with the carriage and the wheels on the rails. You know the bearing surface area of each wheel on the rails. What do we have to do? Firstly, we have to calculate the weight of all the bodies that exert pressure, and secondly, we need to calculate all the bearing areas. Then we divide the total weight by the total area.

It turned out (this is also interesting), that if you present a finished diagram to learners that depicts this problem, it does not provide any help: a child needs to see how you draw these lines, how you highlight and add all the parts that make the total weight, and the areas of support of each wheel. It is a very peculiar thing that a wide variety of problems can be solved in a similar way, with a very complex arrangement of the bodies in relation to their bearing area. Imagine the scales (Fig. 2).

Here the weight of the cups is combined with the weight of the yoke and the bearing area is, in fact, the pointing part of the beam. As you can imagine, various combinations can be very difficult. It is very important that in these different combinations the scheme becomes very similar: there is the mass of the bodies, which exerts pressure, which means there is a pressing force P, and the total mass exerts its pressure on the area S (Fig. 3).

This is, in fact, a scheme that can be used for solving any problem about the pressure of solid objects. But this—its final form, and the original form—are the lines that connect all the bodies, exerting the pressure and all the bearing points where the pressure is exerted. So, this is a generalised operational scheme of thinking, the scheme that can be applied for a range of problems.

Together with L. F. Obukhova we analysed the differences that occur in children's thinking in the transition from a happy preschool age to an early school age, when the school "drill" starts. It turns out that a child's thinking undergoes very significant changes. In its happy preschool age, a child believes that the things are the way he[2] sees them. This is the age when a child does not want to know anything about measuring, adjusting, etc. A child sees these things and believes that they are the way he sees them: such a naive egocentric position. In addition, a child usually thinks that

[2]Child (noun) is masculine in Russian.

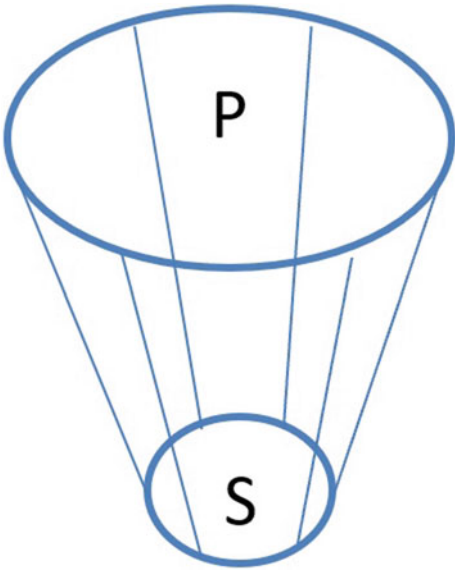

Fig. 3 A pressing force P exerts its pressure on the area S

all the properties of a thing are equivalent to the very thing itself. In philosophical terms, this means: a thing has its essence, and because the essence is singular - it makes a single entity with the thing which is expressed by its different properties. Moreover, all of these properties are equivalent expressions of this single entity. Therefore, a child can easily make judgements about some of the properties of a thing from the perspective of other properties. Well, with a skilful experimenter a child always misses the mark.

There are the wonderful experiments of Piaget used by L. F. Obukhova, in which a child is presented with two bottles filled with coloured water (Fig. 4).

The child is asked if there is more water in one of the bottles. When both bottles are next to each other, he says that the amount of water is the same in both bottles. Sometimes a child (children, you know are terrible quibblers) says: “No, there’s a little bit less here”. Then, we add a drop of water, and he says: “Now it’s the same.” We have to compromise, and we agree that now the amount of water is the same. After that we immediately turn one bottle upside down (Fig. 5).

The water fills the narrow part and it seems that there is more water in one of the bottles. And when the child is asked: “Well, now where is more water?” He replies without hesitation: “Here” (pointing to the upside down bottle). We say to him: “How did it happen? We did not do anything”. He replies: “You turned it upside down, so there was more water”. It is difficult to prove that the child is wrong as he does not even want to measure. He just sees more water in the upside down bottle and that is all.

When a child becomes older he begins to recognise all sorts of difficulties in life, then he begins to evaluate things not on the basis of how they seem, but on the basis of how they really are, which means by measuring: a fundamentally different position

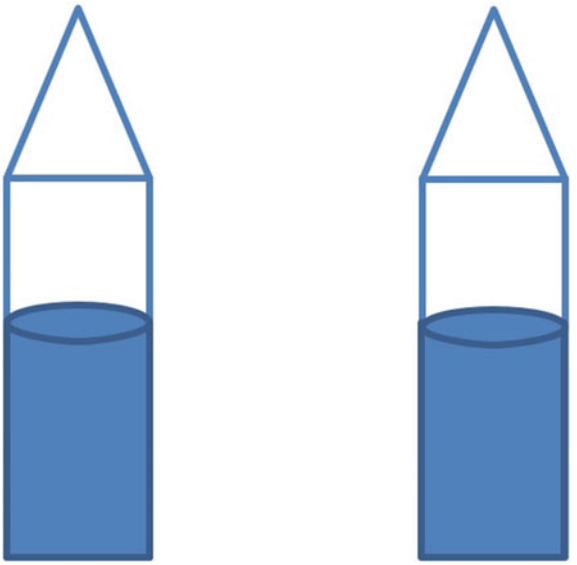

Fig. 4 Two bottles filled with coloured water

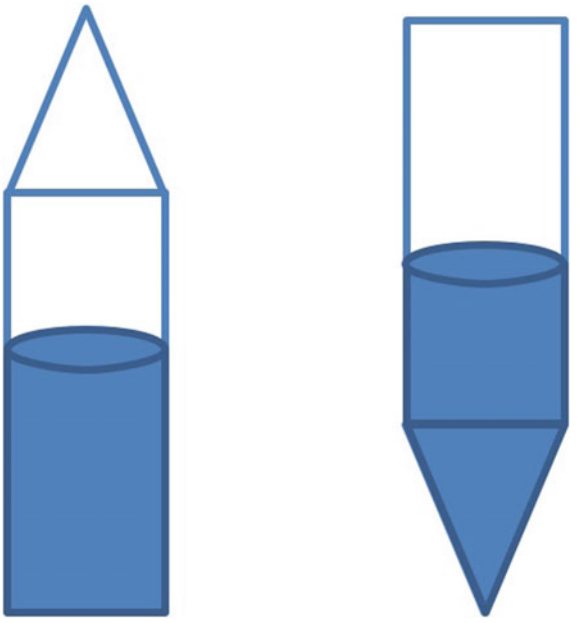

Fig. 5 One of the bottles is turned upside down

in terms of an objective method. Importantly in this transition, from pre-scientific to the first proper scientific thinking in children, what happens is not so much a shift in knowledge, but a shift in a generalised operational scheme of thinking.

An interesting point is that you can teach a child how to measure, and he will measure and will get results, but these results will have no impact on the child's thinking at all. Let's say you showed a child how to measure, and when the bottles were next to each other, he measured the amount of water in the bottles with the help of, for example, a cup and found that there were four cups of water in each bottle (the child could also see that the amount of water in the bottles was the same). However, when you turned one bottle upside down, there came the contradiction. We asked the child: "Well, now how many cups are in this bottle?" He replied: "Now there are seven cups."—"Why seven if we didn't add more water?"—"You turned it upside down, so it became seven instead of four". You have taught arithmetic and measuring, but still his understanding of the situation is subjected to his perception of things. Since the child sees that there is more water, then there are not four cups of water, but seven. You have taught him how to measure using technical tools but his understanding of the phenomenon remained the same. Therefore, it is important not only to teach some knowledge, but to facilitate a general change in the ways of thinking, from pre-scientific, naïve, egocentric thinking to scientific thinking itself.

In scientific thinking too there are a number of schemes, which include, for example, a shift from the naively egocentric position to the objective position of identifying the essence of a phenomenon by using pre-defined criteria. It is important to remember that these operational schemes of thinking may be of different types: they can be applicable for particular cases, or may cover an area of knowledge (as regional schemes). They may relate to the sciences as a whole, or to knowledge about specific physical phenomena. Even younger children, when they make the transition to initial scientific thinking, start evaluating things on the basis of measurements, from the perspective of an objective position. However, when young learners are presented with a problem from an area of, for instance, moral categories (again there are fascinating experiments by Piaget), they again demonstrate their original naivety. One example describes the situation when a boy, who was at home alone, without permission opened a cupboard to get some jam and dropped a cup, which unfortunately smashed. And another boy, in contrast, while helping his mother to put the clean dishes into a cupboard dropped three cups, which also smashed. The question is: "Which boy carried out the bigger offence?" The child usually answers: "The boy who smashed three cups." However, from the moral perspective the response should be the opposite. The first boy disobeyed and consciously committed a moral offence. And the second boy did it accidentally. This is not a moral offence, but, so to speak, a physical one; but the child judges only by the amount of damage, the physical damage. As you see, in the area of morality the learner is still lacking the true criteria, he still thinks very naively, but at the same time the same learner can demonstrate some elements of scientific thinking when dealing with physical phenomena.

Operational schemes of a philosophical type are also worth mentioning. You know that there are great scientists who have very peculiar views in areas that are

not relevant to their field of competence. Let me give you an example of a big physiologist, the professor of Leningrad University, who died recently. He was a very clever scientist and had made a number of important discoveries in the physiology of nerve conductivity; but he was always interested in psychology. He, in fact, tried to transfer schemes suitable for the analysis of neural processes to a completely different area—the field of psychology. So he organised the Laboratory of Parapsychology at Leningrad University to study psychological phenomena. However, the direct transfer of schemes applied in one field to another field does not always work. Schemes of scientific thinking, applied for real material objects, are not suitable for the explanation of social or psychological phenomena. The scheme of thinking and analysis used, for instance, in the study of the struggle for survival in the animal world cannot be transferred and used for the analysis of human social relations. Why is it not suitable for the analysis of human social relations? This is mainly because of the nature of the laws applied in these sciences, which are completely different. Correspondingly, I believe that the schemes suitable in one area cannot be transferred to another area. This is a very important point, but we are not going to dwell on it for long. The important thing is that the operational scheme of thinking is always present, even in the smallest activities, either collective or individual. A person must be given not only a system of rigid instructions about what to do, but the whole perspective, the overview of the action. The operational scheme of thinking constitutes the last and a very important item of the orienting basis for an action.

This last point ends, as far as we know at the moment, the first subsystem of conditions necessary for the construction of an action that is new for the learner, who simply cannot perform the action without these conditions.

You now may be wondering how a person, using the first subsystem of conditions, can construct an action and perform it with the pre-determined and desired properties? In an attempt to answer this question, we need to turn to *the second subsystem of conditions*. We need first to consider what properties we actually want the action to have. To start with, I believe that we need to identify the maximum amount of properties and find the conditions to achieve these properties and later, if we would like to, we can easily reduce the amount of desired properties. I am sure you understand, we cannot work the other way round. If we do not know all the circumstances and conditions of the acquisition of the action and its desired properties, we cannot be sure that the action will acquire the desired properties, for example, if the conditions are randomly selected.

But what are these properties? First, I will list all the properties, and then I will explain the meaning of each of them. First of all, we would like the action to be performed *rationally*. Next the action would need to be able to be *generalised* to a certain extent and applicable to *a range of circumstances* in which the action can be performed successfully. It is also desirable that the action is *performed consciously (with awareness)*. The action also needs *to be critical* (we will talk about this later). And finally, we need *a certain degree of mastery of the action.* This includes, for example, free and fast execution, performance with the minimum of attention—employing automatism, etc.

These are the main properties that we would like an action to have. Since we need to teach these properties, we have to define how we understand them, otherwise risky naïve ideas may quickly arise. It can happen that we think we understand something, and then it turns out that this is not what we mean or what others understand. Let us therefore define each of the properties of the action in detail.

Rationality of the action means that the subject (the learner) focuses on identifying the action's objective and significant relationships. There are many relationships between phenomena and the circumstances that constitute an action. Consequently, the learner should be able to identify those, among all possible relationships, which are essential to perform the action.

Now the second property is usually called *generalisation.* This is also a very important aspect, because an action does not always occur under similar conditions. It can be performed under conditions that vary and sometimes are actually quite disruptive. Therefore, the idea of generalised action means that the acting subject (the learner) is able to identify the significant conditions for the particular action among the variety of conditions in which he operates. This is very important because some actions can be performed under very few conditions. Therefore, a learner has to demonstrate stability, a degree of insensitivity to any interference, and be able to identify the significant conditions needed to perform the action.

Consciousness of the action. We are not going to talk about what *consciousness* is in general, because there are ten thousand opinions on this point. Let us just agree about what we call *consciousness* of an action—it is a person's ability to give a verbal report of the action.

Criticality is a comparison or verification of the defined criteria for an assessment of the action in relation to reality. This is not just an application of the selected criteria to the action; it is an assessment of these criteria. Let us say I select some characteristics for the assessment of the action. Criticality means that I understand the reasons for selecting these characteristics as criteria. I need to understand whether these characteristics are the only characteristics available, or whether they are the most decisive and, in a broader sense, whether they correspond to reality, or whether I have imagined them myself and therefore decided that they were the most important criteria. Therefore, criticality of the action comprises the critical assessment of the criteria selected to assess the action.

Finally, *the measure of the mastery of the action.* This is an extremely important aspect. It is characterised, above all, by whether the action can only be performed by the learner using the initial material resources, or whether it can also be performed verbally, or in a symbolic form, or whether it can be performed mentally and how fast it can be performed, etc.

Clearly, when we plan these properties, we want the measure of mastery to be of maximum value. We want the learner to be able to perform the action at the maximum speed, consciously, and able to give an account of the action in many different ways: with material resources, without material resources, in writing, verbally or mentally, etc. Accordingly, we ask ourselves: how can these properties of the action be ensured? In order to answer this question, first of all, we have to analyse the constituent components of these properties and what initial material we need to

transform to obtain these properties. We need to consider the desirable properties as derivative, secondary ones. These are the properties we want to form, but they may not be actually present in every case. Therefore, we should consider the initial existing properties of the action and form the desired properties from these initial ones by using some techniques.

We have listed all the final desired properties, but what are the primary properties of any action? These primary properties are as follows. *First*, I would say, it is *the nature of the objects with which the action is performed*. These objects can be either material, or verbal: represented in words or derivatives of words (e.g. all sorts of symbols). Ultimately, there might be actions with representations containing visual images of objects, or representations of various concepts. The differences between the objects with which the action is performed can be described as levels of the action, bearing in mind the following. The starting level—is material and is followed by the intermediate level. The intermediate level is a very special one, present only in humans: the level of speech, because speech has material basis. Marx used to say that the "curse of matter" gravitates onto speech. Language and speech in general always have a material basis, however meaning is ideal. And finally, we come to the next level—the mental level (in the sense that I told you earlier). These main levels are like gateways through which we raise the action from the material level to the level of speech and to the level of acting mentally. That's why we call them levels. These levels begin in the material world and through speech lead to the mental plane.

We have explored the first property of an action—the nature of the material, verbal and ideal objects with which we perform the action—which necessarily happens at the levels mentioned above, that is why this property is so important.

Now *the second property*, which is also always mandatory—is the initial completeness of the units of the action. Sometimes we can perform an action by skipping some of the intermediate units or by skipping all of the units, as it happens, for example, in mathematics when doing calculations with formulae. However, what is a formula? You have the initial conditions/components, the operational sign and the final result. By using the formula, we omit the whole action and we perform calculations according to this formula. This is an example of a maximum reduced action. An action is always performed with a certain degree of completeness: it can be deployed to a greater or lesser degree, deployed differently in its different units, but the original completeness of these units is a mandatory primary property of an action.

Now, *the third property*—is a measure of differentiation, separating the essential from the non-essential. This is useful both for the ability to generalise and for the development of the ability, mentioned above, to resist interferences. Just keep in mind two main aspects: (1) the separation of the essential from the non-essential; and (2) a resistance to what is obviously inessential, yet nevertheless, may interfere in the action.

The fourth property—are timely parameters of the action: the tempo and the rhythm. These, as you know, are not the same things, because you may have a certain rhythm at a different tempo.

And finally, *the fifth property*—is the power characteristics of an action, the size and the distribution of effort of the subject (e.g. the learner) engaged in the action.

No action, including mental, can exist without some indicators for each of the five main primary properties. These five properties may have different values at different levels of action (material, verbal or mental), however, greater or lesser differentiation, the varying tempo, rhythm and effort—are always present in any action, and mental actions are no exception.

Consequently, since these five properties may have different values, we can call them the parameters of the action.

We should also note that we consider an action to be both an objective and a subjective process. As an objective process, it can perhaps have only the properties of time and power, as a person has to learn to perform an action with a certain tempo, rhythm and with a predetermined speed. Other properties discussed above are the properties of an action of a human subject.

The next question is—how to form the desired properties from these basic parameters, the initial properties we have identified in the action? We will explore this in the next lecture.

Chapter 3
The Conditions for the Development of the Properties of the Action. The Phases of the Development of the Action

Outline of Lecture 3

The focus of this lecture is on the measures needed to achieve the desired properties of the action. For example, consciousness of the action is achieved by the learner orienting his or her action to the identification of the important relationships between the features of the target problem. To achieve the consciousness of the action, the teacher must fully deploy the action so that the learner is able to trace what happens within each unit of the action and how the transition from one unit to the next unit occurs. Galperin argues that if a learner can trace this process, then the action acquires the meaning of a generic and not merely a subjective process. The second measure in the formation of consciousness of the action is separating the essential from the inessential aspects of the action, which can be achieved by the systematic variation of the problems offered to the learners. Finally, the third measure concerns the presentation of the action as an external process. The action is new and unknown to the learner, so it cannot be assumed that he or she will know how to perform it. Therefore, the action should be explained and demonstrated as an external objective process.

Galperin describes how other desired properties of the action can be achieved (i.e., the generalisation, rationality, criticality, and the measure of the mastery of the action). Galperin defines generalisation as identifying the key features and separating essential features from inessential. To achieve the generalisation of the action, particular attention is given to the significance of introducing a general scheme to learners, which should be actively used to solve systematically selected problems. By employing this scheme, learners identify the key features of the target concepts and the essential relationships between them. However, the main idea is that the scheme should not be memorised but understood by learners. Generalisation happens in the process of applying this scheme to a wide range of problems. The general representation of a concept cannot be conveyed to a learner; in other words, it cannot be "transferred" from one head to another. By applying a generalised scheme to different

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learning materials, the generalised meaning that corresponds to the scheme begins to stand out, and the learners start to make sense of the target concept. In the process of applying this scheme to specific problems, learners identify the key features of the concept and the relationships between them. Therefore, the process of generalisation includes two intertwined elements: the general scheme and the systematically selected material.

Three main groups of learning materials can be used to study the target concept: (i) Discipline-specific tasks; (ii) Logical tasks that differ according to their logical characteristics and contain the following: (a) all the features necessary to solve the task, (b) all necessary and some unnecessary features, (c) not all necessary features, and (d) not all necessary and some obtrusive features; (iii) Psychological tasks that differ according to the ratio of visually represented and conceptual features; that is, tasks in which the visual and conceptual features either coincide or differ. Galperin suggests offering learners different tasks based on the principles of contrast and psychological surprise to keep learners in a state of high intellectual alertness. Such principles imply the random presentation of different materials to learners.

The next property of the action—rationality/awareness—is defined as the ability to present a verbal report of the action. To achieve this property, learners complete the action through talking. As an assessment of the conformity of the defined criteria to the objective reality, criticality can be achieved by evaluating the selected criteria in terms of their compliance with reality, which then should be evaluated by these criteria. The degree of the mastery of the action can be achieved by eventually merging the small individual units of the action into bigger units and subsequently into one continuous process. Establishing the rhythm of the action is an important indicator of the mastery of the action: when the rhythm is fully established, then the speed of the action can be increased.

Finally, Galperin turns to the third subsystem: the transformation of the action into mental action. He emphasises that in mastering a new action, it assumes a higher, mental form. The transformation of the action to the mental plane of the learner happens through six consecutive phases or forms of activity:

1. The formation of the motivational basis of the action
2. The formation of the scheme of the orienting basis of the action—orientation
3. The formation of the action in its initial tangible or material form—materialised action
4. The formation of the action in loud socialised speech—communicated thinking
5. The formation of the action as silent speech—dialogical thinking
6. The formation of the action in hidden speech—acting mentally

Galperin describes the formation of the motivational basis of the action (1) as a guiding aspect of the action, which defines the significance of both (i) the action as a process and (ii) its outcome for the learner. Three types of motivation are discussed: (i) external motivation in which a learning process acts as a tool for earning a reputation of being a good learner; (ii) "sporty" or competitive motivation. By achieving desirable results, a learner develops self-confidence and is eager to achieve more and better results. A learner is eager to achieve these results; however, the process of

learning does not interest him; (iii) inner motivation as an unselfish and insatiable passion for learning. Galperin argues that such motivation can be developed with learners. How learning emerges in each of the other phases (2–6) is presented in detail in lecture 4.

Lecture 3

In the previous lecture, we talked about the primary properties of the action, or the parameters of the action. From these primary properties we would now like to turn to the secondary properties, which are of greater interest to us. In this lecture I will describe how the secondary properties are formed from a particular combination of the primary ones.

The first of the secondary properties is *consciousnessof the action*. However, how do we understand consciousness of the action? As I told you earlier (it appears very clearly in experiments with animals), consciousness of the action is characterised by the subject[1] orienting his action to the identification of the important relationships between the features of the problem that needs to be solved. It is important to emphasise that attention is directed to the identification of the necessary relationships between the features present in a specific task, because the features of one problem can include certain crucial relationships; while the features of another problem with the same objectives can have crucial relationships that may differ significantly.

For example, we have a problem. The features of this problem are related in some way to each other, and some of these relationships are crucial for solving this problem. We have to identify these crucial relationships and present them as a basis for the orientation of the actor. We can do so by applying a combination of the following measures. First, we have to deploy the action fully so that all its constituent individual units are completed. We cannot skip a single unit, as a learner will not be able to compensate for this unit himself and this will naturally create a gap in the sequence of the units. If this were to happen the action would not present itself as something performed consciously because the learner would not be able to understand why, after a gap, there follows another unit of the action. So, the *first measure* is to fully deploy the action. The term "a fully deployed action" is relative, because what is the sufficient deployment of an action will vary for different learners. Therefore, we should identify the required degree of deployment of a new action for a particular group of learners. To deploy an action means that the learner should be able to trace what happens within each unit, and how the transition from one unit to the next one occurs. If a learner is able to trace this process, then the action acquires the meaning of an objectively necessary process.

[1] A subject can be also understood as a learner. Subject (noun) is masculine in Russian.

However, that is not all. Any material[2] has many aspects that may be irrelevant for a particular action. Therefore, the *second measure* for the formation of the consciousness of the action is the purification of the action from minor and insignificant aspects. In our conventional language, this is called differentiation, separating the essential from the inessential. How this is achieved, I will explain in detail later, but for now I shall mention that this can be done by a systemic variation in the problems offered to learners that can be solved by performing a particular action.

The speed at which a learner is able to trace the sequence of the transformations that happen to the initial material during this action is extremely important. Finally, *the third measure* that is always assumed, but which needs to be made explicit, is that the action in its successive units should be presented as an external objective process, not on the mental plane. We are dealing with a new action unknown to the learner, and we need to present this action as fully deployed as possible. This is absolutely necessary because the units of the action and their corresponding transitions are unknown to the learner. We cannot simply assume that the learner will get an idea of how to perform this action himself; we have to unravel the action and demonstrate it as an external objective process.

Now you see how many measures we have to pursue in order to help form the consciousness of the action with learners. This means that we have to create such an image of an action that would empower a learner to perform the action according to its key features and their objective relationships.

The second property is a *generalised action*. Generalisation can be understood in different ways. In our case, we are referring to generalisation in the sense of identifying the key features and separating the necessary relationships between these features from those that are inessential. As you will remember, this also constitutes the consciousness of the action and is achieved in two ways.

We used to believe that a new action, or more generally a new phenomenon, which is introduced to the learner, has to be demonstrated by a clear and simple example. It turns out, that this is not the best way to go about it, because a concrete example, simple and clear for the teacher may not be so simple and clear for the learner. The significant relationships are connected with the specific content of a particular example. Even if the example is simple (for the teacher), it is nevertheless associated with the specific content. Practice shows (I will tell you more about this later) that no matter how much you emphasise that this is a just an example and that the learners have to identify some general relationships, still this particular example gets unconsciously fixed and is remembered by students. Therefore, later on we have to get rid of the specific content of the example that we used in our explanation.

A better way is not to use a specific example (even if the example is very simple), but instead offer a (general) scheme. This scheme can be applied to all the cases where a particular rule can be used, or in all the cases of the target phenomenon. In this sense, the scheme is general; however in itself it is a specific schematic representation of some relationships. The main idea is that this schematic representation should not be simply memorised but should be understood by learners. I have already

[2]Material in the meaning "learning material".

mentioned that a traditional approach to teaching and learning with its reliance on prior memorising of knowledge for its subsequent application is very unfortunate. A better way is creating a scheme (which can be, for instance, in a form of a table) and then applying this scheme for solving systematically selected problems. Generalisation happens, in fact, in the process of application of such a scheme to a wide range of problems.

The view that emerged from our assumptions, that it is possible to give a (general) representation of a concept at the beginning of learning is, in fact, wrong. This (general) representation cannot be supplied to a learner. It cannot be "transferred" from one head to another, because initially you can show, at best, an abstract scheme without any specific content. Although originally this scheme was something quite specific and concrete, it appears to the learner as a schematic drawing, and nothing else. Only when you apply this scheme to varied material, does the generalised meaning that corresponds with the scheme begin to stand out from the material, and only then do learners start to make sense of this (general) representation. In the process of the application of this scheme to specific problems the learners identify the key features and the essential relationships between them.

Therefore, the process of generalisation comprises two intertwined elements: the first is the (general) scheme, and the second is systematically selected material.

However, how do we select this material? There are three main groups of learning material that are used for studying a specific rule or a concept.

The *first group* is specific for each subject. These are discipline specific types of material. I remember one of the studies: it was about teaching children to find the subject in sentences. It is important that the subject in the Russian language can be expressed with different parts of speech, including a verb in its infinitive form. Of course, these differences create certain difficulties which must be overcome.

So, the first group—are the discipline specific types of material. I would like to emphasise that these are different types, not just variations within one type, because, for example, a big book of problems, with many different tasks, in fact, contains only very few types of tasks. Therefore, there are types of tasks, and there are different tasks that belong to the same type. For example, a numeral can be a subject in a sentence, as in the saying: "Seven do not wait for one." Here "seven"—is a subject. Well, you may also say: "Five do not wait for one" This is a variation: seven—is not five, but this variation is of the same type. You can create many other similar variations. However, we should remember that only a difference in types has its differentiating value. So, *the first group is different types of discipline specific material.*

The second group are the materials that are different according to their logical characteristics. Each concept, including the concept of an action is characterised by a set of its essential features.[3] You may have material,[4] which contains only the necessary features or you may have material which contains all those that are necessary and, in addition, some unnecessary features. This is important because you need to identify not only all the present features, but the features that are crucial

[3] In a mathematical problem, the features are the conditions of the problem.

[4] Learning material, e.g. in the form of tasks.

for this action. Another possibility may be when not all the necessary features are to be found in the material. Strictly speaking, this means that the concept cannot be recognised because some of the features are missing; consequently, the target phenomenon fails to address the concept. Finally, the fourth type of material is when not all the necessary features are to be found in the problem and there are many unnecessary, obtrusive features. This means the learners are not supplied with all the necessary features, and they are also given many unnecessary and obtrusive features and they are required to make sense of all this information.

In sum, we have four logical types that contain:

1. All necessary features;
2. All necessary and some unnecessary features;
3. Not all necessary features;
4. Not all necessary and some obtrusive features.

A great variety of specific material should be selected for each of these four logical types.

Finally, *the third group are psychological types of material*. Psychological types differ according to the ratio of visually represented and conceptual features of the material. On the one hand, a task can contain a combination of these two, when visual features and conceptual features coincide (the easiest and the most enjoyable case). For example, there are tasks in which visual and conceptual features differ. You may have a situation where a feature is present in the visual representation, but conceptually it is not there. For example, when we were teaching children the concept of a perpendicular, the learners were given a picture and were told that the marked angle was 90° (Fig. 3.1).

The difference was only in one degree that could not be noticed with a naked eye and it seemed that the angle was right, but in fact, it was not right, but sharp. There was a discrepancy between the visual and conceptual features.

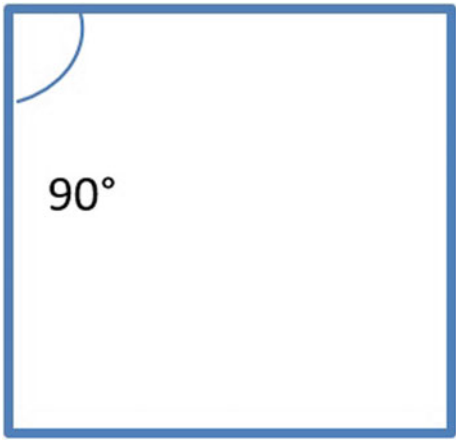

Fig. 3.1 The learners were informed that the marked angle was 90°

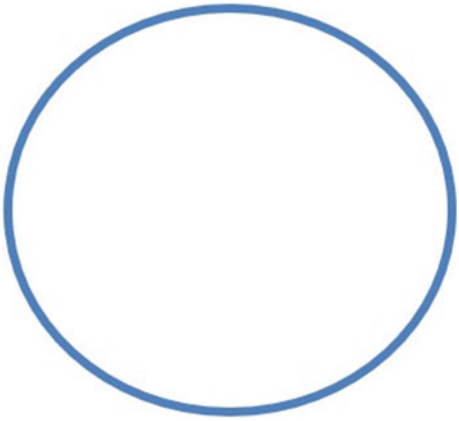

Fig. 3.2 A figure of a "circle"

We may also have the opposite situation. Let us say we draw a figure and say that it is a circle (Fig. 3.2).

We can see that this is not a circle, but the task says that this is a circle. Correspondingly, in a circle all the radii are equal. Working with the figure learners have to come to an understanding that if they were told, that this was a circle, then all its radii were equal.

In sum, you have to select three types of material that belong to a psychological type:

1. When the visual and conceptual features coincide;
2. When the visual and conceptual features diverge: in one case you have the presence of these features visually; however, conceptually these features are absent.
3. The opposite case: the features are not present visually, but you are told that you are given, for example, a circle with all the range of its properties.

To sum up, there are three big groups of material that should be selected and offered to learners: (i) Discipline specific; (ii) Logical; and (iii) Psychological.

Each of these groups requires a selection of particular material in a sufficient amount: we need to fill each of these groups with its own specific content.

Since we have such a large number of different groups or types of material, traditionally there arises a problem of organising this material in terms of the order in which these groups or types should be introduced to learners. A common approach in traditional teaching and learning is to go from simple to difficult, but, as we know, traditional education does not provide a learner with reliable tools for solving problems. Traditional teaching relies heavily on the learner's individual guess at what to do and how to approach learning. Well, the result of such an approach is well known. In our approach, we provide a learner with a reliable tool—the scheme of the orienting basis of the action and different groups or types of materials. Since we provide this reliable tool, then the requirement of a gradual movement from simple to complicated becomes redundant because all the tasks can be solved with the help

of the complete scheme of the orienting basis of an action. In this case, we are facing different requirements: not to move from simple to complicated, but another psychological approach previously identified by Pavlov should be followed. This is an approach based on the principle of contrast, psychological surprise to keep the learner in a state of high intellectual liveliness and intellectually alert.

To begin with, you offer a learner a problem at a low level of difficulty; you may even offer a simple task, which is suddenly followed by one of the most difficult tasks so that the learner does not relax and start thinking that everything can be solved so easily. Then offer a task, for example, with an incomplete set of features so that the learner cannot think that everything is ready for him and he needs only to perform the action. He needs to evaluate whether all necessary features are there. If not all the features are present in the task, a learner has to say that the problem cannot be solved, because such-and-such features are not found.

Therefore, the main principle of the sequence of problems offered to learners is the random presentation of different types of material and maintaining of a high level of tension in the orienting activity of the learner. Since we do not use pre-memorising and recognise that learning happens in the course of the action, in the process of solving problems, we need to have a great number of various problems in our repertoire.

Of course, you cannot rely on yourself being able to figure out quickly everything you need during teaching. It is necessary to arrange the order of the material in advance. We do it this way: we simply enumerate the tasks in the order they will be offered to the students. First, we select a large number of tasks. It is much better to have "leftovers" afterwards then to find ourselves in a situation when we do not have enough tasks. We write numbers on these tasks in advance in the order we will offer them to the students, so that there is no need to worry about that later. Then the tasks are presented according to the assigned numbers. The order of the tasks has to be thought through carefully and checked in advance whether it works well.

If we combine two conditions: give the complete orienting scheme of the action and immediately proceed to solving of the selected problems using this scheme, in doing so, we ensure the desired degree of generalisation. This implies that we cannot say, as it usually happens in traditional education, that a student is capable of doing something, but to a very limited extent. This just cannot happen and if this happens, it is our fault because we have not provided something for the learner.

We identify the levels of generalisation to be applied to the rule, and select the problems that would be directed towards the formation of this level of generalisation with learners. In this case, a student cannot help generalising. We force him to complete this action in its fullest, and the learning outcomes do not come as a surprise. These outcomes have been anticipated.

Now the next property is *rationality, awareness*. These are terms that have an infinite number of interpretations. That is why we are not going to deal with all these interpretations, but simply agree on a particular interpretation of this notion, which is a right of any researcher. The only thing is that the researcher has to let us know which interpretation: "I understand this notion in such—and—such way". You can

disagree with me and say that perhaps another word should be used, but if I explain, what I mean by rationality, none can contradict me.

We understand rationality/awareness as an ability to present a verbal report of the action. The question now is how to ensure this property. It is very important that at the beginning of the action, a person explains what he is doing and why he is doing it. We will listen to what he is saying, and correct him if he is saying something wrong, even in the case of him performing everything correctly. This actually happens very often and we cannot allow such inconsistency. What is important is that students should not learn the most economic and perfect wording by memorising ready-made phrases and formulations. This should not happen, because a speech stereotype can be formed without any relation to what a learner is actually doing. Speech should be an active reflection of an objective process. In order to teach this active reflection, a learner should use a large variety of his own words and even when speaking with his own words, but rather monotonously, he should be told—"You know, dear, I have already heard you speaking that way. Try to speak, with more engagement, not so monotonously, not so boringly". It is curious to note that this process resembles other more subtle processes in other situations.

Apparently, Stanislavsky when rehearsing a new play, demanded that the actors read the play and, in particular, their parts in advance. At the rehearsal, Stanislavsky would not allow the actors to speak with the words written in the script. The actors had to play their parts using their own words. Only after they had played a certain part using their own words, he gradually transferred them to the words of the author of the play. Otherwise, the fixed words of the play would have turned into a speech stereotype that you can learn to enunciate, without thinking. This would have resulted in the actor mouthing some words but acting something different. It is necessary that speech itself actively reflects the situation. When this has been achieved, only then one can use other words. At this point you come to the specific speech formula and this process should accompany material action.

You see, at first, it is necessary to speak with your own wide vocabulary and when the speech formula has been "played around with", you can move on to the standard definition. In this way, we ensure the rationality of the action.

Now *criticality*. This is a difficult property. I have already told you that criticality is the assessment of the conformity of the defined criteria to the objective reality. Very often, we do not notice that certain features predefine some of the criteria that they are based on, and if we doubt these criteria then these features will be invalid. Recently I discussed a published book with its author, who believes that not everything is ideal in the human mind, that some part of mental activity should not be called ideal. I asked him: "Excuse me, but what are your criteria of ideal? What do you call ideal?" He said that ideal is, in fact, everything that comes from ideas. Well, since animals do not have any ideas, this means that the entire mind of an animal is not ideal. I told him: "Well, in this sense, it is banal, isn't it? We have known for a long time that animals do not have concepts. Does this mean that an animal's mind is something which is not ideal? Ideal should be understood in another sense".

This means that a person takes a criterion that he does not have a name for, that is only implicit, and then on the basis of this criterion he presents a risky statement

such as mind is not ideal. I asked him: "Well, what is it then? Material?" To which he replied: "No, not material, but it is of itself". It is neither ideal, nor material, but something of a third nature. The main point, as it turned out, is that he had taken the concept of an idea in a human sense as the criterion of ideal. This is a narrow and simply a wrong criterion.

It is important to notice that very often we do not analyse the criteria we proceed from. They appear to us as something natural. This is always the case when we take the perspective of a criterion; you see things from this perspective. Therefore, understanding criteria is very important as in many cases criteria are adopted intuitively. Above all, the criteria should be evaluated in terms of their compliance with reality, which, in turn, should be evaluated by these criteria. Thus, ensuring criticality is a very difficult and demanding task, but it should be done by selecting the criteria, which are often being used intuitively and unconsciously, recognising that sometimes such an approach to selecting criteria is unjustified.

The next property is *the degree of mastery*. This is a particularly important property and I am going to explain why. After all, we believe (I will talk about it later) that the mastering of the action is not just memorising it in the form in which it is being explained and performed. There is a continuous change in the form of the action itself. You cannot move to the next higher form, until you recognise that the previous one has not been developed sufficiently. However, we cannot linger on these transitional forms for too long either, because every development means mastering the action in this particular form, which is only transitional, not yet the final one.

We conducted a study with children at the end of their first year of school and explored the difference between the underachieving students (those who usually get a grade two[5]) and those who are usually awarded a three; the difference between the grade three students and the grade four students, etc. We found out that underachieving students differ from achieving pupils not in the way they think. Underachieving students do not think poorly, sometimes they think very well, but they do their thinking in early and highly uneconomical forms.

Imagine that a child has a delay in counting, which means that he can only count objects and things. He uses his fingers for counting, which is extremely convenient, as with Russian counters that have tens, and the child can clearly distinguish fives on both hands. Therefore, fingers can be used for counting and this child is holding his hands somewhere under the desk and is counting with an incredible speed, bending his fingers. We were holding his hand and still were feeling the movement of his fingers, but we could not distinguish anything because he was moving them so fast when counting. His counting was absolutely correct; he did not make a single mistake. However, if we squeezed his hand so hard that it was difficult to move his fingers, he stopped counting with his fingers, and began to count using other methods: he counted spots on the blackboard, on the desk, on the walls, etc. He could perform any calculations, but only with objects. When he was given a task with numbers greater than ten, he would count his fingers several times and give the correct answer, but the teacher said, "He thinks so poorly and slowly". In fact, he thinks quickly, he thinks

[5]On the scale one (poorest)-five (best)—the grading system in the USSR.

with a speed of light, but just counted slowly because he was using his fingers. This is the delay in the earliest and first necessary forms of the action. If he remains in these forms for too long, they become the reason for his delay. The trouble is that this gap is not immediately clear to the teacher. Poor little boy, he is struggling to keep up with the others. How can he possibly do it? Only by automating his way of counting as much as possible. He reaches almost perfect virtuosity in performing these activities, but in doing so, he gets more and more "stuck" in this hopeless way of solving problems.

There is a danger of the opposite: intermediate forms of action should not be completely mastered. They need to be brought to a certain degree of mastery no more and no less. Otherwise you will not be able to transfer to the next forms of action. What indicates the mastery of the intermediate forms of action? Initially, an action appears to the child as a series of separate, independent links which are performed in such a way that the child always first inspects the closest link, which he has to perform. Once this link has been inspected—the child begins to complete it, and then he proceeds to the next link, stops again, performs an orientation to the next part of his work, and then completes it too.

In such a way an action is first being divided into independent links, separated by the periods of orientation. Then these links begin to merge into bigger units: instead of two small links, there appears one unit. Hence, the formation of bigger units happens. The mechanism of how smaller links merge—is a very important aspect of theoretical significance. I will tell you more about it later. In the meantime, it is important for us to understand that the original small links merge into bigger units or steps. This does not happen immediately all the way through, but, naturally, first in the easiest links. Later these bigger units also merge, until the action starts to flow as a continuous process without any pauses at individual units.

This is the first phase of mastering the action. Then the following happens: before this phase, the action cannot be performed either with the required rhythm or at the required speed. When, for the first time, the action begins to flow as a continuous process, then its rhythm can be identified, however it is still slower than the final version of it.

Establishing the rhythm of the action is a very important indicator of the mastery of the action. When the rhythm is fully established, then the speed of the action can be increased.

All these parameters: integrity, continuity of the action, its speed and rhythm—are the indicators of the mastery of a new action.

When we are at an intermediate stage, this means that we have not achieved the complete mastery of action. However, it also means the mastery of action in this particular form. We need to move on, because once the action gets its continuous flow, we try to transfer it to the next higher level. Maximum automation is achieved only when the action reaches its final shape. Without such automation, excellence in the performance of the action cannot be achieved. I will tell you about the nature of psychological and physiological mechanisms of automation when we talk about the most representative actions for this case - physical actions.

So far, we have looked at two large subsystems—the subsystem of the conditions for the formation of a new action, and the subsystem of the conditions for the acquisition of this action, the desired properties. Now we have come to *the third and the final subsystem of conditions*—the subsystem of the transformation of the action into mental action. Actually, this subsystem has given its name to the whole process—the phases of the development of mental actions, although it certainly does not represent the whole structure of the system.

To master a new mental action, means to ensure the formation of this action in its highest, mental form. In order to do so, we need to trace the path of its development from the beginning. We can do it through six consecutive phases. I will list them first, and then we will focus on what happens at each phase and what we obtain in the end.

The first phase—the formation of the motivational basis of the action.

The second phase—the formation of the scheme of the orienting basis of the action.

The third phase—the formation of the action in its initial material or materialised form.

The fourth phase—the formation of the action in externalised social speech.

The fifth phase—the formation of the action in outer speech "with yourself".

The sixth phase—the formation of the action in hidden speech.

Let us have a look at what happens at each of these phases.

The *first phase* is very discreet and, I would say, even neglected. I should confess that I and my colleagues have been neglecting this phase for a long time, believing that no matter how and by what means we motivate the learner, the main idea is to make him do what we would like him to do. The type of motivation does not really matter. For example, whether the child is working for a chocolate, or for the sake of being praised, or simply because of the fear of the adults—this does not matter. We used to believe that the type of motivation did not matter; however, we were wrong. The effect of a particular type of motivation is a delicate thing, which is not easily detected, but in the end it can have severe consequences.

Motivation is often viewed simply as a power unit, as something that drives, propels the work of the learner. To be honest, we used to think of it in that way for a long time. Even such a talented modern foreign psychologist as Jean Piaget, has the same understanding of motivation he believes that motivation is the source of energy that drives the behaviour. Hence, a motive—so to say, is the reason, the justification of the amount of effort a learner puts into his work. However, this turned out to be wrong. Motivation is not only the energy, although the energy of the learner is what we can actually observe. Motivation is an orienting aspect, a guiding aspect, identifying in the target object of the action and in the action itself what is important for the learner. Motivation determines the value of the tools used to perform this action, and the stability of this action, and much, much more.

Recently we had a case. We taught children with lack of attention how to improve their attention. In general, this lack of attention was eliminated in almost all the children we were teaching, but there were two boys we did not succeed with. Only two boys! These boys, however, worked with the experimenter very well, like the

other children, following all the instructions. Only later we found out why they could not master the action that would improve their attention. Apparently, the father of one of the boys persuaded his son that no matter whether you are a scientist or not, no one can learn without making mistakes. Well, if no one can learn without mistakes, what is the point of trying not to make them? If one is doomed to be making mistakes when learning, there is nothing to worry about. However, with the experimenter the boy worked well doing everything correctly. Why was it so? Because, as it turned out, he was very pleased that out of the entire class it was him who was invited to work individually with an adult. They were just children of the 2nd–3rd grades: the boy was flattered that no one else was invited, but he was. He enjoyed working with the experimenter. Nothing, unfortunately, arose from this feeling, as the boy did not see the point in mastering the activity; he just did not need to. This is a type of motivation: he works well for the experimenter, but he does not need it himself, so mastering the action does not happen.

And here's another boy we did not succeed with. Though he used to make mistakes, he used to correct them, getting no more than grade "four". He believed that grade "four" was a good enough grade for him and so why would he try and get a "five"? The boy did not have the motivation for learning how to perform better. With the experimenter he worked like everyone else, properly, but as soon as he was out of the direct interaction with the experimenter, he began to work as he had done previously.

The most important thing is that we may not take into account motivation, but it is still there and determines the degree of success of the educational process.

We have previously identified three types of motivation. The first type is that the learner is studying to achieve something that comes from the outside: for example, that his mother would give him the money she promised for the cinema, or he knows that he will be praised for good effort, etc. The child does not mind learning, but he does not like it himself. The important thing is that there is an external and more interesting life, and the true motives of his learning are in this external life. The learning process with this type of motivation acts as a tool for earning his reputation of being a good learner. This is an *external* type of motivation.

There is another type of motivation which is more interesting. It happens when you give the learner all the tools for solving problems and then, moving from task to task, the learner grows in confidence in himself and his abilities. Gradually the learner becomes competitive with his friends and even with himself. He develops the type of motivation, which may not be entirely accurately labelled as a "sporty" or competitive motivation. The aim is the achievement of the desirable result and the learner develops self-confidence and the respect of his peers, because he keeps achieving better and bigger results. The learner is eager to achieve these good results, but in the process of learning, knowledge does not interest him, only the results. This is a so-called "*sporty*" interest or motivation.

Finally, there is the last type of motivation which the most difficult to achieve, but it is truly valuable. This is some special unselfish and insatiable passion for learning. Very often they say that there are some strange people who do not have any ordinary demands in life, but a great love for learning. When I was a little boy, I used to know an elderly man who loved the process of learning so much that he used to say:

"When I die, please write on my grave: his soul craved for knowledge". In fact, it is wonderful to enable a student to be this strange person even for a short time, because no other motivation can replace this urge for learning. The most interesting thing is that people are not born with this urge, but it can be developed like other things. I will tell you how to form this type of motivation at the very end of this course. In the meantime, you have to believe me that this is possible. This *inner* motivation (as we label it) for learning cannot be replaced by anything else, because we certainly cannot stand by the person and repeat: "Read, read, read " if he does not really feel like reading.

In sum, today we distinguish three types of motivation, and it is important that these types can be formed and taught, although not always deliberately.

Chapter 4
The Process of Internalisation. Theoretical and Practical Implications of the Study on the Phases of the Development of Mental Actions

Outline of Lecture 4

In this lecture, Galperin gives exhaustive descriptions of the phases or forms of learners' activities in the process of the development of mental actions. The *second phase* is the *formation of the orienting basis of an action*, which reveals the objective features of the action. Creating the orienting basis of the action is achieved by developing a generalised scheme as described in detail in lecture 3. By applying the scheme as a guiding tool, a person who has never been previously exposed to the task completes it one step at a time. A learner's ability to complete the task correctly on multiple occasions can indicate that the scheme of the orienting basis of the action is complete. The *orienting schemecan be created by the teacher* and offered to learners for them to use. Because it includes a complete set of the features of the target concept, it provides new opportunities for learning. By using this scheme, learners are able to solve various tasks, and the process creates a specific attitude toward learning: mastering the target concept becomes a mean for achieving the personal success of each individual learner. The set of features included in the generalised scheme can not only be offered to learners but also *constructed by learners under the guidance of a teacher* by solving problems that arise from the contradiction of facts. Moving step-by-step under the guidance of a teacher, learners identify the characteristic features of the target concept and, in doing so, create a complete scheme of the orienting basis of the action. When the scheme of the orienting basis has been created, it can be applied by learners to solve various problems.

In the *third phase, the materialised form of an action*, learners engage in and interact with material or materialised objects that carry the meanings encapsulated in these objects. Materialised action is one of the most important forms because the full composition of the action can be shown and transferring the initial materials into desired outcomes can be demonstrated. This form of action can be used in the process of re-teaching when the action developed with learners does not match the requirements of the task. In the materialised form, the action can be fully deployed

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and slowed down so that its every step can be traced by the learners. In summary, the desired properties of the action can be developed in the materialised form of the action. When the action starts to flow smoothly in the learners, it is time to transfer to the next phase or form of the action. This is achieved by removing the material or materialised support, and learners perform the action in the form of externalised social speech (communicated thinking).

In the phase of *communicated thinking*, for the first time, the action takes the form of an ideal action performed with images of the material or materialised objects. Learners' speech should be framed in a publicly objective form to be understood by other people. Learners do not talk about the action, but they complete the action through talking. When the action in the form of social speech (communicated thinking) systematically demonstrates accuracy and the required speed, the action is transferred to the fifth phase, which is silent external speech (dialogical thinking).

In the phase of *dialogical thinking*, by visualising the material or materialised objects that the learners interacted with previously, the action is performed by silent speech or talking to oneself. Finally, in the sixth phase, the action is performed in *hidden speech*, which Galperin refers to as *acting mentally*. In this phase, artificial fragmentation into individual units is suspended, and the action acquires its natural flow. In this phase, the maximum automation of the action can be achieved.

Galperin points out that some phases or forms of the action can be rearranged or restructured. However, he recommends following the suggested sequence of the phases particularly when a new concept is introduced. He argues that automation does not hinder creativity, and by achieving the automation of actions, learners develop ownership of their actions. When maximum automation is achieved, learners do not interact with the objects but with the meanings of the words that describe these objects. External social speech is transferred to the mental plane, and silent speech is used. Eventually, silent speech is substituted by meanings, and the action can be performed quickly and automatically.

Finally, Galperin elaborates on the method of psychological research as a method for studying the development of psychological phenomena with the required properties. He does not reject the method of self-observation, which can be used to explore a mental phenomenon. However, to examine the phenomenon, Galperin argues that the phenomenon must be created. He continues his argument by criticising the notion of epiphenomenalism or mechanical materialism—explaining that it is in the work of the brain that one should search for mechanisms of the human mind and consciousness. However, to develop human consciousness, a system of opportunities should be created by designing external and internal human activities. Galperin points out that the phases of the development of mental actions evolved during 20 years of research and considerable effort was needed to identify them. Moreover, in learning, the phases may not occur in a sequential order. If learners are exposed to a completely new task or concept, then the action aimed at developing this concept should be fully deployed and explained by following the suggested phases. However, even then, the phases may overlap, and contractions across the phases may occur. When learners begin to move from a fully deployed process to a contracted one, such an action may resemble traditional teaching: there is an explanation of a new task, then there

is an external material action, and then everything happens as if by itself. However, if learners have been exposed to the phases of the development of mental actions, they will be able to control their learning. They are able to do so because they have transferred the action from the external to the internal plane and turned it into an individual achievement. By creating and performing future mental actions on the external plane, many more tasks may become achievable for learners. For example, based on the suggested system, many topics studied in grades five and six could be learned by children in the first grade and sometimes even by older pre-schoolers. What once needed to be understood in words that were often unsaid, is now presented as an objective reality with clearly visible links and relationships. By applying the phases of the development of mental actions, the alignment in the performance of many learners can be achieved. This alignment eliminates the problem of variations in performance and achievements within a class, opening up another approach to mass education. At the end of the lecture, Galperin discusses the psychological grounds of achieving and underachieving students. He points out that underachieving students do not need extra time for tuition, but they do need specific interventions that are aimed at compensating missed phases of the actions that students need to master.

Lecture 4

In the previous lecture we started talking about the final, the third, subsystem of the development of mental actions—the subsystem that transfers an originally external action to the inner plane of the learner. I told you that we can distinguish six consecutive phases, and I gave a detailed explanation of the first one.

The first phase is the formation of the motivational basis of the action. We often neglect this aspect, but motivation of one type or another is always present. However, if motivation remains neglected, learning may not even happen.

Now we turn to *the second phase.* The second phase is creating a scheme of the orienting basis of the action. I have already told you about this scheme when talking about the system of conditions for performing new actions. By following the scheme as a guiding tool, a person who has never been previously exposed to a task, completes it by moving one step at a time. What is important is that a person completes the task correctly, and not once, by chance, but many times, achieving a correct result every time. A learner's ability to complete the task correctly on multiple occasions can indicate that the scheme of the orienting basis of the action is complete.

I have already told you what the scheme consists of and that how it is presented to the learner is important. Without more elaboration, I shall only say that the way tasks are usually formulated is far from being complete in relation to all the requirements needed for a fully-fledged action.

The orienting scheme can be created by the teacher and offered to a learner for him to use. Since the scheme is a complete set of features, it provides new opportunities for learning.

This brings us to a point that has not been given enough attention in the past. The point is that the scheme of the orienting basis of the action displays the objective features of an action and, therefore, it is only a starting point for the action a learner will engage in. As a consequence of using this scheme the entire learning process shifts to being the achievements of the individual participants. The theoretical underpinnings of the orienting basis of the action are provided as a set of features so that a learner does not spend time getting into the details of the theoretical sources but proceeds straight to the action. Naturally, the main focus is how the student moves forward in this action. This focus creates a motivational (and not only motivational) basis for the action. It creates a specific attitude to the target concept when mastering the concept becomes a mean for achieving personal success of a learner.

Finally, there is another way to introduce the scheme of the orienting basis of the action as a complete set of features—when the set of features is not supplied, but rather constructed by the learner, who proceeds from the problems that arise from the contradiction of facts. Moving step-by-step under the guidance of an experimenter or a teacher, the learner creates a complete scheme of the orienting basis of an action. In this case, the solving of a specific task recedes into the background. What comes to the forefront of the learning process is the development of a deeper insight into the target concept, which creates totally new motivation and the teaching-learning process occurs in a completely different way. It is somewhat paradoxical, but it turns out that this initial, orienting phase, comprising a student's own actions is of primary importance. Once the scheme of the orienting basis of an action has been created by a learner, its application does not present any difficulties. Two-thirds of all effort and time is spent on understanding the concept and creating the orientation scheme, but the mastery of the concept itself does not require much work on the part of the learner. There is an essential distinction between the three[1] fundamentally different ways to create a scheme of the orienting basis of an action, which determine the three types of learning (I'll tell you about them later).

One more remark about the second phase, which is, in fact, the simplest and the most straightforward. One can introduce the orienting scheme by presenting it in the form of notes on a card and then proceed directly to solving problems. You can also introduce the scheme differently by explaining a specific point and writing it on the blackboard, then explaining the second point and, again, writing it on the blackboard. This way is much better because talking and not writing it down is the worst way of introducing new things. However, when you explain something and put it in writing straight away, this creates much more favourable starting points for learning. For example, you can pause your explanation at any time, and then by pointing to what you have already explained, resume it without any difficulty. This creates a particular freedom for the person who explains, and for the person who

[1] Galperin introduces the first type of orientation in Lecture 7. He defines it as incomplete, where mediational tools and the essential characteristics of the concept are identified by learners through trial and error. In this case, learning happens slowly with many mistakes and the activity of learning is extremely sensitive to the slightest changes in conditions.

listens to the explanation. This is the *second phase—creating the orienting basis of an action*.

In the *third phase* you proceed to solving the problems you selected previously (I told you about this earlier when talking about the third subsystem of the conditions for the formation of mental actions), using the orienting scheme created earlier. A very big question is how this first independent action is performed. Learning a new concept is a new objective process (objective for everyone who comes across it for the first time), and it should be presented in the most objectified form so that it can be observed and traced by a learner very slowly by fully deploying all the phases of the action. This new objective process becomes observable and accessible for learners when they engage with material objects.

Therefore, the first form of learners' independent engagement with a new concept is *materialised*. Here we should distinguish between two elements: the material object a learner is engaging with, and the orienting scheme a learner follows when performing this action. These are two different and unequal constituent parts of a materialised action and both of them should be initially represented as external material objects.

Of course, it is not always convenient to operate with material objects. They can be either unavailable or inconvenient to use and, actually, they are not always needed in the learning process. A material object can be substituted by a materialised object, which is a transformed form of a material one. You can either use material models or you can use diagrams, representations and even notes. Many think that taking notes is not a material action, in the sense that the record itself does not carry a meaning, but only the signs that you use to make this record. This is not completely true. Psychologically, taking notes is also a materialised action, although a very special one. We label it a materialised action because materialisation of knowledge you learned previously occurs. Just imagine that you engage in algebra by using algebraic notations. You do calculations in writing, which means you perform an action in a materialised form. For example, you have to work with similar terms. You have to find these similar terms, cross them out and replace them with the sum. If you do all this in writing—this is a materialised action. This form of action is very important because in this form you can trace what you have missed out and check if you have solved the problem correctly. The record is a material object that you can turn to later. You can also transfer one part of your record to another record and vice versa.

In summary, the record carries particular meanings (for those who do not understand these meanings, the record does not make any sense at all) and it is a material object. From studies in psychology we know that even what we identify through direct perception, is full of acquired meanings. People perceive the same things differently depending on the premises on which they build their perceptions. In fact, even what is labelled perception is full of publicly accepted meanings. In materialised action, it does not matter what kind of meanings are encapsulated in this record (which is also, of course, essential), but what is important is that these meanings are represented by a material artefact that carries the meaning and which can appear as a real, objective thing.

So far, we have two forms of representation of an object of an action, and the ways of working with this object—which may be material object and materialised object. In the learning process, it is very important that we can actually substitute the original material objects with all kinds of materialised alternatives, by assigning them the specific and well-defined properties of the objects we are interested in.

The materialised form of action is one of the most important; it is in fact the most important of all the forms, because in this form you can show the full composition of an action, and teach how to transfer the initial material into the desired outcome. This form of action can also be used when we need to re-teach someone if, for example, a person has developed an action that does not match the requirements of the task.

Recently some of my colleagues conducted a study about eye movement in relation to an object. Strict requirements were applied to this movement[2]: it had to be performed very quickly. It turned out that the eye movement, which we do in everyday situations, such as, clockwise (from left to right) eye tracking around an object, is not suitable for these special, strict requirements. Is not suitable because the eye movement is usually accompanied by lots of vibrations, which a person is unaware of (an eye does it automatically), and because of these vibrations it is impossible to achieve a high and steady speed of eye movement. It turned out that our eyes need to be re-trained to achieve a productive action performed under very strict, predetermined requirements. This is possible by fixing our eyes on a material object, for example, on the edge of a pointer and following the movement of the pointer with our eyes. Only after this kind of training can you get what seems to be a new type of the same movement.

Similar things happen in the army: when a soldier is enrolled, he is taught how to walk. It turns out that if we impose high requirements for an action, we have to re-learn how to do it, because in everyday life we complete many actions in ways which don't meet these high requirements. Hence, one needs to re-learn how to use mechanisms that are hidden within us and over which, it seems, we have no control. You cannot control these mechanisms because you do not know how they work. This control can only be achieved when an object and an action with this object is performed on the external plane. Then you can control your learning! Therefore, the materialised form of the action is the most important form for learning and teaching and especially for any type of re-learning.

However, something else has to be accounted for if the materialised form of action is to satisfy all the requirements. First, it is necessary to fully deploy the action and slow it down so that every step can be traced by the learner. For example, in the process of learning a foreign language a person is given an example of phonetically correct pronunciation, which he tries to imitate, thinking that he is doing it correctly. Actually, most probably he is doing it wrongly because it is not enough to give an example, you have to record immediately what the person has pronounced (by, for example, using a recorder) and then replay it.

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[2]Podolsky (1973) *Experimental formation of visual recognition of objects*. Moscow: Moscow State University.

An action should be performed in a form in which it can be easily traced by the learner: in slow motion, deployed and unfolded in such a way that it can be followed by an external observer. In this form, the action can be subjected to what I have already mentioned: differentiation and awareness of this action. These are accomplished by performing the action in the form of speech, which should accompany the action in all its units. With time (if this is possible) a deployed action should be shortened i.e. be accomplished more rapidly. In brief, in the materialised action the desired properties of an action are formed.

Now the question arises: when do we finish this phase and transfer to the next one? After all, this is just a phase, and it is very dangerous to linger at it, without moving ahead. I have already said that automation at any phase indicates its completion. When this happens, we should transfer to the next, higher forms of action. Automation means that the action starts flowing smoothly, accurately and at a sufficiently high speed. When the action reaches these indicators, we begin to remove the material support. However, what material support can be removed? First of all, you can remove the orienting card. When you notice that the learner is looking at the card occasionally or working without using it, you flip the card onto the reverse side. You can also tell the learner that if he forgets anything, he can always look at the card to complete the action, however, after the card has been used, it should be placed with its face down again. This situation encourages the learner not to use the card every time and creates a situation of involuntary memorising. However, if a learner spends too much time using the card, you will get the opposite effect. This is very important because the same tool can perform completely opposite functions. If you overdo the availability of the card as a resource, then the learner might get an impression that there is a memo or reminder which can be used any time, so there is no need to remember things. If I, for example, have an address book, I'm not going to memorise all the addresses; I will turn to the address book whenever I need it. This creates a psychological situation that encourages a learner not to make any effort at remembering things. Many attempts to introduce such memo cards were unsuccessful in the history of different education systems. Therefore, the orienting card should be removed when the time is right.

Later, when the action is transferred to the mental plane, then the initial material should be also removed. Well, let us say, if you want to perform calculations or analysis of any kind, you have to understand not only the formula or the algorithm of the analyses, but also that the initial data or analysed material can be at some point removed and the action will be completed without referring to them. However, this is not so important. What is essential here is the orienting scheme of action itself.

When you remove the material support, the action will not be immediately transferred to the mental plane. First, it is transferred to the plane of *externalised social speech*, which means that the analysis of this material and the actions with this material will be completed in the form of social speech. This speech is aloud, not only in its form but more importantly in its function as speech directed to another person. It is important that this is both a verbal action, and a message about the performed action.

The message about the performed action is of crucial importance, because anyone who has worked with people knows that quite often people say the right things; but at the same time, when performing the action, they omit important points, or even say something that is not related to the action, this is a mismatch of action and speech. This mismatch is a very dangerous thing. Critical responses from another person are crucial here because at this point, for the first time, the speech needs to be comprehensive and clear enough for another person to understand it; it is a requirement of its social (public) qualities. This means that a learner has to talk about the action and not only in a way that seems clear to him. A learner can visualise the material object and keep this object in his mind when talking about it. However, the material object is not present, we have already removed it. At the same time, the learner may think that he is doing everything properly. Perhaps he is acting correctly, but speaking about it unclearly. He should learn to speak in a way that is clear enough for another person to understand. Hence, the main emphasis is on the social aspects of speech: the action for the first time acquires the form that exists in the public consciousness. This is so because in this phase the material object is not present, but only its verbal expression: the communicative action acquires the form, which reflects the action with the material object. In the form of externalised social speech the action carries only one possible meaning which is a publicly accepted meaning.

When a learner is acting with material objects, it might seem that speech is of secondary importance. One has to do the job first: here is the initial material; here is the order of the actions; and a final outcome has to be created. This is the main, primary point. When the learner is making sense of the orienting card, speaking, being corrected—all this seems to be of secondary importance. However, in externalised social speech—communicated thinking—there is no material and no cards. Everything in expressed in speech and speech, as a fully-fledged representation of the action, performs its publicly objective function.

This is very important because for the first time the action takes the form of an objective thought. Therefore, logically (not psychologically), an action expressed in speech, is, actually, a thought. On the external plane, when a person moves from action with material objects to communicative action, a transformation from the action with objects to thinking about this action occurs and the person has to recognise that his speech should be framed in a publicly objective form.

However, one should avoidexpecting learners to use definitions, because by doing so, they may access an abstract formula, which does not yet carry the correct meaning for them. Therefore, to begin with, a learner should use his own extensive vocabulary and a teacher should insist on his doing so. Afterwards, when all these different ways of expressing the same thought have been played with, one can frame the speech with a given formula.[3] Only then will this formula encapsulate a whole variety of speech expressions.

In this phase, the action, now in the form of speech, is applied to solving the same set of different types of tasks as in the previous phase of materialised action. When the action in the form of speech, applied to the different types of tasks, begins to

[3] A formula may be understood as a definition.

systematically demonstrate its accuracy and the required speed, we can move to the next, the *fourth phase*—the transfer of the action to the mental plane. At this point an interesting thing happens. Once the action is transferred from the external to the internal plane, you immediately lose control over it. After all, you do not know what the learner is doing mentally. This is a big challenge, which we have only solved to some extent, though a rather important aspect.

We have found a way to control the action that has already been transferred to the mental plane. After all, the orienting card contains numbered instructions. When we transfer to this new form of the action, we can say to the learner: "Now we will work in a new way, I'll either point out a number to you, or you will tell me the number of the instruction you are working on at the moment". The action is performed mentally, only the result of the performed action is announced out loud. In doing so, we monitor the action in its individual operations. However, within individual operations the action happens on the mental plane, which we still do not know how to control. Nevertheless, we do not allow the learner to skip all the operations right away and simply present the final outcome, although very often a person is capable of doing it. Sometimes a learner gives the correct answer, and you realise that this answer includes performing not one, but several operations. In this case you say, "No, do not do it this way yet. First, give me the first answer then the second answer, etc." Of course, we know which answer should be given at each of these operations and if after the final operation has been completed the answer is the correct, we say, "Yes."

This is how we perform operational monitoring. What kind of form does the action take? Is it the first mental action? What does the learner transfer there? He transfers the action that previously was the action in a form of an external socialised speech to the internal plane. In this phase a learner can imagine the material objects or the orienting card, but this is not so important and we[4] do not interfere in this process. We require only one thing: that the action is performed as a sequence of operations recorded by voice or symbols, and we get an answer. Therefore, we believe that the first form of the mental action is the action performed in external speech when the learner talks to "himself" silently. This is the most frequently deployed form of speech, without saying anything out loud, not even in a whisper, because a whisper is a form of audible speech and is quite common with children and uneducated people. This form of action comprises the *fifth phase—the action in silent external speech.*

Once again, we apply this new form of action to the whole range of tasks which we discussed in the previous lecture. When the learner achieves fast and correct completion of every operation of the action, we move to the last, the *sixth phase.* We say to the learner: "Now we are going to work in the following way: I will give you a problem and you will give me the final answer". The final answer is not given at the end of each operation, instead what we need is the very final answer! In doing so, we remove this artificial fragmentation into individual operations that we had demanded previously, and instead permit an action its natural flow on the inner, mental plane. In this case, the developed action relies on the same content in the

[4]Researchers/teachers.

phase of a materialised action, and in the phase of communicative thinking, and in the phase of external silent speech. That is why the action is smoothly following the "tracks" and can be automated easily. We would like the learner to achieve maximum automation of the action in its final form. In order to do so, we require the learners to apply the action in its final form to the whole range of problems.

The action has to be performed correctly with maximum automation, and maximum speed. The slightest mistake—and we must return to the previous phase: either to the phase of externalised social speech (communicative thinking) or even to the phase of a materialised action. Errors are not allowed.

The more we explore this, the more we become convinced that any fluctuations in the performance of actions are not welcome; sometimes some operations can be rearranged or restructured, but you have to follow a certain order, one way or another. These fluctuations are not useful as they can hinder automation and an action that at first may seem to be satisfactory, begins to break down.

Many oppose automation, saying that it supposedly inhibits creativity; but these are different things. Creativity is an ability to solve a new problem. However, some aspects of the solutions to new problems must be already mastered. The best evidence for this is, for example, artistic performance. You know that no actor can achieve a good, creative performance, if he does not bring the technique of his action to maximum automation. Once your technique has been automated, only then do you first achieve the ownership of your actions. This happens if you have ensured sufficient generalisation of the action. When you have not, you should not blame the automation, but blame yourself because you did not form this property of the action.

When maximum automation is achieved, the following happens. Starting with the phase of externalised social speech (communicative thinking) a person is not acting with objects but with the meanings of the words, which express these objects. When externalised social speech is transferred to the mental plane, first externally deployed and precise silent speech is used. However, the more we master this silent speech, the more it becomes an obstacle, because it creates a barrier between individual elements, and, hence, creates a delay. Since the action has been automated, any delay is unnecessary. Something happens that was previously observed only in some intermediate operations: whole elements of the speech action disappear. Speech, being an obstacle for the flow of thoughts, begins to contract. First inner speech appears (that is, only the elements of speech, which reflect the difficult parts of the action and these elements should be deployed so that they can be traced), and everything else gets contracted. This is what is labelled inner speech. However, this is also only an intermediate form between the external silent speech and the form of the action that no longer contains any speech. With time, images of words, articulatory elements of speech begin to disappear from consciousness, because being fragmented they delay the action. What remains is the action comprising the movement of meanings - and scientists have not yet agreed on what a meaning is. Therefore, in the last phase of the action there emerges a phenomenon that previously has been labelled "a pure thought". This means if a person performing an action would like to trace the inner process of solving a problem, he is not able to see anything there, except for a special state labelled as "a state of consciousness". In short, something very vague.

When "the state of consciousness" was first discovered, it fascinated some psychologists, while others got outraged because they saw this as a proof of idealism and said, "This pure thought, is an experimental proof of idealism". While others, also idealists, but supporters of sensationalism (those who claim that everything in our mind comes from our senses), disagreed, saying: "This is impossible".

Well, they kept repeating: "impossible, impossible", but it still exists. An English scientist conducted a very simple experiment, which clearly demonstrated the existence of a pure thought. The experiment was as follows. A person was sitting at the table that had two buttons. An experimenter said: "I am going to say a word. If you understand the word, press the right button. If you visualise the image corresponding to what you have understood, press the left button. That is all". The person was given very simple, everyday words, such as a glass, a pencil, etc. If the person had understood the word, he pressed the right button and if he had visualised the image corresponding to the word object, he pressed the left button.

It turned out that in such experiments our understanding is significantly ahead of our visualisations. Sometimes we visualise the object and sometimes this does not happen at all, because it is simply unnecessary. For example, if I say: *a glass*, you understand what I am talking about. Do you really need to imagine a glass? It is not necessary. So, what is our understanding? Neither images nor speech elements are used, but understanding is present. As I have already said, the idea of a pure thought outraged some psychologists and fascinated others. The dispute between these two groups lasted until everyone had had enough, as often happens in psychology. However, the issue had not been resolved and it cannot be solved if you do not know how it occurs. You can understand that pure thought happens only when the automated action is created by you, starting from its original external forms.

So, the final form of a mental action is labelled pure thought when it is, in fact, hidden speech. This form is constructed from the elements of speech present in our consciousness in the form of meanings. Their material shell, including kinaesthetic sensations, articulation and sound images—all this becomes a nuisance and is eliminated. In fact, all these aspects are present, but hidden from view, because meanings belong to words and expressions but meanings are not to be found in the mind. Therefore, the *last phase* of the action is the *action in hidden speech*, subjectively expressed as a pure thought.

Now it is extremely important to emphasise the following: we started with the external action with objects, and finished with thinking about this action. When we were tracing this unfolding process, we understood how a new concrete thought was born in its original primary form. There might be secondary forms, which are also hidden, but that is a different matter. What is important is that the initial appearance of a thought is nothing else but a transfer of the action with objects to the human mind and its being processed there, everything that K. Marx had told us.

Therefore, if you study the formation of the action in its final form and trace the unfolding all the way from the material to the ideal action, then you might develop an understanding of how an exquisite psychological phenomenon such as an individual thought is formed. This is very important, because it opens up a new direction for the studying of mental processes. Up until now all mental processes

have been considered internal and can be studied only by self-observation. This considerably restricts research on these processes. When observing psychological phenomena only in their final form, researchers would make a gesture of helplessness: what can we do, what are we to study?

Of course you can only explore physiological processes; they are material. We are a long way from being able to trace a trajectory of a psychological process in the brain but, in principle, this is possible. However, if we assume that any psychological process is purely subjective, then it becomes impossible to investigate the process.

That is why there is such a strong tendency in modern psychology to find the physiological origins of psychological processes. It is not worth arguing against this tendency, and we are not going to do so, because this will only be relevant, if the physiological origins are revealed. On the other hand, even if these physiological origins are disclosed, they will not explain the psychological processes that are underpinned by these physiological features.

Another direction for research is through examining logic, a direction which is pursued by the outstanding scholar Jean Piaget. He believes that it is quite legitimate to look for physiological explanations of psychological processes. However, this is not sufficient; physiology does not explain the logic of external processes. Therefore, we can use the logic that is employed as an explanation of other psychological phenomena. Well, where is psychology as a science then? As you can see, from this point of view psychology as a science does not exist. There are only phenomena, but they do not constitute the subject of a science. If you know the process of the formation of a particular psychological phenomenon, for example, a mental action, the creating of an image, etc., then it's a different matter. Then the physiological origins may be useful, because people are not made from air. However, these physiological origins only create premises for the realisation of psychological processes, only premises!

With this understanding, we move on to describing the actual method of researching psychological processes. I have already told you about the subject of psychology, and now we turn to the method of psychological research, which is focused on studying the formation of a psychological phenomenon with its necessary properties. If you do not specify a priori these properties, then you will never understand why the phenomenon has turned out in one way rather than another. You can select these properties based on the ideas we were talking about and create the conditions that will allow you to form these properties. When you understand this system then you will be able to recognise why an action is lacking some of the necessary properties (if there really is a lack): not because a person is not capable, but because they were not provided with the conditions for mastering some of the tools of the mental activity.

Up until now, psychology has held the simplified view that a mental phenomenon is a spiritual act that is indivisible into its constituent parts and that it can be either good or bad because of its nature. In fact, a spiritual act is nothing but an action with objects transferred to the ideal plane. This phenomenon may contain specific conceptual tools, which can be applied, mastered and generalised in one way or another, but we have to understand that a mental phenomenon like this is a real process. Transformation of this process to the ideal plane—is also a real process and

if you do not ensure this transformation, then you might end up with "limited mental activity".

Mental activity has to be understood quite pragmatically. It is a type of work, like any other work performed by people. This work has to be mastered and resourced by proper tools.

Some people think that a mental action is an action of the brain. These views are the relics of old ideas about mental actions, seeing them as existing independently of the real world and therefore not subjected to any restrictions. However, it turns out that mental actions can be resourced with tools that can significantly improve them.

To sum up, our first conclusion concerns the method of psychological research. We do not dismiss the method of self–observation, we use it and accept it. Self–observation can describe a mental phenomenon. However, this is only a description of the phenomenon and nothing else! What lies behind this phenomenon? We can only discover this when we are creating the phenomenon and shaping it in a controlled process. Then we know what lies behind it. There are no reasons not to take the data of self-observations into consideration; however, to limit us to self-observations means to deny psychology as a science, because science cannot be framed by phenomena only. Once we know all the mechanisms that lie behind these phenomena, then we can begin to understand their role. Philosophers claim that phenomena are important because if you have a complex process, which is hidden from view, then with the help of a phenomenon you can control the whole process. At that point you begin to recognise how useful the phenomenon of mental, contracted and automated action actually is. This is the most profitable, the most economical form of mental activity.

Therefore, a phenomenon—is a special form of very economical work, because you are not dealing with the parts of the process; rather it is presented to you as a sum of the parts and as a phenomenon as a whole. If the phenomenon appears to sit at the top of a pyramid of well-established and thought-through connections, its positive value is greatest.

Most people cannot move beyond the idea that mental phenomena, human consciousness, are in their heads. What lies behind these misconceptions—is their idea of the brain, which is, in fact, a working organ. Their argument is that because psychological phenomena do not manifest themselves in any way, it is in the work of the brain that one should search for mechanisms of human mind and consciousness. However, this is a very subjective point of view. The notion of epiphenomenalism or mechanical materialism is still quite common. This notion claims that the brain produces mind, but mind is useless, because it is an ideal phenomenon. In addition, these misconceptions suggest that ideal notions like thoughts should not affect the material and confuse all the laws of material things.

This view, suggested by Hobbes, still exists. Many physiologists have a similar understanding of the human mind. Well, there is a brain, which is worth studying, but what is the human mind?

Now you understand that a brain and human brain especially—is a system of opportunities. Which of these opportunities will be realised depends on how we construct external and internal human activity. These opportunities cannot be realised

by the work of the brain by itself. A subject engages in the action, his mind does not act by itself, but a subject as an owner of the mind creates a form of ideal action.

What is the practical significance of the system we are talking about? Do the phases of mental development always have to be in such a fully-fledged form? If it were so, it would not have been so difficult to identify these phases. We, on the other hand, have spent more than 20 years studying these phases. The point is that development does not always follow these clear phases. Why? Just recently A. F. Karpova[5] defended her dissertation on this subject. Her research has shown that if you deal with new material and a new task, then you need to deploy the full sequence of the phases of the action. If you need to repair a previously formed action, then you should also follow all the phases. However, if you apply the phases of the development of mental actions systematically, you will find that overlaps and contractions across the phases will occur.

For example, speech is a very important form of action. First, students learn to talk, so that another listener can understand both them and the content of the action performed. When a student understands the requirements that are imposed on his speech, he begins to apply these requirements appropriately on other occasions. Therefore, there might be no need to include the phase of external social speech because the learner already knows how to speak in the required way.

The second point in relation to the reduction of the phases of the development of mental actions is that the learners begin to move from a fully-deployed process to a contracted one, shortened in such a way that it seems to last for only a moment. For example, when a learner is introduced to a task, he processes it in his head according to already well-established automatisms. The learner gets the answer at once, without any preliminary work. This marks the transition from successive to simultaneous action.

The third point—is the use of automated actions for solving new problems. This differs from simultaneous action in the way that there is a clear sequence of operations, but they happen very quickly.

If you have been applying the phases systematically to solving problems, then when they are applied to other problems, these phases contract and learning may connect with the form of traditional teaching: there is an explanation of a new task, then there is an external material action, and then everything happens as if by itself.

The initial awkwardness or challenge of the materialised action pays off quickly by: i) the speed of the formation of the action, and ii) the fact that the materialised action may be eliminated from the learning process. An extremely important point is that a learner becomes able to control his learning. After all, what has the process of learning been so far? Memorising. Something is explained to you, then you are asked to memorise it and then you are tested to see if you have done so. Nothing else. How this memorising happens remains undiscovered. When you apply the phases of the development of mental actions, you transfer the external action to the internal

[5]Karpova (1977) *Changes in the phases of the development of mental actionsin their systematic application. Controlled formation of psychological processes.* Edited by P. Ya. Galperin, Moscow: Moscow State University.

mental plane, turning it into the individual achievement of a learner. In addition, we can control this process.

Because we carry out the foundations for creating and performing future mental action on the external plane, many things become much easier and more accessible for learners than in traditional teaching, where everything is presented mainly in words and is only sometimes illustrated.

For example, we discovered that very many of the topics that had been studied in grades five and six could, with the help of our system, be learned by children in the first grade, and sometimes even by older pre-schoolers. It is often suggested that children appear to have hidden abilities, likening them to deep reservoirs of oil which, when revealed, begin to gush.

Well, this is nonsense. They think that the brain is full of hidden abilities and if we drill a hole in the brain, the abilities begin to gush. This is a complete nonsense! The point is that you simplify students' work. What was once needed to be understood from words, and often words, which are largely unsaid, is now presented as an objective reality with its obvious links and relationships. Therefore, the point is not that there are some kinds of abilities which can be revealed, but that the learning activity of a child is organised differently. The point is that new tools can empower a child's mental activity.

Another practical matter is that, due to the simplification of the process, we get a new solution to an old problem—the problem of the alignment of the performance of a large number of learners. Traditional teaching is classroom teaching, and a class is a significant amount of people, selected randomly. Because of that there is a big difference in performance and in abilities.

This issue was first raised back in the late nineteenth century and attempts were made to group all students according to their abilities. Then so-called talent tests appeared, and these tests are still in use, although significantly improved. Indeed, people can be divided into groups according to the level of their development and the differences between these groups can persist for their whole lives. However, what lies behind this grouping – is another matter. In some European countries, the issue is resolved in the following way: students of similar abilities are grouped together, and each of these groups has their own curriculum, their methods of teaching, etc. This approach often has economic and other implications, because you just select people according to pre-defined criteria. One group can easily master the curriculum, another group will require more time on it and the third group will not manage it at all.

It has turned out that the use of the phases of development of mental actions, applied to ordinary children, results in the alignment of their performance. This means that the general education programme appears to be quite accessible for ordinary children. Underachieving students (of course, these children are always present) need additional tuition, but only at the beginning and for a very short period. Then the alignment of students' achievements happens. I would like to emphasise that we are discussing the alignment of performance and achievements, not abilities. We will discuss abilities separately—we do not deny abilities exist; they just need to be explained appropriately. However, in relation to the general curriculum, you can get

this kind of alignment of performance so that the worst performance would be as different from the best, in the way that 98% is different from 92%, no more than that. This alignment eliminates the problem of variation in performance and achievements within a class.

These teaching methods open up another approach to mass education. I have already told you that we selected some children at the end of their first year of schooling and examined the development of their mental actions in relation to arithmetic. We found very clear differences, which generally corresponded to the evaluation of the teacher. In fact, the differences were very interesting.

It appeared that the students who used to get a grade two (on the scale 1–5)—were those who were stuck at the early phases of actions. In their attempt to catch up with their peers, they automated these earliest phases, because the automation results in the acceleration of the performance of the action. Trying to catch up with their peers, these less successful students automated what they could do and therefore got stuck in these early phases. The trouble is that when the teacher wants to help them, and engages with them, this engagement happens in the same way as the action had been performed previously. The students simply get some additional tasks. At this point, everything depends on the teacher: if we have a good teacher, let us say, a talented teacher, he may notice that a child is not working the way he should. The teacher modifies how the student works and this can lead to a positive outcome. If we have an average teacher, he does his job properly, working extra hours with the less successful student, but he does not notice what is missing in the child's approach. The teacher just spends more time on solving problems, but a child gets completely stuck in the early phases and does not achieve what they should. Then the teacher says: "I have done everything I could, but it's hopeless". Everything stops here. This is the psychology of underachieving, grade two students.

Now let us explore why a child becomes "a grade three student". On one hand, "a grade three student" is learning something and, on the other hand, why doesn't he get a grade four? It turned out, that these children master the first phases of the action, memorise the results of these first phases and skip the intermediate mental phases of the action. Therefore, whenever a learner may rely on the available data, he produces the right answer. If the data is not available, he turns to the expanded materialised action. However, if he needs to do something mentally, he simply cannot do this. Therefore, this student almost always gets a grade three because he can perform some actions on the external plane, but if the action has to be performed mentally, this student is helpless.

Now "grade four students". They are very interesting and colourful people. They differ from "grade five students" by the fact that they always have something unfinished. Sometimes, for example, they may not generalise, or some of the phases of the action have not been automated. In short, they always have some small faults, these faults vary, but they are always present.

What about "grade five students"? These students are those who have mastered all the phases of the development of mental actions. They satisfy the complete set of the requirements. Sometimes, one comes across students who are not genuine "grade five students". When we presented them to the teachers, the teacher agreed that the

grade five was given as a form of encouragement. This encouragement can be of different kinds; sometimes, a teacher sees that the student deserves a grade four, but he tries his best, makes every attempt, so he is awarded "a five". Somebody can be given "a five" just because "he is just a good boy"; in this case a grade is given for his moral qualities. On the other hand, there are "grade five students" who are given "a four" so that they do not become conceited. In short, these personal relations and considerations are very confusing, and teachers admit their existence.

Now the final, very interesting point. The grades given by a teacher usually summarise many different aspects, but the action of a learner in various phases reflects what kind of learner he is. We chose seven "grade two students", underachievers, and identified what was automated with these students and what skills were missing. The first thing we did was a "de-automation". We did it so that the students were returned to the expanded, played in a slow motion, materialised action. This phase was used as a starting point for the development of the mental operations of the action. Very quickly, within two weeks, these underachieving students were transformed to a completely different level: almost all of them became "grade four students", a few even "grade five students" and one became a "grade three student". However, all of them became achieving students. The point is that underachieving students do not need extra time for tuition, but they need specific interventions, which are aimed at compensating for earlier missed operations of the action that students need to master.

Chapter 5
Psychological Grounds of the Development of Ideal Actions and Concepts

Outline of Lecture 5

Galperin starts by reminding that the development of mental actions comprises two parts, *orienting and executive*, and both are transferred to the learner's mental plane. *The orienting partof the action* has a guiding function that is needed to perform the action; therefore, *the executive part* of the action is connected to the orienting part. The orienting part includes four main purposes or tasks: (i) evaluating the present situation; (ii) identifying the potential of the objects present in the situation for meeting the actual needs of the learner; (iii) creating a plan for the action; and (iv) controlling the action's execution according to the created plan. Each of these four tasks or purposes of the action's orienting part can become separate areas of study. Galperin points out that it is important to trace the development of the action's orienting base as well as the changes that this process may undergo during the development of the action. The phases in the development of the action can be used to identify what was overlooked in the learning process and to make the required corrections. Such corrections may include changes to the orienting and executive parts of the action, which are particularly important if (i) a completely new action is developed with learners, and (ii) if an action developed with learners requires corrections.

The development of mental actions begins in the materialised form during learners' interactions with material or materialised resources, followed by the transfer of the action to communicative thinking, where for the first time the action acquires the form of an objective thought. During these transformations, the action is transferred to the learner's mental plane where the action undergoes further changes. These transformations lead to the appearance of a mental phenomenon that is usually studied using two approaches: (i) examining the physiological aspects of the learning process, and (ii) studying the objective logic relationships that are manifest in a thought. Galperin emphasises that in the near future, psychologists may be able to study psychological phenomena by examining the physiological processes in the brain.

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The method of logic allows for studying psychological phenomena only in their final phase, but it does not provide any information about the origin of these phenomena. Galperin argues that researchers should not study phenomena as such, but they should study their ontological grounds as well as the causes and the processes behind these phenomena. He suggests that psychological phenomena should be understood as internal actions that have been transformed from external actions with objects. How the actions are performed indicates whether they have been developed correctly. Therefore, psychologists should study the development of mental actions.

The discussion of the development of mental actions is continued by considering the *development of concepts.*Galperin indicates that concepts constitute one of the two main forms of reflecting on the real world; the second form is sensory images. The development of concepts is central to learning in schools and higher education.

Previous research examined the development of concepts by learners in schools: *scientific concepts* and under laboratory conditions, *artificial concepts*. In school learning, the concept was explained by the teacher, and the learners mastered the characteristic features of the concept by reading relevant texts and solving problems. Under laboratory conditions, the learners identified the characteristic features of the concept by examining a set of objects that encapsulated its features. The results showed that the process of the development of artificial concepts was challenging for learners. These two methods of developing concepts were used in many subject areas and in different countries; however, they had similar mediocre learning outcomes. In both methods, the learners used substantial amounts of time to develop their understanding of the target concepts.

Galperin concludes that *first,* the development of concepts in learners happens gradually and over time. *Second,* generalising the target concept also happens over time. By applying the concept in various situations, learners enrich it with features that are derived from their everyday life experiences. However, because such concepts lack structure, the essential (scientific) and inessential (everyday life features) are given equal weight, and students struggle to identify the primary and secondary features of the concept. In addition, the development of conceptual understanding is possible in 11 and 12-year-old students. Galperin suggests that the development of scientific concepts is possible in 6 and 7-year-old students by identifying the characteristic features of the target concept and introducing them to the learners. *First,* learners must identify the presence or the absence of the characteristic features of the target concept in the object and then determine whether the object belongs to the target concept. *Second,* the characteristic features of the target concept must be presented to the learners on an orienting card and arranged in a column where each feature is under its number. *Third,* different tasks should be offered to learners (based on the principle of contrast), such as subject-specific, logical, and psychological tasks. By following this approach, learners develop an understanding of the target scientific concept, and the difference between their achievements becomes insignificant. The learning process happens quickly without memorisation, and the learners are able to apply the target concept in various situations.

Lecture 5

I would like to briefly remind you of the content of our previous lectures. We touched upon the subject of psychology, which is of particular importance for contemporary psychology. We argued that psychology should study a person's orienting activity. The orienting part of an action has a guiding function that is needed to perform an action; therefore, the executive part of an action depends on and is inherently connected with the orienting part. Usually the orienting part is developed spontaneously under the influence of some visible final outcomes of the action. Such an approach is insufficient to ensure the action's desired properties. The orienting part of the action carries four main tasks or purposes: (i) evaluation of the present situation, (ii) identifying the potential of the objects present in the situation for the actual needs of the learner, iii) creating a plan of the action and iv) control of the action's execution according to the created plan. Sometimes, the control of the action's execution may turn into an evaluation of our understanding of the present situation.

The four tasks or purposes of the action's orienting part are quite straightforward, though sometimes each of these tasks can turn into separate areas of study. For example, what we call evaluation of the present situation can turn into an investigation of the surrounding world and a human being as a part of this world. Such an investigation can be divided into several independent areas. This is an example of how one part of the orienting activity can turn into several independent areas of study.

A similar situation is when we create a plan. Sometimes creating a plan can turn, as for example, with animals, into a study of an action's trajectory from its start to its final point. It is absolutely necessary to single out this trajectory, and to sketch it so that it can be turned into a sequence of necessary activities. Each of these activities can take different forms but there are always four main tasks (mentioned above) that ultimately ensure a successful action performance.

It is very important to trace in an expanded form the development of an action's orienting base, and what changes this process may undergo during the development of the action. We have traced specifically the process of the development of mental actions. We did so because this process comprises two parts, orienting and executive, and both are transferred to the learner's mental plane, where the action undergoes changes and acquires certain properties. If we are aware of the development process of an action and the changes the action undergoes in its various phases, we can use this action's development phases to identify what has been overlooked to make the required corrections. Such corrections may include changes to the orienting and the executive parts of the action, which may have been created spontaneously or under insufficient control. This is particularly important if (i) this is a completely new action, because following the phases of an action's development can ensure the development of a new action with the desired properties, and (ii) if we need to make some corrections to the action that had been developed incorrectly by learners.

I would like to touch upon an extremely important statement: we begin the development of mental actions with the process of interaction with material or materialised

objects—materialised action. Materialised action implies interactions with models, signs and diagrams, which means interactions with materialised objects. For example, if we deal with mathematical signs, they can be transferred from one part of a mathematical equation to another, as these signs can be summed up or crossed out—we can interact with these signs like with material objects. You can also check your answer to the problem by performing certain operations with signs. Therefore, we always begin to develop a new action in a materialised or material form and then the action is transferred to communicative thinking, where for the first time the action acquires the form of an objective thought. By going through these phases, the action can be transferred to the learner's mental plane, where the action undergoes further changes. These sequential transformations reflect how an action with material or materialised objects may turn into a thought about this action, though this thought cannot be easily expressed in words. However, it is important that in the cause of these transformations there appears a mental phenomenon. If we were not aware of the process that leads to this phenomenon (mental action), it would be impossible to study the phenomenon of a mental action using objective methods. The question then arises of how researchers can study a mental action. They do so usually in two ways: either by examining physiological aspects of learning processes, or by studying the objective logic relationships that manifest in a thought.

These two methods of studying the learning process are quite common in modern psychology. It is considered that psychological phenomena cannot be subjects of science, as they can only be described. Further, this description is never objective; it is rather an experience which can barely be expressed in words. Therefore, we have a phenomenon, but how can we study it? It would be quite sensible to approach this phenomenon (mental action) by studying the processes that happen in the brain. It might happen that in fifty years, scientists will discover how to trace the processes that happen in the brain. This is a valid method and most psychologists pursue this method to study psychological phenomena. Other scientists approach psychological phenomena by using the logic method. If we were not aware of the development phases of mental actions, we would not have a choice other than to pursue the method of logic, since we can observe the development process of mental actions only in its final phase and we do not know its origin. However, science does not and should not study phenomena, but the causes behind these phenomena, the processes that lead to the observed phenomena.

Yet, what causes the phenomenon of a mental action? As I have already said, if we were not aware of the development phases of mental actions, we would think that mental actions were caused by physiological processes and, therefore, these physiological processes have to be carefully examined to develop our understanding of mental actions. However, we are aware that we are dealing with an internal action that has been transformed from an external action with objects. We have developed this action and make use of it in various situations. We need to control the flow of this action and, in fact, we can sense whether the action is being performed properly. From studies on the physiology of the process of control, we know that this sense appears by comparing the actual flow of the action with the action scheme that we have created. If we get a sense that the actual action flow corresponds to the created

action scheme, this means that we should not interfere in the action and everything is going well. If we get a sense that the actual action flow does not correspond to the created action scheme, then we should pause the action and look for mistakes. If the correct action has been developed with learners, then the whole action is performed automatically. Therefore, how the action is performed indicates whether the action has been developed correctly and we get this indication by examining the correspondence of the action flow with the created action plan. This makes us consider that it is not a physiological process, but an action that has been developed with learners that lies behind the phenomenon of mental action. The physiological processes may actually assist the performance of the mental action. If a person is ill or tired, then the physiological processes can hinder the action's performance. Therefore, psychology should study the development of mental actions, and not physiological processes. This is an extremely important point related to the main subject of psychology.

Development of Concepts

The topic *development of concepts* logically continues the topic *development of mental actions*, which we have just talked about. Concepts constitute one of the two main forms of reflection of the real world, with sensory images as the second form. We will start with the process of the development of concepts, because concepts are more concrete and, to some extent, easier to understand than sensory images.

All sciences study certain concepts, and developing an understanding of these concepts is one of the most important tasks of the learning process in primary, secondary and higher education. The development of concepts with learners is considered an important characteristic of learners' mental development and we are very much interested in the age when students are able to engage in learning different concepts. In addition, we are interested in the structure of the learning process aimed at the development of concepts with learners.

Studies that examine the development of concepts with learners pursued two approaches: examining the development of concepts during school learning, and of so-called artificial concepts in laboratory conditions. The process of the development of artificial concepts was examined to avoid the influence of the experience concerned with learning in school. In school learning the teacher explains the concept's content to the learners in an appropriate and understandable way, then the learners master the characteristic features of this concept by reading relevant texts in the suggested textbook, and by applying the concept to solve various problems. In laboratory conditions, the following way of learning was pursued: the learners were offered a set of objects that had to be combined in a concept according to their common characteristic features. The combination of these common features was defined by an artificial concept. In doing so, the researchers wanted to trace the development process of concepts with learners. It turned out that it was quite complicated for the learners to create an artificial concept.

These two methods of examining the development process of concepts were completely different, because under the laboratory conditions, the learners had to develop their understanding about the examined objects, and formulate a concept that

would combine the characteristic features of the target objects. In school learning, the concept was explained to the learners by the teacher to be memorised and applied to solve various problems. It seemed that these two means of developing concepts with learners completely differed from each other. However, these approaches' results appeared to be similar in different subject areas: specifically, in mathematics, geography, history and grammar. In addition, these approaches to studying concepts were similar in different countries and even on different continents. What was similar in these approaches to the development of conceptual understanding was that the achieved learning outcomes were quite mediocre. This was particularly true for learning school concepts, the content of which was presented to the learners at the beginning of the learning process and repeated by the students for several years. It turned out that only after 5–7 years of studying the same concepts the learners developed their understanding about the concepts that were explained to them many years earlier. The students slowly developed their understandings about the characteristic features of the target concept. A similarly slow development of concept happened under laboratory conditions: the learners were able to develop their understandings about one or two characteristic features of the target concept at a time, and then after some time the learners developed their understanding about other characteristic features of the concept, despite that all characteristic features of the target concept were presented to the students at the very beginning of the learning process several years earlier.

Therefore, first, we can conclude that the development of concepts with learners happens gradually over time. Second, generalising a target concept with learners also happens gradually and the learners over time become able to apply the target concept in various situations. It is interesting that in the process of the development of conceptual understanding, learners enrich the concept with other characteristic features that come from their everyday experiences in interacting with the world. Therefore, for a long time, learners might maintain a so-called hybrid understanding of a concept that comprises scientific characteristic features and the features that come from their everyday life experiences. For some time, psychologists admired such a combination of scientific and everyday life features in the target concept that learners maintained, because they considered this an individual approach to learning. However, the presence of the features that stem from everyday life experiences in the learners' understanding of the target concept implies that the concept is lacking structure, and the essential (scientific) and inessential (everyday life features) are given equal weight. Such an understanding on the part of the learners results in the absence of a feature hierarchy, and the inability of the students to identify the target concept's primary and secondary features. Similar results were reported in several studies at different times and in different subject areas; it was therefore concluded that such a process of the development of concepts with learners is inevitable and should be adopted in education.

For a long time, it was considered that the development of conceptual understanding is only possible with 11- and 12-year-old students. First, such an understanding resulted in the idea that learning concepts before the age of 11/12 was not recommended and even forbidden. It was considered that children develop so-called

quasi- and pseudo-concepts, as they are unable to develop their true understanding of the target concept. Therefore, teachers must introduce incomplete concepts, or a "simplified" version of a concept, and when the children reach the age of 11/12 years old they are able to develop their true understanding of the target concept. On the other hand, why do children of exactly 11/12 years old become able to develop their conceptual understanding? This is the age of adolescence and some think that there is a direct connection between this age and the ability to develop conceptual understanding. This suggestion has had consequences for the practical organisation of the learning process, and it was almost impossible to make changes to such a learning process until we developed the method involving the phases of the development of concepts with learners.

We approached the process of the development of concepts by considering two actions: first, a mental action is only one constituent part of the process of the development of conceptual understanding, and second is the images of objects and the meanings they carry. The students develop their understanding of these meanings when interacting with these objects. Therefore, we need to shift our focus from the development of actions to the development of the images of the objects learners interact with. We have approached this issue in this way: every concept consists of distinctive characteristic features and these features must be identified and introduced to the learners.

First, the learners must identify the presence or the absence of conceptually distinct features in the object they interact with and determine if the object belongs to the target concept. The characteristic features identified in the object must be excessive and necessary to conclude that the object belongs to the target concept. There should not be any other features that the learners simply memorise and do not use. Sometimes, in mathematical concepts studied in school, learners are introduced to features they cannot use. The question then arises, why are these features introduced to the learners? Just to complicate the learning process? We do not accept such general knowledge, and instead select such characteristic features of the target concept that learners are able to use for solving problems.

Second, the characteristic features of the concept must be presented to the learners on the orienting card arranged in a column, each characteristic feature under its number. This is not an easy thing to do, because very often teachers want to explain the target concept in a comprehensive way by introducing the concept features that the learners are not going to use. This should not happen. In addition, we select different types of tasks (subject-specific tasks, logical-type tasks and psychological-type tasks) to be solved by the learners.[1] The order in which these tasks are presented to the learners has to be carefully thought through.

The tasks should be selected based on a psychological principle which was first suggested by Pavlov and discovered in his experiments with dogs. This is the principle of contrast. For example, learners can first be presented with a very easy task, followed by a very difficult task that will enhance full attention on the part of the learner. The teacher presents the characteristic features of the target concept necessary to solve

[1] Galperin presents these types of tasks in detail in Lecture 3.

this task. At this point, the orienting card with the characteristic features of the concept is available to the learner. When solving the next tasks, the orienting card is removed, and the learner repeats aloud the characteristic features of the target concept when approaching the task. When solving other tasks, the teacher might indicate the number of characteristic features of the target concept that the student needs to use to solve the task. This means that the learner does not need to repeat all characteristic features of the target concept but solve the task mentally. In doing so, we control the internal learning process of the student. Further in the process, the teacher introduces a task and the learner solves the task mentally, then presents the result to the teacher. Such an approach to the development of concepts with learners, produced totally unexpected results.

First, it turned out that the school concepts that were intended to be developed with 11/12-year-old students, could be developed with children of 7 and even 6 years old. In addition, it turned out that all students in the class developed their understandings of the target concepts. When the concepts are introduced to the learners through traditional teaching, there is always a large spectrum of achievements among the learners: some students learn very fast, other students learn very slowly and some students do not succeed in the learning process at all. To summarise, in a traditional school teaching, we observe different learners: from those who learn fast and easily, to those who struggle and fail in their learning process. Such a difference among the learners' achievements is often explained by the students' different abilities, which seems a reasonable explanation. However, in our approach, we discovered almost no difference between the students' achievements. Of course, some students learned faster than others, but all students developed their conceptual understandings and the difference between the learning outcomes of the individual students was truly insignificant. In traditional school teaching, different learning outcomes are evaluated by marks awarded to the students and, usually, the range of marks in one class is quite wide. When we applied the phases of the development of concepts, we did not observe such a difference between the students' learning outcomes. The learners followed the instructions on the orienting card and they could not miss a single characteristic feature of a target concept when solving a task. In doing so, the learners did not develop any hybrid concepts, though true scientific concepts were developed with the learners which contained the whole set of characteristic features. The learning process happened fast, and the students did not need to memorise the target material. The essential features of the target concept were available for the learners on the orienting card and they could use the orienting card until they did not feel the need to use it when solving the tasks. Only then was the orienting card removed from the learners. The learners developed their understandings of the target concept, and they became able to recall this concept not orally, but to use it to solve various problems.

In traditional school teaching, the learning process is not visible to the learners: it happens in the heads of the individual learners and, therefore, teachers do not have access to this process and cannot control it. For example, a teacher explains the concept, and then checks how the students have understood this concept by asking questions. The students respond to these questions usually by recalling the

content of the teacher's explanation. Then, the students memorise the content of the concept, but how this happens remains out of the teacher's sight, so the teacher cannot control the learning process. In the next lesson, the teacher checks the students' understanding and it usually turns out that the students demonstrate quite a wide spectrum of understanding of the target concept, which is often explained by the students' different abilities. However, the learning process that led to the development of the students' conceptual understanding was totally uncontrolled and the students were confused by applying both scientific and their everyday experience features of the target concepts. If we create a more rigid framework around this process, it begins to flow quite differently. We do not attempt to explain how the age of adolescence is linked with an ability to develop conceptual understanding, but we are convinced that the students' achievements depend on how the learning process is structured and organised.

In traditional teaching, a new concept is first explained, then memorised, then applied for solving typical problems. After that the concept is applied by learners in other situations. If teachers are unaware of any other methodologies, then such an approach seems quite reasonable, so we should not develop a totally neglectful attitude towards traditional teaching methods. First, the teacher explains a new concept and to be able to apply it in various situations, the learners must develop their understanding of this concept. To achieve this, the learners have to memorise the concept, and then engage in solving various tasks that apply the target concept. This is a logical way to go, but reality, as we know, does not always correspond to the laws of logic.

In our method, students do not need to memorise the target concepts; however, they remember the essential features of these concepts involuntarily. In addition, if the teacher explains the characteristic features of the target concept presented on the orienting card to the learners, and elaborates on how to engage in the learning process by using the orienting card, then the information presented in the orienting card will be memorised very quickly, in 1–1.5 h, and the students may continue solving other problems without the orienting card. Learning happens quickly and without any special efforts from students.

Several researchers are very cautious about such involuntary memorising. American scientists call such memorisation accidental, meaning that it happens by itself, without any effort on the part of the learners. However, we cannot structure the whole learning process on accidental, uncontrolled and chaotic processes. In our method, we can enhance the learners' involuntary memorisation by presenting the characteristic features of the target concepts on the orienting cards, and by having the learners use these orienting cards to solve various problems.

Now, a few words about the outcomes of the learning process that follows the phases of the development of mental actions. Several studies reported that after learners had been exposed to learning through phases, when they encountered a new material or object, they could identify if this material or object belonged to the target concept. For example, a learner comes across a noun in a sentence. The learner sees the word and he is able to identify that it is a noun, and thus demonstrate his conceptual understanding. This phenomenon has been described previously; however, the

learning process that has led to such a phenomenon happened spontaneously, without interference on the part of the teacher. How does a student identify that the word he/she has come across is a noun? The learner follows the process of identifying the essential characteristic features in the examined object (a word in our case) and concludes that the examined word belongs to the noun concept. When we systematically examine an object that belongs or does not belong to the target concept, we identify a set of features that comprise a so-called dynamic stereotype model. This dynamic stereotype model was first introduced by Pavlov, who suggested that it can imply a different order of the concept's characteristic features. For example, the learner identifies a feature that was presented in the middle of the list of all characteristic features on the orienting card. The dynamic stereotype model is then triggered, and the learner identifies that the examined object belongs to the target concept. However, in this case, a learner can express his understanding by using such words as *it seems that this word is a noun.* In the later learning process, the student develops his ability to identify all essential characteristic features and conclude that the examined object belongs to the target concept. The learner develops such an ability by interacting with the objects that encapsulate the essential characteristics of the target concepts.

Chapter 6
Development of Sensory Images

Outline of Lecture 6

In this lecture, Galperin presents a case study of the development of *sensory images* in learners by tasking them with the analysis of medieval Armenian churches. Both target and control groups participated in the study. In the control group, the students were presented with photographs of typical examples of medieval Armenian architecture. The students had to compare and contrast the photographs to identify the characteristic features of Armenian churches and outline the differences and similarities between Armenian and other churches. In the target group, the phases of the development of mental actions were applied. The learners were introduced to the functions of Armenian churches: (i) temples of religion, (ii) places for public meetings, and (iii) fortresses to protect the city's inhabitants from enemy attacks. The construction of the churches and the building materials used were also explained to the students. They were also introduced to the historical circumstances of the construction of Armenian churches. In analysing this information, the students identified the characteristic features of medieval Armenian churches. When the students had identified the characteristic features of Armenian churches, these features were presented to them on the orienting cards in a distinct order. The learners analysed the images of the churches by using the list of characteristics and then concluded whether the church was Armenian or not.

At the end of the learning process, the students in both the target and control groups were able to identify Armenian churches. However, in the control group, the students' ability to recognise Armenian churches was unstable: the students were unsure about their analysis, and they could not justify or explain their answers. A different situation was observed in the target group: the students could enhance and explain their answers, which they expressed with confidence. Galperin concludes that when they are exposed to spontaneous comparing and contrasting, learners develop conceptual understanding; however, the process of learning remains unstructured and invisible to them. Learners in the control group could identify the characteristics

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of the target concept; however, they demonstrated uncertainty in their choices. In addition, the learners were unable to justify and explain their answers, and they did not develop an understanding of the learning process.

Galperin provides another case study of learning to recognise different objects, which was conducted by A. Podolskiy, N. Nechaev, and G. Lerner. A target group and a control group participated in the experiment. In the control group, the participants were exposed to traditional teaching, and in the target group, the participants followed the phases of the development of mental actions. The outcome of the experiment was that an unexpectedly fast speed of recognition of the objects was achieved in the target group, and the participants were insensitive to any interferences or changes in the experimental conditions. In addition, the participants in the target group required considerably less time to achieve the required speed of object recognition than those in the control group did.

Finally, based on the results of these two case studies, Galperin discusses a method of psychological research. He argues that a system of psychological conditions should be created to develop actions with the required properties. In the absence of such a system, the development of the desired phenomenon cannot be ensured. Galperin points out *that human mental activity* has material grounds and originates in a real external process. The transfer of the external process to the mental plane of the learner is also a real process that can be traced. If we do not ensure the successful transfer of the activity from the external to the internal plane, a psychological action with the desired properties cannot be developed in learners.

Lecture 6

Previously, I discussed the process of the development of concepts, because this process is, to some extent, algorithmic and fairly simple to explain. Today, I will discuss the development of perception images, or sensory images. In order to trace the development of sensory images, we have to engage with objects that are quite unusual. This is because we have developed sensory images of a great variety of objects and to develop a new sensory image, we have to engage with an object that we have not engaged with previously.

In the experiment on the development of new sensory images conducted by our researchers, medieval Armenian churches were chosen as a research topic, which were unfamiliar to most Russian students. These churches were presented to the students as large pictures, so that they could review these buildings in small detail. First, the students examined the pictures of the churches; however, they could not identify any of the buildings' characteristics. This was because the learners had not developed an image of medieval Armenian churches. We (the team of researchers) took on the task of assisting the students in developing a generalised image of Armenian churches in two ways, by using a target and a control group of students.

The students in the control group were presented with photographs of typical buildings of medieval Armenian architecture. The teacher introduced these buildings with the aim of students developing their sensory image of typical Armenian churches, and confidently recognising these churches, among others. The students were presented with pictures of Armenian and other churches, and had to compare, contrast and identify the characteristics of the Armenian churches, and outline the similarities and differences between these and the other churches.

We started our experiment by presenting the students with the pictures of different Armenian churches. Then, among these pictures and in a certain order, the students were presented with very similar but still different pictures of other churches. These were medieval Georgian and Russian churches. In fact, the students were supposed to compare the Armenian, Georgian and Russian churches of the same medieval period (some of these churches were very similar). In addition, pictures of other churches that were very different from Armenian ones, were also presented to the students. These were, for example, West Gothic churches and buildings of Muslim architecture, specifically mosques of different types. As I have mentioned previously, first, the students in the control group were presented with several pictures of typical Armenian churches and asked to carefully examine these churches. Then, the students were presented with the pictures of other churches and told to examine the images, concluding if the churches were Armenian or not. The experiment facilitator approved or disapproved the students' answers by saying, "That's right, this is an Armenian church", or, "No, this is not an Armenian church". Such a procedure continued until the participants were able to identify Armenian churches confidently and without any mistakes.

In the target group, we used the method of the phases of the development of mental actions and the learning process was totally different. First, the learners were introduced to the purposes of Armenian churches: they were temples of religion and, therefore, expressed a religious idea. Second, the Armenian churches were places for public meetings and third, were used as fortresses, where people could hide from enemy attacks. Armenian churches were built to serve these three purposes and as such they had to fulfil certain criteria. The construction process of the churches and the building materials used were also explained to the students and they were introduced to the historical circumstances of the construction process of Armenian churches.

By analysing this information, the students identified the characteristics of medieval Armenian churches. On the one hand, these characteristics were an expression of ideology and on the other, the churches were also used as fortresses to protect the city inhabitants. The ideology of that time was embodied not only in external forms, but also in how the churches were built. Both Russian and Armenian churches were built with the contours of the building erected in the shape of a cross. The proportions of typical Armenian churches are also worth mentioning, as medieval Armenian churches are wider and higher than Russian churches, specifically in the part called the drum, which is located under the roof. In Armenian churches, the drum is particularly wide and the roof therefore low. The windows and doors of Armenian churches are also a very specific shape: The churches were used as fortresses to

protect their inhabitants, so the windows are narrow and high. The doors were also made as narrow as possible, so that enemies could not break through. The construction material used to build Armenian churches was also specific—this is the famous Armenian tuff. This is a magnificent building material, durable but easily shaped. The churches were built from large stones, carefully processed to fit precisely to each other. These were not just boulders found in Western Europe, which were used to build walls and gaps between the stones and filled with mortar. In the Armenian churches, the stones fit well together, because they were carefully shaped for this purpose. The final characteristic of the Armenian churches is minimal décor. Sometimes ornaments are used, but they are not dominant. Although there were some differences among the churches, in general, Armenian medieval churches have less décor than, for example, Georgian or Russian churches. Once the students identified the characteristics of Armenian churches, the characteristic features were presented to the learners on the card in a distinctive order. The learners were to analyse the images of the churches by using the list of characteristics, and to conclude if the church was Armenian or not.

In the control group, the research team and the teacher did not interfere in the learning process; the learners performed the analysis of the church images independently. The teacher only approved or disapproved the students' answers. In the target group, the learning activity was carefully designed by the research team in collaboration with the teacher: the learners analysed the images of the churches according to the list of characteristics presented on the card (materialised action). When the learners transferred to the out-loud speech phase (communicated thinking), the card was removed and the learners analysed the churches against the characteristics of the Armenian churches in a distinctive order: to start, against the first characteristic feature, then against the second, against the third and so on. In the dialogical thinking phase the teacher only said the number of the characteristic (not naming it) to the students and the learners analysed if it was present in the church. In the last phase—acting mentally—the teacher did not interfere with the learning process and the learners could analyse the churches presented on the pictures independently.

What were the outcomes of the learning processes in the target and control groups? As it were, we achieved quite similar results in both groups—the students were able to identify Armenian churches. However, in the control group (where the students were exposed to traditional learning), the students' ability to recognise Armenian churches was very unstable. In a traditional approach, the learning process remains hidden and invisible for the students and, therefore, it is sensitive to various factors. The students in the control group could perform the analysis and achieve the correct answer, but they were not completely sure about their answers. For instance, if the teacher looked at them in a puzzled way, the learners became hesitant about their answers. They turned to the images of the churches again, looking, thinking and resonating; in short, they were very unsure about their analysis and answers. In addition, the students in the control group could not explain or justify their answers. When asked, they also could not draw a typical Armenian church, even schematically. Although they could draw the church they analysed, the students were totally confused when asked to independently draw a typical Armenian church.

Different results were achieved in the target group, where the students were exposed to the phases of the development of mental actions. The students performed their analysis according to the list of characteristics of Armenian churches. Even when the teacher expressed doubt in the students' answers, they could resonate and explain their answers: "This feature is present and that feature is present, therefore, the church is Armenian." To summarise, the students could argue and explain their choice and we believe they could do so, because they had been exposed to a different learning process. When the learners were asked to draw a typical Armenian medieval church, the quality of these drawings was of course different. Conceptually, however, these drawings were correct: the students could draw a simple image of a typical Armenian church. This provided evidence of the students' ability to create a generalised image of an Armenian church, which was very encouraging.

This experiment clearly showed the following. First, the development of concepts with students can be achieved in the learning process; yet, the learning process can have a different structure. It can either follow the phases of the development of mental actions or it can be based on students' spontaneous comparing and contrasting of different objects that belong to the same or different concepts. When exposed to spontaneous comparing and contrasting, the students develop their conceptual understanding; still, the whole learning process is unstructured, and therefore remains invisible to the students. The learning process happens slowly and although the students are able to identify the characteristics of the target concept, the learning process as such remains unconscious.[1] The learners are able to identify some characteristic features but they cannot identify whether these belong to the target concept. The learners use the identified characteristics in their analysis, but still do not develop their understanding of whether these characteristics belong to the target concept or not. Therefore, the learners are not able to explain their answers, and do not develop their understanding of the learning process.

Now, I would like to present recent experiments conducted by A. Podolskiy, N. Nechaev and G. Lerner. These experiments examined the participants' ability to recognise different objects. Such an ability is particularly important for different kind of controllers and operators of machinery. In the experiment, the objects were represented as shaded cells in 4 x 4 matrices (Fig. 6.1). The task was to identify the shaded cells within 0.6 s, which is a very short time for such an operation. This meant that within 0.6 s a participant had to scan all the cells in the matrices, to identify if any cells were shaded and their position in the matrices. It was suggested that a participant should start by examining the cells in the matrices in a clockwise direction. The experiment was conducted in two ways: through traditional teaching and by following the phases of the development of mental actions.

In the experiment using traditional teaching, a participant was presented a matrix, shown examples of shaded cells and given the explanation that other cells (not shaded) might contain some dots; however, the position of these cells should not be identified.

[1] Galperin defines consciousness of an action as a person's ability to give a verbal report of the action (Lecture 2).

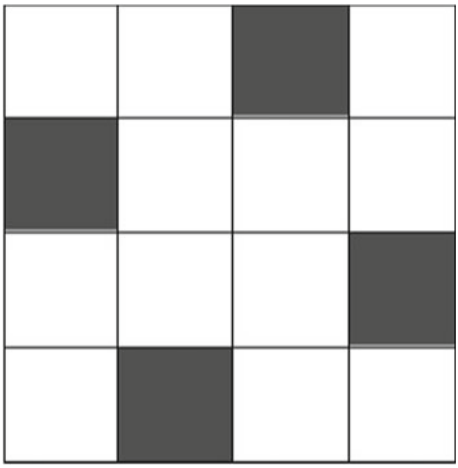

Fig. 6.1 Shaded cells in the 4 × 4 matrix

Then, the participant was presented with several matrices to identify the position of the shaded cells and the time to complete the operation was recorded. On average, the participants had to repeat the operation of identifying the position of the shaded cells 5,000 times to finish the task within the required time. Some people achieved the required time having completed 3,000 operations, while some people had to complete even 7,000 operations. When the required time was achieved by the participant, the experiment stopped.

In the target group, where the phases of the development of mental actions were used, a participant was presented with the same matrices and he or she had to complete the same task: identify the position of the shaded cells. This time, though, one additional element was introduced: the rows in the matrices were labelled with the letters a, b, c and d and the columns were labelled with the numbers 1, 2, 3 and 4. Therefore, each cell had coordinates. The participant had to examine the matrices, recognise the shaded cells, identify the coordinates of the shaded cells and announce them out loud. In addition, the participant had to say out loud whether the cell was shaded or not. At the same time, the materialised action phase was introduced, with the participant given a pen to examine the cells in a clockwise direction by pointing at them one by one, and saying out loud if the cell was shaded or not. The participant used the pen for the whole experiment, and removed the pen from the matrix only when all cells had been examined. It seemed to be a very easy task, with unnecessary details imposed for a grown-up participant, but we achieved quite unexpected results. First, it turned out that to achieve the required speed of recognising the shaded cells, a participant did not need to complete 5,000 operations, as in the control group exposed to traditional learning, but 220–250 operations, which was approximately 20 times less! Second, in the control group the speed of recognition of the shaded cells was very unstable: there were variations in the recognition time for different participants. Third, in the control group, the recognition process was very much sensitive to the slightest changes in experiment conditions. The change of even one factor increased

recognition time by 25%, and the change of two factors by 48%. The change of three factors confused the participants so much that their behaviour looked irrational: the participants were completely lost, and did not know how to approach the task. As a result, we had to stop the experiment.

In the target group that followed the phases of the development of mental actions, an unexpected speed of recognition of the shaded cells was achieved, despite very slow action performance in the initial (material) phase. Such a slow process may seem irrational, but it is important to perform an action correctly from the start, and only then increase performance speed. In our experiment, the participant used a pen to slowly examine all cells in the matrix; this process got faster and faster, though, and by the end the required speed was achieved. Most importantly, the learning process in the target group was insensitive to any interferences or changes in the experiment conditions and the participants stayed focused on the task.

The results of this experiment, in fact, puzzled the researchers, and prompted them to find an explanation for such results. It was decided to track the eye movements in both groups (control and target). This could be done in two ways: by placing a small but noticeable object on the eyeball, or by recording the electrical impulses from the eye muscles that are produced when an eyeball moves. By using these two methods, the researchers attempted to find out what the eyes did while a participant was identifying shaded cells in the matrices.

The results of this experiment in the target and control groups were quite interesting. It turned out that the participants in both groups, when asked how they identified the shaded cells in the matrices, reported a similar process: they examined the matrices to identify the shaded cells. However, their eye movement patterns were different. In the control group, the participants' eyes made movements similar to their movements in everyday situations. Their eyes did not stay focused only on the target object (shaded cells), but made oscillatory movements around the target cell, examining surrounding cells. These movements were unnecessary and time-consuming. In addition, the participants' eyes often made return movements, though the learners were not always aware of these movements. Finally, it turned out that even after the participant had made up his/her mind and announced if a cell was shaded or not, his/her eyes continued uncontrollably to make movements, as if looking for evidence of the announced answer. These additional movements were small, but the majority of participants performed such movements. Such chaotic looking back, sensitivity to any interferences and changes in the experiment conditions made the process difficult and time-consuming. The participants' eyes made many unnecessary movements that required additional time and the whole process was disorganised and chaotic.

In the target group, the learners followed the phases of the development of mental actions and their eyes moved in the shortest, straight trajectory: from one cell to another. The participants' eyes also followed the tip of the pen and did not make any unnecessary additional movements. The participants' eyes were indeed going through the phases of training: material action first, and then out-loud speech (communicative thinking). The eyes were learning to perform new movements, not the way that they move in everyday situations, but the movements that were required by the task.

The ability to examine something visually is developed in the first days of our lives and we receive up to 85% of information from the outside world through visual perception. We develop this ability spontaneously in everyday interactions; however, when we need to perform a visual examination in an effective way, we have to retrain and in fact change the whole structure of this activity. Retraining is always more difficult than the initial training, as it requires a learner to return to the material form of the activity, because otherwise we cannot unfold the activity for the learner so that they are able to trace it. If a person follows the tip of a pen with his/her eyes, and moves the pen along the shortest trajectory, then the eyes follow the most beneficial and economical movement of the pen.

The results of this experiment may outline and give evidence to a new approach to studying mental processes. I have already touched upon a method of psychological research in Lecture 4. I would like to re-emphasise that we need to find a particular method to study psychological processes, but what are psychological processes? Psychological processes comprise the system of conditions that ensures the development and performance of actions, both external and internal. This system of conditions should be created in advance by psychologists. However, traditional education does not use such a system. We believe that the system of conditions that ensures action development and performance may be used as a method to develop psychological phenomena (conceptual understanding, action, etc.), with the required properties. If we do not create such a system, we cannot ensure the development of the desired phenomenon. If the system you have created is complete, then the learner develops the desired action and his/her conceptual understanding. If this does not happen, it means that something is missing in the system you have created (and not that the person is lacking certain abilities).

An idealistic understanding of a mental activity as a spiritual act that a person acquires from his/her birth, and which does not undergo any changes during a person's life, is still quite common. In fact, this spiritual act is nothing but a real action with tools transferred to the learner's ideal plane. We should understand clearly that human mental activity has material grounds and originates as a real external process. The transfer of this process to the learner's internal mental plane is also a real process that can be traced. If we do not ensure the successful transfer of the activity from the learner's external to internal plane, we cannot develop a psychological action with the desired properties.

Chapter 7
Development of Physical Actions

Outline of Lecture 7

In this lecture, Galperin discusses the process of the *development of physical actions*, which are also referred to as *motor skills*. He identifies that a skill can be both a characteristic of an action and an indicator of the excellence of the performance of the action. However, the focus is on the development of physical actions in which the *executive part* remains on the external plane, and the *orienting part* undergoes development by transferring through speech to the mental plane of the learner. Galperin argues that physical actions can be developed by employing two types of orientation: incomplete and complete. In an *incomplete orientation*, which Galperin termed *the first type of orientation*, a learner acts by trial and error, and after numerous trials, some may appear to be successful. The development of a psychical action in the first type of orientation comprises two phases: first, a learner seeks an action that leads to a successful outcome; second, a learner directs his or her efforts to improve this action. Galperin describes this approach to mastering physical actions as unconscious and not understood because the relationships between the action and the external conditions remain unrealised by the learner. In addition, this approach is unproductive and extremely time-consuming. This is an example of spontaneous learning, and the significant part of this learning process happens uncontrollably and remains unrealised by the learners. The result of such a process is that in a group of students, there is always a wide variety in their academic achievements. Moreover, the developed actions are sensitive to any changes in the conditions of the actions: learners do not achieve similar results after several attempts. In traditional education, these variations are explained according to learners' individual abilities. Galperin argues that *learning is a psychological process and, therefore, to* examine learning, one needs to explore its psychological grounds. These grounds comprise *learners' orientation in the learning process.* To develop a physical action, the desired outcome and the sequence of the operations needed to achieve this outcome should be identified. *The complete orientation*, which Galperin terms *the second type of orientation*, might

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offer an approach to developing physical actions. In the learning process after the complete orientation, students utilise the orientation scheme created by the teacher to develop an action; hence, unnecessary trials and mistakes should not occur. Most learners develop the desired action, and there are almost no variations among their achievements. Galperin offers three examples of the approach in case studies that aimed (i) to teach children to write, (ii) to teach them to work on metal-cutting machines, and (iii) to teach them how to use a bow saw. Galperin summarises that when a complete orienting basis of the action is offered, the action is performed correctly by students in the first attempt, and the skills developed during this action are stable and can be transferred to other situations. By using a complete orientation, students develop a positive attitude toward the process of learning by engaging in the learning process, not by trial and error but consciously. Galperin concludes that in developing learners' conscious skills, *the duality between skills and knowledge disappears.* Finally, Galperin describes the process of the *automation of action* through the formation of bigger units of the action and then by merging all units into one continuous flow of the action.

Lecture 7

In this lecture we will discuss the process of the development of physical actions also referred to as motor skills. Since the term *skills* is used in that case, I would like to note that a skill is not an independent phenomenon; it is rather a characteristic of an action. Sometimes a skill is considered an indicator of the excellence of the performance of the action, because it may reflect different degrees of mastery. However, we have to bear in mind that a skill is not always defined this way, because skills may vary in development. In some cases, the achievement of the highest degree of performance of the action —that is, the development of the best possible skill —may actually hinder further development. Therefore, we have to understand that a skill is only one characteristic of an action, although a very important one.

In this lecture we will not talk about skills as such, but about physical actions in which the executive part remains on the external plane and the orienting part undergoes development, which may happen in two ways. For example, with animals, the orienting part remains in the plane of perception and transforms into an ideal action. With humans, the orienting part always transfers through speech to the inner mental plane of a learner.

To perform an action correctly, a system of conditions is required. But this system is not always supplied to the learner and then the learner may act by using an incomplete orientation. To summarise, physical actions can be developed by employing two types of orientation: incomplete and complete. There also exists the third type of orientation, the most advanced, though I will not talk about this type yet.

If a learner has only an incomplete (essentially incomplete) orientation available and cannot improve it himself (sometimes a learner may be able to find the missing elements of the orientation), then, naturally, the learner must act blindly through trial

and error. Inevitably numerous trials happen, very often erroneous and sometimes, by chance, successful. The successful trials are singled out and remembered and gradually the structure of the successful action is developed. This means that with the first type of orientation, the development of a physical action happens through trial and error. So far, this has been the only type of orientation used for the development of physical actions.

The process of developing a physical action with the first orientation type comprises two distinctive phases which are unequal in length. In the first phase the learner seeks an action that leads to a successful outcome. This is the development phase of the action. After the desired action has been found, then the learner directs his efforts to improve this action. This is the second phase, the improvement phase of the physical action.

In the first phase of the action's development with the first type of orientation, numerous trials and errors are inevitable, because a learner has no instructions about how to perform the action and he seeks a way to perform the action. If we are to present this process graphically, we would plot the successful achievements on the vertical axis and the consecutive trials on the horizontal axis, and we would get an ascending curve, i.e. gradually, the productivity of the attempts of the learner increases. If, the other way around, we plot the number of unsuccessful trails that the learner attempts before he finds the desired action on the vertical axis and the number of attempts on the horizontal axis, then, as the number of attempts increases, the number of unsuccessful trials decreases.

This means that the curve of the development of the action, depending on the factors that you plot on the vertical or horizontal axes, may either ascend or descend. However, each of these curves has specific characteristics, which have been described in detail previously. First, this is never a straight ascending or descending curve. This curve is always a zigzag, which shows successful and unsuccessful attempts the learner pursues with the aim to develop an action. Second, on this curve, characteristic periods are often observed during which the zigzag remains, but in general, despite ongoing attempts, it seems to stay at the same level. Then the curve starts to gradually descend until it levels up, which may indicate that the learner has achieved a period of stable skill, although the skill has not yet reached its best characteristics. There are different theories that explain these periods of levelling up, but this is a different matter and we will touch upon it later. What is important is that there is always a characteristic curve that shows the development process of the action. This curve is inevitable, because the learner lacks the essential orienting instructions on how to perform the action correctly.

This curve, which is always present in the first type of orientation, gave rise to an understanding that such a development process of a new action is absolutely unavoidable and even necessary. Researchers, in collaboration with practitioners, attempted to give a theoretical explanation of this process: for a new action (especially when it can be characterised as a skill, that is, performed with a certain measure of automaticity), new neuromuscular reflexes are needed, or new pairings of nervous impulses in the brain and appropriate muscular responses should be developed. This is a very complicated matter. It is important to understand that we cannot voluntarily

develop our nervous processes—they are not the object of our control. Therefore, we have to send random impulses and "catch the moment" when these impulses result in a desired activity. This means that the whole process of numerous attempts and trial and error is inevitable, simply because new neuromuscular reflexes can only be found by chance. Only when these reflexes have been identified through trial and error, can they be singled out and memorised as useful. Such reflexes cannot be found in any other way, because we cannot control or influence our nervous activity. This is the case when fortune is created out of misfortune by attempting to prove that mistakes are useful. Surely you remember the famous saying that we learn from our mistakes. It seems that if you do not make mistakes, it is impossible to learn anything.

Of course, one can learn from mistakes, but first, not everyone can learn from mistakes, and second, not all mistakes can one learn from. When a successful action is developed in the trial and error approach (orientation of the first type), it is revealed as successful only by its final outcome: "Aha, this action turned out to be correct." The relationship between this action and the factors that have influenced it, almost always remains unrecognised. However, understanding the relationship between the action and the factors that ensure its successful performance characterises the consciousness of the action. Therefore, even when a learner finds the correct action through trial and error, the action remains unconscious, not understood, because the relationship between this action and its external conditions or factors remains unrealised by the learner. Therefore, such an approach is barely an attempt to make fortune out of misfortune. Of course, the learning process does happen through trial and error, but this is a very unproductive and extremely time-consuming way to learn. In addition, the action developed in such a learning process remains unrealised (unconscious) by the learners.

Moreover, the action developed through trial and error is often not, so to say, the best possible action, and may contain some unnecessary operations. Such an action has been selected only by its outcome, memorised and fixated in its structure when the desired outcome has been achieved. Therefore, the action selected in such a way does not always achieve its desired outcome in the best possible way.

Educational practitioners should realise that the approach of trial and error does not offer the most productive way of learning. A long time ago, for example, the great philosopher Hegel said that in order to teach a baby how to swim, you must throw it into the water. Now, when we teach swimming in schools, no one begins by throwing a child into the water. We teach swimming in quite the opposite way: we teach on land those actions that will be needed in the water. Teaching via Hegel's method is old-fashioned and cannot be used when an action with desired properties has to be developed with learners. Yet, in a number of pedagogical practices where the goal is to develop more subtle actions, the practice of trial and error is still pursued.

What are the results of such a learning process? We call it spontaneous learning, because a significant part of such a learning process happens uncontrollably and remains unconscious, not realised by the learners. This does not mean the whole learning process is totally unconscious and not realised by learners, though. The learning process may be controlled by the learners, at least by its outcome and at some points of this process. The result of such a spontaneous process is that in a

group of students, there are always vast differences or variations in learner academic achievement. If you plot a graph of the students' achievements, you will get a wide range of achievements: there are many underachieving students, some mediocrely achieving, some students with an average performance and then a steep fall when you approach the number of high-achieving students (shifted Gaussian curve).

Interesting to note is that the students who achieve either excellent or average results do not achieve similar results all the time. We always observe variations in the quality of the achieved learning outcomes and the actions are very sensitive to any changes in the conditions of the actions. Not only environmental factors may influence students' performance of the action and its final outcome, but also the unfavourable state of the learner (fatigue, illness, dejection, etc.) or, quite the opposite, emotional uplift, may affect the development and subsequent use of their skills. Moreover, the learner himself usually cannot explain why he, for example, is performing the action today differently than he performed it previously. Only when there is a big difference in the conditions of the action may the learner provide an explanation: for example, poor lighting or feeling unwell may prevent him from performing the action properly. However, this happens only in some cases, for in most, the learner cannot identify the reasons why he performs the action differently. This is because the action has been developed unconsciously, without being realised by the learners who observe the outcome, which may not be as good today as it was yesterday. The learners cannot identify whether the influence of external environmental factors or something else prevented them from performing the action properly.

To summarise, the action developed with the orientation of the first type is very sensitive to all sorts of changes in various factors, to all sorts of interferences. In addition, actions may influence one another. This is called the phenomenon of the co-influence of actions. Such a co-influence happens in the learning process when learners transfer from one subject to another. If learners are engaged in learning one subject, they may find it difficult to switch to another subject. Why does this happen? Because there is no precise, subtle distinction between actions and they remain undiscovered and unrelated to each other. Therefore, one action can hinder another. This is because these different actions have not been realised by the learners; the actions have been identified only by their outcomes and both their development and performance remain hidden from the learners.

The development of the action with the first type of orientation is time- and effort-consuming and the educational achievements of the learners vary significantly. Different learners need different amounts of time, tools, individual assistance and feedback to master this process. Traditional education explains these variations according to the students' individual abilities. Such an explanation seems to justify everything; however, not everything can be explained by students' abilities. Of course, students' abilities matter, but it is far too easy to explain our unawareness of the psychological grounds of the learning process by referring to students' individual abilities. However, what are these psychological grounds?

The psychological grounds comprise learners' orientations in the learning process. If we would like a learner to master a physical action, we need to clearly identify

the desired outcome of this action, and the sequence of operations to achieve this outcome. The outcome is always present in any action, even in gymnastics or any other form of physical activity, and this outcome has to be divided into the components or units that constitute it. We also need to identify the sequence of the operations in which the outcome's components will be developed. Each operation requires detailed descriptions of each component, and how they will be achieved. In other words, if we create a complete orienting scheme of the physical (or any other) action, then the learners will be able to perform this action in a totally different way.

The appropriation of a complete orienting basis of an action implies that mistakes should not happen in the learning process. At the beginning, a learner moves slowly from one unit of the action to another, from one operation to another, making a stop every time he transfers to the next operation to orient him/herself in the small environment of the next consequent unit of the action. Still, the learner follows the complete orientation scheme that we have created and suggested for use. In doing so, we create the most favourable and beneficial for the student learning process; therefore, unnecessary trials and mistakes should not happen. The learning activity becomes conscious, because each unit of the activity is related to and is performed under its own previously identified conditions. There are almost no variations among the students' educational achievements, because both weak and strong students achieve the learning activity's desired outcome. Of course, stronger students can master the action faster than weaker students, who perform the action slowly, so it takes longer for them to achieve the desired outcome. Yet, even weak students achieve the desired learning outcome in the end.

A typical example of such a process is teaching young children to write. Usually this process starts with teaching children how to write the individual elements of letters in lined exercise books. The learners are typically presented with an element of the letter and are asked to draw this element. The learners do so via trial and error; this process can take a long time until, eventually, the learners are able to draw the suggested element. As you know, this kind of teaching is highly ineffective. Interestingly, teachers usually check how students write letters in the first years of primary school, and then they believe that the learners have already mastered writing. However, students' ability to write letters varies significantly and only a small percentage of students are able to write letters correctly and develop good handwriting.

I have studied many ways of teaching writing and I believe that the Czech method is of particular interest. In this method, a learner is given a large sheet of paper divided into eight equal, very wide rows. The child is then given an element of the letter—for example, a line with a hook—to draw. Since the row is very wide, all deviations in the child's writing are highly visible. Therefore, the child can easily notice these deviations and correct them. Then the width of the row is reduced by half and the same procedure is repeated. After the child has achieved good results on smaller rows, the width of the rows is again reduced by half, though the size or element of the letter is still twice as big as its normal size—the size we start teaching writing. By reducing the width of the row by half again, the normal size of the letters is achieved.

By following this method, the children learn to write letters in 2–3 weeks, and thereafter write the way they have been taught, correctly and nicely, although this method employs the orientation of the first type—incomplete. First, the students use the trial and error approach when learning how to write letters. Second, they develop the skill of writing letters, though this skill is rather narrow: the children learn to write letters and nothing else. The learners still find it extremely difficult to perform such correct writing when they start writing words (several letters together) and sentences. Therefore, the skill of writing letters, developed with learners previously, has very few areas of application and the learning process with the orientation of the first type remains unconscious, with a narrow area of application.

Let us have a look at the learning process with the second type of orientation−complete and provided by the teacher. We examined this process together with my Ph.D. students at the time, when the first-graders were learning to write in the exercise books with three horizontal and oblique lines (Fig. 7.1).

We found that in order to write such a simple element as a line with a hook, a student received eight different instructions; even so, many essential instructions were still missing. It turned out that in some places, the element should not follow the oblique line, which was essential for correctly writing a letter. Then, the lower point of the hook had to touch the line, but where? So, the teacher gave the students different instructions and since a compete orientation had not been developed, some instructions were missing.

We suggested the following: we introduced the most important points of every letter and the child learned to mark these points on paper with dots first, and then connect those dots with a line. By following this method, the process of learning to write happened faster: first the child marked the important points of the letter with dots on the paper and explained why these dots were made in these particular places. Then the child connected the dots with a line to write a letter. Later, the child

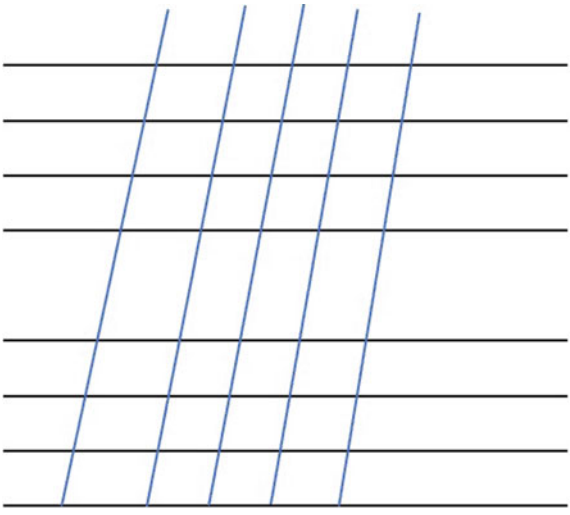

Fig. 7.1 Lined sheets in the exercise books

was asked to make the dots on the paper only in his/her mind and connect these imaginary dots with a line. Through this method, the child gradually mastered the orienting basis of this action and was able to perform the action correctly on the first attempt.

This is a completely different way to learn to write, which leads to quite different learning outcomes. First, all students master the process of learning to write; the learning happens faster without many mistakes and the students are able to transfer their skills when learning to write other unfamiliar letters, even letters from other alphabets, such as those from the Latin, Armenian, Georgian and Arabic alphabets. The students are able to follow the method of placing dots in the most important points of the letters in any alphabet. The most difficult task is to identify these important points in the letters of various alphabets; therefore, the transfer of this method can be complicated. Still, we observed that the students could use this method independently, which did not happen when learning with the first type of orientation.

Another example—from the research of Zoya Reshetova—is about teaching to work with metal-cutting machines. In the control class, the learning process was conducted in a traditional way: the teacher showed how to use the machine and the students were supposed to repeat the teacher's actions. The students tried their best to imitate the teacher's actions, but it took a very long time to learn how to do so. In the target class, the teacher wrote on an orienting card all the necessary instructions: how to use the metal-cutting machine, insert the cutting tool, set up the cutting mode, cut the metal precisely in the required place, etc. Before cutting, marks were made on the piece of metal which indicated where the metal had to be cut, and the students learned how to cut by proceeding from one mark to another. It turned out that by following such a method, all students (even weak students, who were supposed to be expelled from the vocational programme, because they could not carve the simplest bolt) accomplished the task on the very first attempt. Their work was not absolutely perfect, but it was of satisfactory quality and generally acceptable.

Another similar example is from a vocational class in a secondary school. The students were supposed to learn how to use a bow saw, wherein the handles are used to rotate the blade, while a student holds the bow. By doing so, the saw is suspended, and the wood is cut with the saw's lower edge. Because the student looks from above, he can see only the top edge of the saw and he cannot control the movement of the saw in the cut. This is a very complicated task, learning how to saw properly. Additionally, the students must first mount the board that has to be cut on the crafting table, by using a wooden piston that presses the board to the wall of the crafting table. Such an easy task to mount the board on the crafting table turned out to be very difficult for the students. The learners were asked to mount the board so that it was stable but not too tight, so that the board would not crack. How were they to do so? We saw that the students spent much time just mounting the board. Some students even managed to break the crafting table. After a long time, the students found the right strength to mount the board on the crafting table, so that the board was stable enough. They did so through trial and error.

A teacher suggested measuring the pressure needed to mount the board. He made a device that measured the pressure needed to mount the board properly and identified

that a minimum pressure of approximately 57 kg/cm^2 was required to mount the board on the crafting table. He asked the students to follow the arrow on the device while they screwed in the bolt. When the arrow reached the number 57, they were to stop. To assist the sawing process, the teacher made marks on each edge of the board, showing the line the students were to follow. In addition, he attached two iron rods to these marks and connected them to a wire, a light bulb and a battery. When the student sawed in a straight line and did not touch the rods, the light bulb was off; if the student deviated from the straight line and the saw touched at least one rod, the light bulb immediately turned on. The students got an immediate warning that their cut was not straight, and they had to adjust the saw. By doing so, the students learned to hold the saw in such a direction that the light bulb would not turn on. It took approximately 1.5–2 min for the students to learn how to saw properly and this skill appeared to be stable with them. After that the students could saw well enough without using the rods and the light bulb.

To summarise, if you supply the complete orienting basis of the action, the action is performed correctly by the students from the first attempt and the skills developed during this action are very stable. These skills are developed on the basis of the learner's kinaesthetic position and his/her muscular sensitivity. How can this muscular sensitivity be developed? Imagine a monkey who does not have any theoretical understanding of this process. The monkey jumps, runs and grabs, and only on the basis of fine kinaesthetic or muscular sensitivity it is able to develop successful movements. After a long period in the process of natural selection, the kinaesthetic patterns of movements are developed within monkeys. If a movement does not receive reinforcement as correct, it is replaced with another movement. If a movement does receive reinforcement as correct, it is fixated as the kinaesthetic movement pattern and all further movements are performed according to this pattern.

How can this explain the teaching process in the vocational classes with the students who were learning to saw? The control class was exposed to traditional teaching: the students were shown how to perform the action, and then they had to repeat the teacher's actions. In the target class, the students used the complete orienting basis of the action. In the control class the strong students performed more successful operations than unsuccessful; however, the majority of students performed more unsuccessful operations than successful ones. In the target class, meanwhile, approximately 92% of all operations performed by the students were successful and the difference between the performance of the strong and weak students was insignificant. Therefore, the students' educational achievements were very similar. In addition, the "worst" student in the target class performed better than the "best" student of the control class.

The most unexpected result was the fact that the teachers who were teaching the students in the target and control classes could perform only approximately 65% of the operations correctly. Of course, such level of mastery was much higher then the level of mastery of the students in the control class, but the students in the target class clearly outperformed their teachers.

The time required to develop such skills with the students in the target and control classes was also different. The students who used the trial and error method took much

more time to learn to saw correctly than the students in the target class, who learned how to saw in 1.5–2 min by using the controlling devices. However, it turned out that the developed kinaesthetic pattern of movement may grow weaker with time and then the learners may need to repeat sawing with the controlling devices to reinforce the pattern. After that, the correct kinaesthetic pattern of movement is established completely. What is important is that the students in the target class developed a very positive attitude towards the process of learning—they learned to perform the activity not through trial and error, but by engaging in the learning process consciously. They also applied their positive attitude to practical lessons, because they could make connections between theory and practice.

To conclude, the learning processes in the target and control classes were totally different. The skills developed by the students in the control class who used the trial and error approach had very few areas of application. Such skills are considered the simplest form of learning, and are opposed to knowledge. However, these skills are also the simplest form of learning, because they are being taught in the simplest way or, to say it correctly, they are not being taught at all, although the students attempt to learn on their own through trial and error. Still, if we develop skills with learners consciously, the duality between skills and knowledge disappears.

Now, a few essential points about the development process of a new activity. How does this process happen and what changes does it cause in the orienting and the executive parts of the action? In the orienting part, the activity is divided into units. The learner proceeds in the following way: first, he gets familiar with the situation in the nearest unit, then performs the activity in this unit of the action, pauses, gets familiar with the situation in the next unit, performs the action in this unit and pauses again, to get familiar with the situation in the following unit to perform the action in this unit thereafter. This cycle repeats itself until the action has been performed by the learner in all units of the action. When the learner performs the same action again, the units of the action eventually merge into one flow. This happens, because the learner does not need to pause to get familiar with the situation in the next unit, as he quickly recognises the situation and performs the action in this unit at once. Yet because the situation in the following unit is already familiar to the learner, he starts getting ready to perform the situation in the following unit, while he is performing the situation in the previous unit. Therefore, when the learner approaches the next unit of the action, he is ready to perform the action in this unit. The learner does not need to pause before this unit and with time, he stops pausing at all, just slowing his action performance before transferring to the next unit. In the end, the action starts to flow as one continuous process. The action is performed according to the recognised image of the situation. The learner controls this action's flow by comparing the actual action with the sense of the right flow of the action he or she developed earlier. The learner does this automatically, without too much thinking; he or she just compares the actual action flow with the image of the action he/she has developed previously. Physiologists call this validating or controlling the performance of the action. This process leads to automation of the action: first the formation of bigger units of the action (not immediately, but gradually), and then merging of all units into one continuous flow.

When the action begins to flow as one indivisible process, indicators of the action, such as the tempo and rhythm, become important. As a matter of fact, the action can be performed at a different speed in its different units. The speed of the action performance is the rhythm of the action and it can vary. At first, the rhythm of the action is unimportant, but after the action has been mastered by the learner, the rhythm has to correspond to the required parameters and the learner has to work to improve the tempo of the complete action.

Chapter 8
Psychological Grounds of the Process of Automation

Outline of Lecture 8

Galperin starts by referring to the previous lecture, in which the process of skill development was considered. He describes the internal process of skill development as the transformation of the unfolded and divided into units action into one indivisible process. After the automation of the action is achieved, the learner performs the action by (i) recognising the situation and (ii) performing the action according to the image of the action he or she has developed previously. This process is termed *acceptance of the action*. However, from a psychological perspective, Galperin describes the acceptance of the action as the development of an image or a model of an action. He emphasises that skill development should not be understood as a process of memorising the action's structure by subsequently repeating and improving it. Instead, skill development involves the processes of transformation and change that can be developed gradually in learners. During these transformations, the actions performed by learners undergo considerable change. To develop an action, the following steps may be followed: (i) the model of an action has to be identified and presented to the learners; (ii) the model of the action should be divided into individual manageable units with specific characteristics (secondary structure). The *secondary structure* of each unit should be recognised by the learners. This structure assists learners in performing the action. The characteristics of the entire action comprise the *primary structure*, which also has to be presented to the learners. Understanding the primary structure is crucial in the process of *action automation.* Galperin argues that the process of the action automation is based on the development of conditional relationships, which is often understood as *stereotyping the action* by monotonously repeating it. However, stereotyping can also be achieved by identifying common parts in different actions. This approach is beneficial because an action can be applied in many other circumstances and situations, and it creates a positive basis for the generalisation of learners' skills to other applications, which is termed *skill flexibility*. Galperin explains that skill flexibility can be developed in the orienting part

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of an action when learners are introduced to the main conditions, circumstances, and situations in which the target skills may be applied. First, a generalised basis of the action should be identified (skills), and then different tasks, circumstances, and situations where these skills can be applied should be introduced. Learners may apply the developed skills and actions in different situations. It is concluded that skill flexibility (automated action) is achieved when it can be applied by learners in various tasks, situations, and circumstances. Galperin summarises that (i) when action automation happens, learners do not need to examine the situation, but to recognise the situation that was introduced previously. The learners' performance of the action is controlled by comparing the actual flow of the action with the image of the action developed by the learners; (ii) in automated actions, the learners' detailed orientation is substituted by the recognition of the situation and the comparison of its specific characteristics with the action's generalised orientation. The control of the action's performance happens by comparing the actual flow of the action with its imaginary model. When the action becomes automated, it acquires *expressiveness*, which has a double meaning: (i) it is directed to the outside world and (ii) it connects the acting person with other people. Expressiveness simplifies the task and reveals the orientation of the acting person. Finally, Galperin summarises his study on the development of mental actions and identifies other psychological phenomena that warrant study, such as attention, thinking, creative thinking, memory, dreams, feelings, and will.

Lecture 8

In the previous lecture we talked about the process of skill development. As you remember, the internal process of skill development with learners is a transformation of the unfolded and distinctive units of an action into one indivisible process. After the action units merge, the learner performs the action in the following way: first, he recognises the situation and performs the action according to the image of the action developed earlier. Physiologists call this process acceptance of the action. From a psychological perspective, we call it the development of an image or a model of the action. When the model of the action has been developed with learners, the action flows as one indivisible process and the learners do not slow down in the places where the transfer from one unit to another happened previously. Once the required rhythm of the action is established (the speed of the performance of the action in its individual units), and the action has been completely mastered by the learners, the tempo of the action (the speed of the performance of the whole action) may be increased.

It is important to emphasise that skill development is not a process of memorising the action's structure, with its subsequent repeating and improving. This is a very mechanistic understanding of the process that prevailed in researchers' minds until we learned of a more subtle structure of the process of skill development. When learners engage in skill development, these skills undergo transformations and changes. This

process is time-consuming, when the learners should give this time for the transformation to happen. The worst approach is to attempt to develop a skill with learners according to the given model of that skill in a very short time. Such an approach may actually hinder the development of true skills with learners. We should remember that skill development is a transformational process that can be developed gradually with learners. During such a transformation, the action performed by the learners undergoes considerable changes.

The process of action development may happen in the following phases: first, a model of the action has to be identified and presented to the learner, and second, this model should be divided into individual, manageable units. Specific characteristics should be identified for each unit, with these characteristics forming a so-called secondary structure. The secondary structure has to be recognised by the learner when analysing the situation in each of the units. The secondary structure assists the learner in performing the action. Correspondingly, the characteristics of the whole action form the action's primary structure, which also has to be presented to the learners when the action is first introduced. The primary structure is particularly important when the individual action units have been mastered and the learners perform the whole action. Only then can the action be automated by learners.

The process of action automation is based on the development of conditional relationships. This is a very general understanding which is correct, although insufficient to understand how and where these conditional relationships should be developed. The development of conditional relationships is often understood as a process of stereotyping the action by monotonously repeating it. This is true, though stereotyping can also be established in two different ways: either by monotonously repeating the action, or by identifying common parts of different actions. The second approach is more beneficial, because the first is limited by the conditions of the action and the action developed by the first approach has very limited areas of application.

If we stereotype the action by identifying common parts in several actions, then such an action can be applied in many other circumstances and situations. In practice, stereotyping individual actions is impossible. This is because the conditions of the action cannot be identical, nor can the learners who engage in this action. There is always variation in the action's conditions, or among the learners who engage in the action.

We can conclude that stereotyping by identifying a common part in several actions is beneficial for the learners. However, I warn you of a very common mistake: teachers often aim to develop so-called automated skills with learners, the skills that learners can perform automatically without thinking. This is achieved by reducing the number of situations the action is applied in. Therefore, the skills are developed only in the most common situations. Still, such skills are not of the best quality, so to say, and as I have already mentioned, they have very limited areas of application. In fact, it is not more complicated to develop skills by following the second approach: identifying a common part in several actions. The benefit of such an approach is that the developed skills can be applied in various situations. Therefore, we have to introduce to the learner the whole set of situations where these skills may be applied. Such an approach creates positive premises for maximum generalisation of these

skills, and shows the areas of the application of these skills. If following the opposite procedure—first developing skills in particular situations, and then attempting to transfer these skills to other situations—learners often struggle and we face the need to retrain or re-educate them, which is often time- and effort-consuming—indeed, much more time- and effort-consuming than initial training. To sum, the stereotypes required for establishing conditional relationships should be developed using an action's generalised basis.

However, while it is important to single out an action's generalised basis, it might be challenging for learners to apply the generalised action in various situations in which specific conditions should be accounted for. Such an ability to adjust the skill for specific conditions is defined as skill flexibility. In other words, it is important for learners to be able to apply the generalised skills in various familiar and unfamiliar situations. But how can we ensure such skill flexibility?

We can start developing skill flexibility in the orienting part of the action, which is developed with learners at the very beginning of the action. In the orienting part, the learners are introduced to the main conditions, circumstances and situations where the target skills may be applied. We can do so in the following process, as opposed to the generalising process: first, we identify the generalised basis of an action (skill), and then introduce the types of tasks, circumstances and situations where such a skill may be applied. We do not need to include all situations, though the learners should be introduced to the types of tasks or situations where the target skill may be applied.

If we select the types of tasks and situations and introduce them to the learners, in doing so, we can prepare the learners to apply the developed skill and action in different situations. When a learner meets a new situation, the action/skill will be performed at a slower pace at the beginning; however, the learner will able to perform the action in the new circumstances. To conclude, skill flexibility (automated action) is achieved when it can be applied by the learner in various tasks, situations and circumstances.

Two more remarks about skill development. First, when action automation happens, the learner does not need to examine the situation, but he recognises the situation that has been introduced previously. The control of the learners' action performance happens by comparing the action's flow with the image of the action developed with the learner. In physiology, this is called correlation of the performed action with its imaginary model. Second, even the most automated action or skill does not "fall out" of the human mind, as it may seem during self-observation. This action is still present in the mind, albeit in a different form. In an automated action, the detailed orientation of the learner is substituted by the recognition of the situation and comparing its specific factors or circumstances with the action's generalised orientation. In addition, control of the action's performance happens by comparing the actual flow of the action with its imaginary model. This can be well-illustrated by the work of a machinery operator who analyses signals from the lights on the dashboard. Yet, the operator is not just dealing with signals: he understands that each signal symbolises a specific process. Therefore, when receiving a signal, the operator can interfere in the process that requires his assistance. However, if all the dashboard lights are green, then the process can flow by itself and interference is not required.

It should be mentioned that we, in fact, exercise "the automated process" with regards to our health. Our life processes are also automated, and our minds receive signals informing us if these processes flow successfully or require our (or a doctor's) interference. Similarly, as we control the processes in our bodies, we can control the processes outside our bodies, and even an automated action remains an action we perform. This is important to realise, as it supports our considerations that machines cannot substitute people. A machine is only a constituent part of a human action. This is applied to any machines or technology and we, as people, only manage processes by using an advanced control system.

Automation means that a device can control action performance, and that we can develop such a device in ourselves. Such a device performs both an action's orienting and executive parts, so a person does not need to perform the action himself. In doing so, the performed action connects the person with the action's final outcome. The person does not need to think about how to perform the automated action; the purpose is just to achieve the action's final outcome.

An action can be characterised by its expressiveness, although sometimes the expressiveness of the action appears to be rather ridiculous. For example, when people of vocational (blue collar) professions are invited to speak on the radio, it appears to be extremely difficult for them to speak and express their thoughts orally. Their speech is often indistinctive and difficult to follow, because talking, for them, is a new and largely unknown task. Children, on the other hand, are very expressive when they talk. Without thinking, children speak freely and with much expression. You have to be either a child or an actor to master the art of expressive speech. Until you have mastered the action (e.g. to speak expressively), it can be described as a connecting link between the person and the action's final outcome, with all your attention focused on this link in the middle. However, once you have mastered the action, you do not need to focus on the action itself, as the action happens automatically; what becomes of primary importance is the action's final outcome. Only then can the so-called expressiveness of the action becomes visible.

At the end of the 1920s a remarkable German psychiatrist wrote an article that was published in the *Journal of Psychiatry* and devoted to the topic of psychology; therefore, the article remained unnoticed by both psychiatrists and psychologists. The article was about "the inner pose", which was explained as the highest form of all automated processes. The inner pose was defined as an attitude of the person towards the action he/she is engaged in. This attitude is established involuntarily and manifests itself in the way the person acts. For example, when a person talks on the phone, even if the person is totally alone, he makes some expressive gestures to support his or her speech. However, since the person on the other end of the line cannot see these gestures, what is the point of making them? Gesturing happens because it is difficult for the talking person not to show his or her attitude to the conversation and he or she does so by mimicking, gesturing, etc. The talking person simultaneously expresses his/her attitude on what he/she is talking about. This is what we call "the inner pose"—an attitude of the person towards what he/she is doing. This attitude does not reflect if the action is being performed correctly or it achieves its desired outcome, but instead the significance of the action is in achieving the far

or near goal. When the action becomes automated, then the action may achieve its expressiveness.

Action expressiveness has a double meaning: first, it is directed to the outside world, and second, it connects the acting person with other people. Animals have a large number of inborn expressive movements that have important defensive and adapting significance. For example, when an animal wants to make a deep impression on another animal, it takes a defensive pose, which might frighten the enemy. During the evolutionary process, animals have developed a great number of automatic mechanisms to demonstrate frightening poses, and sometimes take these poses without even understanding the purpose of such an action. The animals that can take such poses have better chances for survival. To summarise, expressive movements are of primary importance, and are always directed at objects in the outside world.

However, an acting person may also direct expressive movements at himself. For example, I have seen a person who huffed when chopping wood. I thought, why is he puffing if this does not affect the log or the axe? It turned out that this puffing materialised the person's orientation in the action. Only an unawared person may think that chopping wood is an easy job. This is actually a complicated action that requires much thinking, about the shape and the structure of the log, where the circles and the knots are, how to strike the axe at the right angle so that the log will split properly, etc. So, when this person puffs, he is saying, do it in such and such way. He identifies where to hit and confirms his orientation by puffing and, in doing so, the expressiveness is of primary importance not for the surrounding people, but for the acting person himself. In addition, such expressiveness simplifies the task for the acting person, though it also reveals the orientation of the acting person. If you would like to disguise your orientation from other people, you should not demonstrate your expressiveness. In fact, some people should be trained not to demonstrate their expresiveness openly at all.

At this point we finish our examination of the process of the development of actions with humans. As you remember, we started from the inner actions, or actions that can be transferred to the inner plane of the learner as mental actions. Then, we examined the actions that remain on the external plane, but that transform into ideal actions (ideal actions of seeing, listening, etc.). After that, we discussed how these actions are accompanied by the development of sensory images of surrounding objects, and how we develop our conceptual understanding about the surrounding world. Finally, we studied the development of physical actions, where the executive part of the action develops as a physical interaction of a person with appropriate tools. In the following lectures we will talk about the psychological grounds of attention, thinking and creative thinking. We will also touch upon the psychological grounds of memory, dreams, feelings and will.

Demands and Realities: Significance and Implications of Galperin's Legacy for Learning and Teaching in 21st Century

Irina Engeness, Gethin Llewellyn Thomas and Andrey Podolskiy

Learning and Teaching in the 21st Century

The fourth industrial revolution (Collins & Halverson, 2018; Kaplan & Haenlein, 2016), unprecedented climatic events, rising nationalism and racism, considerable demographic movements and rapid technological advances affect all areas of society. These challenges highlight the need for educating professionals who can respond to the demands and realities of such evolving societies (Laurillard, 2002; Sahlberg, 2010; Zepke, 2008). The recent global impact of the COVID-19 pandemic has caused significant transformational changes in the lives of people across the globe (Mishra, 2020). The nature of employment, schooling, communication and interaction has changed fundamentally in just a few months. In such circumstances, the professionals' capacity for creating stronger links between theory and practice, and continuous learning about the world around us, is crucial. For years' traditional education has been based primarily on the principle of knowledge transfer: from older to younger generations, from textbooks to readers and teachers to students. Recent transformational events indicate the need to reconsider approaches for educating 21st century citizens in preparation for current changes and related uncertainties. Students are expected not only to acquire knowledge, but also to have the ability to apply it in various situations. However, of greater significance (together with knowledge acquisition and its practical application) is developing learners' understanding of how to engage in the process of knowledge creation and enhancing their capacity in learning

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to learn (Engeness, 2018; Smith, et al., 2016). Such an approach urges consideration of the role of the teacher and student (Selwyn, 2016) and is related to wider questions about what learning is and what we want education in 21st century to be.

During the 1970s, Säljö suggested that learning was an ongoing process rather than a finite product (Saljo, 1979). Such an understanding resonates with "conscientious learning" (Rogers, 2003, p. 26), where individuals have full awareness of engagement in a task that involves some form of learning and consequently learning itself becomes a task. Similarly, Claxton reminds us of Albert Einstein's words: Education is what remains after one has forgotten everything one learned at school (Claxton, 2013, p. 2). These words position education as an understanding of learning; the capacity to engage in learning and develop as a learner. The purpose of this article is to build upon these foundations by presenting Galperin's legacy as a consolidation and extension of ideas of Vygotsky and Leontiev which offers a valuable approach to enhance learning and development of students as lifelong learners.

The Continuity of the Contributions: Vygotsky, Leontiev and Galperin

Vygotsky's was the first to adopt a non-dualist approach to mind and society by offering a social, historical approach to understanding the development of human consciousness (Leontiev, 2005). Consequently, in order to understand cognition, one should turn to real life, which is stimulated by the development of relationships among humans involved in practical activities through the use of tools (Vygotsky, 1980). Vygotsky considered tools, both material and conceptual, as meditational means that connected individual and society. He argued that tool mediation during practical activity created changes in human consciousness and that these tools acquired special meanings: tools-signs. The material tools used in the practical activity were directed outside and connected the person with the surrounding environment; whereas the tools-signs were directed inside and caused the changes in human consciousness (Vygotsky, 1986). Therefore, the tools-signs a person operates with on the internal plane are of material origin. Language constitutes the system of signs that mediates human psychological activity, which also repeats within the pathway of internalisation. First, externally as communication with others and then individually in the form of inner speech which has evolved as a particular form of human social relationships originated in practical work (Vygotsky, 1986). Human consciousness, therefore, develops within new social relationships that arise in the course of practical activity (speech) and is the product of human culture (language). Hence, the cultural-historical origin of human consciousness (Leontiev & Luria, 1999).

While Vygotsky was very clear about the primary role of a practical activity in the development of human consciousness, he focused on investigating the role of tools, placing less importance on the role of the activity that employed these tools. However, Leontiev and Luria (1999) argued that the presence of tools, although important, did not fully explain the relationships that emerged in the course of human activity. Leontiev suggested that neither concepts and meanings, nor tools and signs on their own, but life itself, determined the development of human consciousness (Leontiev, 1978). Consequently, he identified the activity connecting an individual with the surrounding environment as a subject of psychology (Leontiev, 1978). Attention

was directed at examining the structure of the activity with the purpose and motive of crucial importance. Introducing the notions of action, activity and operations, an action was explained as the active attitude of the subject to reality characterised by the concurrence of the motive and purpose: the action of a subject was caused by a purpose and was directed towards achieving it (Leontiev, 1978). An activity was initiated by a motive realised in the course of the activity and operations were a means of realisation of the activity, adequate not to the purpose or the motive, but the conditions in which the activity was carried out. In line with Vygotsky, Leontiev suggested that learning happens in the process of transformation of human external practical social activity into internal, ideal activity. However, even on the ideal internal plane the activity retains its structure and is directed towards solving tasks, emerging from the person's interaction with the surrounding environment. In this way, human consciousness is not viewed as the opposite of external activity, but as originated in and transformed from the external activity. Such an approach allowed Leontiev to argue that human consciousness and external activity are linked together as one is a product of another. On the one hand, this means that external and internal activities have a similar structure consisting of actions, activities and operations; while the similarity in the structure allows mutual transformations between the external practical activity and human consciousness.

The principles of the activity approach to studying psychology, the social nature of human psychological activity and the unity of the external practical and the internal psychological activities posed a further question about how external activities transform into internal activities. Galperin provided an answer to this question by connecting the advances made by Leontiev with the legacy of Vygotsky. Galperin's contribution centred on the question of how the mental, psychological (Vygotsky's legacy) emerges out of the "material", non-psychological (Leontiev's legacy). His approach was based on three premises: (a) the leading role of teaching and learning in development; (b) conceptual development involves material or materialised actions; and (c) a recognition of the importance of cultural tools and social interaction in human development (Engeness & Lund, 2018).

Galperin's Legacy: Learning as an Orienting Activity and a Process of Dialectical Transformations

Following Vygotsky and Leontiev, Galperin believed that new types of psychological activities were initially formed on the external plane in the material form in the course of social activities and were transferred to the internal, psychological form.

> … ideal in nothing else but material transferred to the human head and transformed in it (Lecture 1).
>
> To start with, we need to find out how actions are first formed as external actions with objects and then transferred to the internal plane. As a result of this transfer, external actions undergo changes, which make them totally unrecognisable and they begin to look like mental processes (Lecture 2).

Galperin's contribution was in describing how this transformation happens. The research conducted by Galperin identified that a learning activity comprised three

parts: orienting, executive and controlling (Galperin, 1968). Orientation was of particular significance in any learning activity, requiring careful planning of the type of orientation learners were going to be exposed to in the executive part of the learning activity. Orientation was understood by Galperin as necessary information about (i) the activity in which learners were to engage (ii) the potential of available resources and (iii) how learners were to engage in the learning activity. Galperin argued that orientation can be specific for a particular task or it can be used in several situations. In addition, orientation can be either supplied to the learner in its final form for use in a learning activity, or it can be constructed by learners. The construction of the orientation by learners, in turn, can happen either by the method of trial and error or by the approach offered by the teacher.Based on these premises, Galperin identified three types of the orientation: (i) incomplete, where mediational tools and the essential characteristics of the concept are identified by learners through trial and error. In this case, learning happens slowly with many mistakes and the activity of learning is extremely sensitive to the slightest changes in conditions; (ii) complete, where learners are informed about all the essential characteristics of the concept necessary to solve a particular problem. However, these essential characteristics are specific and can be used only in one case, for example, when solving a particular problem. Learning happens quickly and with minimum mistakes; however, the transfer of the skills formed in the course of such activity is possible only when there is close similarity in the learning situations and (iii) complete but constructed by learners following the approach offered by the teacher aimed at identifying the essential features of the target concept. By using the approach offered to the learners by the teacher, a specific orientation can be constructed by learners suited for the particular case. With the third type of orientation (complete but being constructed by learners following an offered approached), learning happens quickly, with minimum mistakes and the skills formed in the course of this activity can be transferred to other learning situations.

Galperin emphasised that the second type of orientation (complete and provided to learners) develops empirical thinking with learners without getting into the essence of the phenomena; whereas the third type of orientation reveals the essence of learning and promotes theoretical abstract thinking. The third type offers a unified approach to learning and forms the basis for creating links between sciences and approaches to studying them. By applying the third type of orientation learners master the essence of learning through studying a phenomenon which carries a new function: not as a studied object, but as a tool for studying the essence of the learning. In doing so, students develop their understanding about the nature of the activity of learning across contexts and subject areas and their agency as learners is being enhanced.

The orienting part of a learning activity was considered by Galperin as a 'managing device' whereas the executive part was seen as a 'working device' transferring the activity from the external plane to the internal. For Galperin, the transformation of the learning activity was described by the measure of its acquisition by learners engaged in the activity i.e. when transferred from the social external to the internal plane.

During 20 years of research, Galperin outlined the dialectically developing forms this transformation may go through: (1) *motivation*, (2) *orientation*, (3) *materialised*

action, (4) *communicated thinking*, (5) *dialogical thinking*, and (6) *acting mentally* (Galperin, 2002). In the initial *motivational form*, a learner's attitude and relation to the learning outcomes that have to be achieved is formed. In the *orientation form*, Galperin identified three types of orientation which are presented in detail above. In the third form of a *materialised action* learners interact with material (real objects) or materialised objects (models, simulations, animations, schemes, etc.), and over time become less dependent on the material support they give and more aware of the meanings they carry. Speech becomes the main guiding tool in the fourth form, *communicated thinking*, which reflects learners' activity with material or materialised objects. It should be noted that communicated thinking does not imply learners' ability to explain the activity they are involved in, but to complete the activity by talking, for example, to solve target problems in speech. In the form of communicated thinking an activity already acquires the characteristics of ideal, theoretical activity, but it is still 'visible' and available for monitoring from outside. The fifth form, *dialogical thinking*, establishes a dialogue of a learner with him or herself so that the activity is being transformed mentally. In dialogical thinking a mental activity: (i) presents itself as a reflection of the materialised activity on the ideal plane where material or materialised objects are substituted with their images; (ii) is directed to the images of the material or materialised objects and (iii) reflects learners' ability to perform the activity with the images of the material or materialised objects mentally. The transformation of students' learning that happens from communicated thinking to dialogical thinking happens by substituting the externally oriented speech with its image. In dialogical thinking the activity is directed inside the learner establishing communication with himself (as another person). Learners' ability to perform an activity in the form of dialogical thinking reflects the pathway the activity has undergone from its materialised to dialogical form. In the final form of *acting mentally*, an activity has become a pure mental act with the focus on its outcome. The activity is performed with the inner speech that does not include a dialogue with a learner as 'another person' but becomes a purely individual activity completed by means of mental images and meanings that help a learner to deal with similar or differing situations on the basis of previous experience.

Galperin's study of orientation and his understanding of learning as a process of the transformation of the external social activity to the internal plane of a learner has considerable implications for research and educational practice to educate lifelong learners in 21st century.

Significance and Implications of Galperin's Legacy in 21st Century

Unit of analysis and methodological implications

Based on the ideas presented above, Galperin's theory offers an understanding of learning as a transformational process that happens in the specifically designed activities with material and social resources aimed at enhancing learning and developing students as leaners. Students are central actors in this process and, by engaging in learning activities, students gradually develop (i) their understanding of the target concepts and (ii) how to learn.

The emphasis on students' participation in the specifically designed learning activities with material and social resources has methodological implications for educational research and shifts to focusing on the analysis of: (i) students' actions as active participants in the learning process and their interactions with the available resources and (ii) analysis of the design and structure of the learning activities. These premises imply the need to examine students' learning in its ontogenesis with the *unit of analysis* comprising *students' actions and their interactions with the available material and social resources* and *the design of the learning activities* engaged by students. Such an approach has been used in several studies (Engeness, 2018, 2020; Engeness & Edwards, 2017; Engeness & Mørch, 2016) to examine students' learning with digital technology. The implications of these findings for classroom pedagogy indicate the need (i) to introduce both material and social support resources and (ii) to carefully design learning activities to assist students' move from orientation to dialogical thinking.

Galperin's theory to understand learning to learn approach

The contributions of Galperin indicate that learning and development involve engaging in social experience and aim at initiating changes in the existing psychological functions by forming new relationships between these functions. Therefore, the development of the learner comprises quantitative and qualitative changes. *Quantitative changes* are characterised by the formation of new psychological functions, the acquisition of new skills and learners' ability to apply these skills in various contexts. *Qualitative changes* are characterised by modifying the structure of the psychological functions and establishing new relationships between these functions across contexts to enhance learners' capacity to be in control of their own learning.

The relationship between learning and development, in turn, was described in Vygotsky'szone of proximal development (ZPD)—as an ability of a child to perform tasks with assistance from a teacher or a more capable peer (Vygotsky, 1986, p. 198). For Vygotsky the quality of teachers' instructions and teacher-students' collaboration in the learning activity was crucial. This evokes an emphasis on the agency of the teacher and the learner in bringing about quantitative (e.g. acquisition of new skills) and qualitative changes (e.g. establishing the relationships between skills across contexts and practices to enhance the capacity to be in control of one's own learning) in the psychological functions of the learner. From the perspective of Galperin's legacy, *students' capacity to learn how to meaningfully engage in new types of learning activities constitutes learning to learn, which brings about qualitative changes in the psychological functions and the development of the learner*. Such a position evokes the need to design activities aimed at enhancing students' capacity in learning to learn. The third type of orientation (complete and constructed by learners following an approach suggested by the teacher), presented in detail above, might indicate how to design such learning activities. The benefits of the third type of orientation Galperin saw in the 'wholeness' of the approach to learning instead of studying various phenomena/concepts separately. This type of orientation offers a new way of storage of information: instead of memorising a great amount of separated facts and concepts, a unified method of systematisation is offered which

can be reused by learners in other activities. The third type of orientation offers a unified approach to learning and creating links between sciences and approaches to studying them. By applying the third type of orientation learners master the essence of learning through studying a phenomenon and a *learning activity* carries a new function: not as a studied object, but as *a tool for studying the essence of the learning.* In doing so, students develop their understanding about the nature of the activity of learning across contexts and subject areas and their agency in leaning to learn may be enhanced.

Galperin's theory on the agency of teachers andlearners

Several authors have made attempts to define agency from a socio-cultural and cultural-historical perspectives. For example, Rajala and colleagues explain:

> …agency for the opportunity, will and skill of people to act upon, influence as well as transform activities and circumstances in their lives. Agency is hence closely related to autonomy and power relations in human activity and learning" (Rajala, et al., 2016, p 1).

It is argued that:

> …agency alludes to the capacity of humans to distance themselves from their immediate surroundings and it implies recognition of the possibility to intervene in, and transform the meaning of, situated activities" (Mäkitalo, 2016, p. 64).

By taking a perspective of transformative activist stance (TAS), Stetsenko (2017) defines agency as:

> …a quality of activity by actors that is contingent on how this activity contributes to and makes a difference in the world of social practices" (Stetsenko, 2017, p. 225).

These definitions resonate with Edwards' (2015) conceptualising learners' agency as an ability to propel themselves forward while recognising and responding to the demands in tasks and with increasing competence, repositioning themselves within a knowledge domain (Edwards, 2015). As we have already indicated, Galperin's pedagogical theory, might offer a useful conceptualisation of *learners' agency as an ability to engage in the process of learning and advance in this process while mastering their understanding about the target concepts and about what learning makes*:

> … to teach – means to develop the capacity with learners to analyse independently" (Lecture 1)

However, Galperin goes further by not only offering his understanding of learners' agency but discussing in detail *how* learners' agency may also be enhanced. In doing so, Galperin empowers teachers and offers an approach with significant pedagogical implications. He explains that learning activities designed with the orientation of the third type might foster the capacity in learning to learn and enhance learners' agency as independent lifelong learners. Therefore, teachers are encouraged to offer an approach to enhance learning and the development of students as learners:… teachers have to find the system of conditions under which students cannot help mastering the action and, in doing so, learn how to complete other tasks" (Lecture 1).

By engaging in such activities students' agency as lifelong learners (Mäkitalo, 2016; Rajala et al., 2016) may be enhanced. As Stetsensko (2017) emphasises:

> Agency is constituted by the activities we perform including the ones in which we anticipate and imagine the future- as parts of the larger process of positioning ourselves within the practices, that is, taking a stand on how one is positioned within social practices and, most critically, on these practices (p. 227)

To develop such agency is of primary significance in educating independently thinking lifelong learners. The phases of the development of mental actions, suggested by Galperin, indicate that learning is a dialectical process originated in learners' interactions with material and social resources that happens through transformations of various forms of activities learners engage in and, therefore, the transformations of learners themselves. By engaging in these transformations, learners reposition themselves in knowledge practices and in doing so, enhance their agency. Therefore, learners' agency is of a transformative nature. The emphasis on the development of students as independent agentic learners is central to the debate about contemporary challenges; essential to create learners' own development, their future and their world. In the following, we discuss several implications of Galperin's legacy for pedagogical practice.

Implications of Galperin's theory for sports coaching

The explicit conceptualisation of the role of the sports coach as educator by Jones (2006) over a decade ago, has led to increased traction of the pedagogical nature of coaching. To make sense of coaching practice and how to teach it; scholars have engaged with a broad range of pedagogical perspectives (Jones et al., 2018). The burgeoning work in this area has seen tentative steps taken using Vygotsky and Leontiev's work in coaching research (Jones et al., 2018; Jones et al., 2016). More specifically, a comprehensive case has been presented of how their principal ideas can aid our understanding of both the act and process of coaching, as well as a structure for practical and theoretical coaching improvement. As such, through consolidating and extending Vygotsky and Leontiev's work, Galperin's pedagogical framework, as presented in this article, has the potential to make a significant contribution to deconstructing and guiding future coaching practice.

Within sport coaching knowledge acquisition has continued to be the predominant model of learning (Jones et al., 2018). An individual's mind is viewed in this instance, as a container to be filled with certain materials; with learning seen as a permanent state of having (discovering) separated knowledge and skills (Sfard, 1998). However, the development of learners' conceptual understanding about what it means to engage in a team game appears to be underplayed. Here, the link with Galperin's first type of orientation is evident, where learning has a reproductive character directed at acquiring knowledge by trial and error (Engeness & Lund, 2018). Incomplete orientation activity echoes 'traditional' forms of coaching, for example in team games such as football, where the development of techniques occur in isolation, away from, or external to, a game context (De Souza & Mitchell, 2010). In a

typical football session using this approach, there is an explanation and demonstration of a technique such as passing to all players, with little if any emphasis placed on players' conceptual understanding how to tactically play the game. The players replicate the technique in isolated practices before attempting to implement it as a skill in a game situation. Unsurprisingly, this approach has had limited success in enabling the transfer of techniques from the training field into skills in games (Harvey et al., 2018). Viewed through a Galperin lens the movement from practice to theory (concrete to abstract) means that the orientation scheme of the game is incomplete, and the players do not develop their conceptual understanding of the game.

Although coaching using 'traditional' approaches continues on a regular basis, there has been a shift towards placing greater emphasis on developing learning within context (Renshaw et al., 2015). This, for example, has involved modifying practices in team games (e.g. player numbers, space, rules) focusing on designing exercises representative of the full game form. For instance, a constraint-led approach, underpinned by the theory of ecological dynamics, gives prominence to behaviour emerging through manipulation of constraints (Chow et al., 2013). The focus is on a coach assuming a more 'hands-off' role and being a facilitator during practices (Renshaw et al., 2016). Hence, the onus is on shaping exercises that allow the 'game be the teacher' with players implicitly learning the required skills within the context presented. Here the limitations, as highlighted by Galperin's first type of orientation are evident, with learning developed through trial and error while discounting the link to the essence of the phenomena (i.e. tactical understanding how to play the game) (Engeness & Lund, 2018).

As mentioned previously, cultural-historical scholars have highlighted the necessity for a more capable other (i.e. teacher/coach) to design practices that will assist the development and learning of participants (Vygotsky, 1978). In recent debates on 'athlete centred' philosophies, the importance of a coaches' influence on pedagogical interactions has been reiterated, arguing against approaches based solely on athletes driving their own learning (Jones et al., 2018; Denison et al., 2015). Similarly advocates of game-centred approaches (GCA), who value the combination of tactical understanding and skill development in team games, stress the importance making teaching explicit, purposeful and directed through structured exploration, to ensure knowledge development and learning (Harvey et al., 2018). The ability to foresee or infer consequences has been identified as a vital ingredient for coaches (Hemmestad et al., 2010), with the presence of sociality and related intentionality key factors in the process (Jones & Corsby, 2015). Therefore, how a coach interacts and explains ideas, values, strategies, and speech patterns, influences greatly what an athlete internalises and learns from (Jones & Ronglan, 2017; Jones & Thomas, 2015). Crucially in the context of this article, coaches can carefully construct ideas by 'seeing' the outer limits of athletes' ZPD; which the learner can only imitate initially but, with further time and assistance, develops into understanding and ultimate internalization (Jones et al., 2018).

Here, the potential value and importance of Galperin'stheory for coaches is evident as it can shape interactions with athletes and transform learning through supporting the transformation of external social activities into internal activities. His pedagogical

theory provides a specific framework for coaches to structure collaborative solutions to team tactical problems (abstract), through the dialectical movement of the applying theoretical knowledge in practical situations (concrete). Using the development of tactical knowledge between teammates in basketball as an example (Vasiljev, 1971), the *second type of orientation* (complete and provided by a teacher) can provide an opportunity for a coach to identify essential features of their own game and plan what they want the players to produce in games. Identifying all the characteristics of the key moments in the game is crucial here (e.g. attacking in the final third) alongside providing detailed descriptions of the role of each player in these situations. A task involving a specific tactical problem can then be analysed by players from a certain perspective (i.e. role in a specific position on the field) in the form of *materialised action* using detailed objects (e.g. descriptions on the orienting card) provided by the coach. In this activity, placing importance on *communicated thinking*, players take it in turns to use the cards, to analyse and verbally explain to teammates their role in solving the tactical problem. This also involves completing the activity by talking, using objects such as a tactics board, video footage or even during the training session itself, which also creates collaborative understanding amongst the group of players. Having this 'visibility' of thought contributes to creating players' common understanding of the target situation and by engaging in collaborative analysis of the situation, plan further actions of players to engage in tactical interactions. Such an approach is termed by Galperin as creating a common orienting basis and it allows players to critically challenge others knowledge while also providing the coach with the opportunity to monitor and check individual's tactical understanding. As player learning progresses the activity moves from materialised to *dialogical thinking* whereby the player establishes communication of these thoughts with themselves (as another person), before finally becoming a pure mental act focusing on its outcome (*acting mentally*).

According to Galperin's extensive research, the advantage of the second type of orientation is that it provides the opportunity to enhance the learners (i.e. players) ability to develop their conceptual understanding of the target game, the role of tactical interactions and individual contributions of the players. In the example above, this produces greater individual awareness of their own and teammates' tactical performance, while also developing the ability to analyse and adapt movements, prior to, during practices and within competitive games. In doing so, players can potentially develop their understanding about the essence of the activity of learning across contexts and their agency in the leaning process. Therefore, the pedagogical framework could also be used to develop specific skills in team sports, as evidence of verbal understanding of tactics on its own is not enough, as the desired performance or knowledge has to be actively demonstrated (Jones & Thomas, 2015).

In theory, tactical understanding can also be developed using the third type of orientation. In this instance, the coach and players collaboratively construct the orienting cards, which are subsequently applied to solve tactical problems. A potential shortcoming of the third type of orientation is that it is time consuming, conflicting with a coach's main priority, which is to have players meaningfully engaging in playing the game as soon as possible. From a coaching perspective, therefore, there

is potentially less importance placed in developing players understanding about how to learn to play the game.

Implications of Galperin's theory for pedagogic design principles of classroom activities and digital environments

The importance of the learning to learn approach and the contemporary digital transformation shifts the emphasis to understanding how to design not only classroom activities, but also digital environments (for example, Massive Open Online Courses—MOOCs, learning management systems (LMS), various software and applications). Such a two-dimensional focus is of particular significance for teacher education and pedagogical practice aimed at preparing students for their future work. We suggest that Galperin's theory may offer an approach to design classroom activities and digital spaces aimed to enhance learning and their understanding of how to learn. From the perspective of Galperin's pedagogical theory, the following design principles (DP) of classroom activities and digital environments may be suggested.

DP1: When designing a classroom activity or digital environment, it is important to (i) identify the target concept students need to develop their understanding about and (ii) the essential characteristics or structural parts of the target concept. In addition, the sequence of presenting the essential characteristics of the target concept to learners should be identified based on students' prior knowledge and skills.

DP2: If a learning activity is to adequately assist the development of students' learning and their understanding of the learning process, it might be organised according to the third type of orientation: complete and created by students by using an offered approach.

DP3: The overview of the whole activity, termed by Galperin as 'operational scheme of thinking' might be integrated into classroom activities or digital environments to enhance students' understanding of the learning process they engage in.

DP4: The phase of materialised action indicates that some resources to assist the development of learners' conceptual understanding should be presented in the materialised form (digital resources, animations, etc.). Students' experience from interactions with the materialised resources is transferred through collaborative interactions to the internal plane of the learner (materialised action—communicated thinking—dialogical thinking—acting mentally).

DP5: The phase of communicated thinking, creates the premises for social interactions in digital environments (e.g. discussion forums, collaborative video meetings, etc.).

DP6: The role of feedback and teacher facilitating of the learning process need to be accounted for in the design: feedback provided to learners will assist students to develop their conceptual understanding and to enhance students' understanding about how to go about learning. It has been discussed that such feedback is particularly appreciated by the students in the phases of materialised action and communicated thinking (Engeness, 2018, 2020). In later forms of the learning process, e.g. dialogical thinking, feedback might be provided on request or with regards to how well learners master the activity they are engaged in.

In summary, these design principles are intended to: (i) enhance students' learning and (ii) by adopting the third type of orientation, develop students' understanding about how to go about learning. In doing so, students might foster their capacity in learning to learn and position themselves as active agents in knowledge practices. We acknowledge that there is still work to be done in making the arguments about the pedagogic potential of the presented here design principles, however, this discussion is timely and may offer teachers a powerful tool to respond to the demands in the contemporary education.

Critical reflections on benefits and limitations of Galperin's legacy

A theory is worthless if it cannot be adopted and used by practitioners. Theoretical knowledge can be used as a guidance or an orienting tool to inform practical decisions. To be able to do so, a theory should be understood by the practitioners to empower them to implement and operationalise the suggested theory in practice. We believe that Galperin's psychological theory, originally termed as "Planned Stage-by-Stage Mental Actions Formation" (PSMFA) (1968, 1989, 1992)[1] can be considered as an approach particularly useful for educational and other practitioners.

Galperin's legacy offers a perspective on various psychological processes that interplay to contribute to the development of mental actions and concepts with learners. Such a perspective comprises, on the one hand, a theoretical analysis of the human psychological functions and consciousness, and, on the other, a carefully elaborated and tested system of psychological conditions of intentional development of mental actions with the desired properties. However, Galperin's theory should not be understood as an algorithmic prescription that has to be followed in an attempt to achieve the desired outcome. Rather, it should be understood as theoretical guidance to be taken away, adopted and operationalised in specific learning situations characterised by several variables: the nature of the subject and target concepts, age and previous knowledge of the learners, and characteristics of the environment and others.

We have seen periods of great optimism with regard to the usefulness of Galperin's approach. Indeed, by implementing this approach in classrooms, it appears to be possible to radically transform traditional learning and teaching. Consequently, many objectives of effective schooling have been achieved and have been documented by hundreds of empirical studies. For instance: (1) the mastering of the curriculum by a majority of learners who possess the required level of prior knowledge and skills can be achieved without extending schooling time and at no additional cost; (2) the differentiation of the types of instructions teachers give to students with varied educational needs is minimized or disappears entirely; (3) learners are able to transfer knowledge and skills to new situations within and across subject areas; (4) by developing their understanding about what learning involves, students gain control over their learning and their motivation to learn may be enhanced (Galperin, 1989; Podolskij, 1993).

[1]First publication of the approach appeared in Russian in 1952, followed by a comprehensive description of the approach in English—in 1968.

However, when comparing publications from the 50s–70s and 80s–90s (Podolskij, 2009, 2014) it is clear that there has been a significant decrease in optimism concerning the application of PSFMA. While there have been many interesting experiences in different parts of Russia and outside of it, which demonstrate successes and challenges in the application of PSFMA in educational practice; there is evidence that the implementation in classrooms has been rather limited.

There is a reason for the lack of sustained take up, and it is of a methodological nature in relation to Galperin's approach. The initial success of the approach and the enthusiasm it engendered led to a serious misunderstanding concerning the status of the approach. In brief, sometimes the approach has been interpreted not as a general description of principles and regularities, which attempt to explain the dynamics of the development of human mental activity, but rather as a set of techniques and instructions about how to teach. Such an interpretation can distort reality and transform the approach into a kind of "absolute" knowledge, a sort of so-called philosopher's stone.

It is evident that the direct application in classrooms of methods employed in research, has a number of fundamental limitations. Strong results cannot be observed in lessons when the conditions, which were consciously controlled in a psychological experiment, do not correspond to the conditions of the practical situation. The direct transfer of the mechanisms of the development of mental actions, gives satisfactory results only in those infrequent cases when the conditions of the experimental formation completely (or at least in a major part) correspond to the conditions of real learning in classrooms. Determining the correct balance between a theoretical scheme adopted purely for research purposes, a scheme that describes the general principles of the acquisition of new knowledge by a learner, on the one hand, and the real complexity of learning and teaching on the other hand is challenging. It is therefore crucial to understand the following: in order to bridge the gap between research methods and the practice of learning and teaching, it is necessary to carry out several adjustments that account for the complexity of learning. These requirements for the practical use of the method of systematic formation were described in numerous studies by the followers of Galperin (Podolskij, 1987, 1993, 1997, 2008).

Concluding Remarks

To summarise, by briefly introducing the central ideas of Galperin's conceptual contribution presented in this collection of *Lectures* on the development of human mental activity, we attempted to outline some implications of Galperin's pedagogical contribution for educational practice and research.

First, we argue that Galperin's theory explicates his profound understanding of the foundations of the cultural-historical theory and should be understood as an attempt to consolidate the contributions of Vygotsky and Leontiev, to extend and operationalise them in educational practice and in research.

Second, the emphasis on students' learning in the specifically designed learning activities urges the adoption of a *unit of analysis* comprising students' actions with material and social resources and the design of the learning activities students engage in.

Third, Galperin's theory offers a useful understanding of a *learning to learn* approach as a capacity of students to learn how to master new types of learning activities to bring about qualitative changes in the psychological functions and the development of learners. It is argued that the orientation of the third type (complete and constructed by learners following a suggested approach) may enhance the agentic capacity of students in learning to learn. By following such an approach, *a learning activity* carries a new function: *as a tool for studying the essence of the learning.*

Fourth, the emphasis on the learning to learn approach to develop students' understanding of the target concepts and the way how to go about learning, has implications to conceptualise *learners'agencyas an ability to engage and advance in the process of learning while mastering their understanding about how to learn.*

Fifth, Galperin's theory has significant implications for pedagogical practice. In this article, we have briefly discussed how Galperin's legacy can contribute to deconstructing and reconstructing coaching practice. We argue that the second type of orientation may be useful to develop learners' (players) conceptual understanding of the target game, the role of tactical interactions and individual contributions of the players. Based on the premises of Galperin's theory, we have suggested the pedagogic design principles of classroom activities and digital environments aimed to enhance learning and the development of students as learners.

Finally, Galperin's theory should not be understood as an algorithmic prescription that has to be followed to achieve the desired outcome. Rather, it should be understood as theoretical guidance to be taken away, adopted and operationalised in educational practice. As indicated above, in the 21st century we live in times of rapid and complex climatic, demographic and technological transformations; that have tremendous effect on the way we live, work and learn. We have become central actors and participants in these transformations moving away from our roles in 20th century as spectators and consumers. Galperin's conceptual contribution may therefore have significant implications for the education of agentic citizens in contemporary society who possess the capacity to meaningfully respond to the challenges and transform the world where we live.

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