



SEÇÃO: ENTREVISTAS

Cultural-neuropsychological Theory of Language Functioning: an interview with Professor Aaro Toomela

Teoria neuropsicológica-cultural do funcionamento da linguagem: uma entrevista com o professor Aaro Toomela

Teoría neuropsicológica cultural del funcionamiento del lenguaje: una entrevista con el profesor Aaro Toomela

Aliciene Fusca

Machado Cordeiro¹

orcid.org/0000-0002-5792-0284

aliciene_machado@hotmail.com

Bento Selau²

orcid.org/0000-0002-5792-0284

bentoselau@unipampa.edu.br

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Abstract: The article aims to present the transcription of the interview with Professor Aaro Toomela, professor of Cultural and Neuropsychology at Tallinn University, Estonia. The questions came from meetings and joint work between the investigators of the Research Group Vygotsky's Psychology and Education, linked to Unipampa, and coordinated by professor Bento Selau; and GETRAFOR Research and Study Group about Work and Teacher Formation, linked to Univille, and coordinated by professor Aliciene Cordeiro. The interviewers understand spreading the results of this project can help students of the fields of psychology, education, and neurology, as well as more experienced investigators, at continuing studies about Vygotsky and Luria's work.

Keywords: psychology, education, neurology, educational psychology, soviet psychology

Resumo: Este artigo pretende apresentar a transcrição da entrevista com o professor Aaro Toomela, professor de Psicologia Cultural e Neuropsicologia na Universidade de Tallin, na Estônia. As perguntas surgiram de reuniões e trabalhos em conjunto entre os investigadores do Grupo de Pesquisa em Psicologia e Educação de Vygotsky, ligado a Unipampa e coordenado pelo professor Bento Selau, e o Grupo de Estudos e Pesquisas em Trabalho e Formação Docente (GETRAFOR) da Univille, coordenado pela professora Aliciene Fusca Machado Cordeiro. Os entrevistadores entendem que divulgar os resultados deste projeto pode auxiliar estudantes de psicologia, educação e neurologia, tal como investigadores mais experientes, em estudos continuados sobre o trabalho de Vygotsky e Luria.

Palavras-chave: psicologia, educação, neurologia, psicologia educacional, psicologia soviética

Resumen: Este artículo pretende presentar la transcripción de la entrevista con el profesor Aaro Toomela, profesor de Psicología Cultural y Neuropsicología de la Universidad de Tallin, Estonia. Las preguntas surgieron de encuentros y trabajos conjuntos entre investigadores del Grupo de Investigación en Psicología y Educación de Vygotsky, vinculado a Unipampa y coordinado por el profesor Bento Selau, y el Grupo de Estudios e Investigación en Trabajo y Formación Docente (GETRAFOR) de Univille, coordinado a cargo de la profesora Aliciene Fusca Machado Cordeiro. Los entrevistadores entienden que la difusión de los resultados de este proyecto puede ayudar a los estudiantes de psicología, educación y neurología, así como a investigadores más experimentados, a continuar los estudios sobre el trabajo de Vygotsky y Luria.

Palabras clave: psicología, educación, neurologia, psicología de la educación, psicología soviética



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¹ Universidade da Região de Joinville (Univille), Joinville, SC, Brasil.

² Universidade Federal do Pampa (Unipampa), Jaguarão, RS, Brasil.

Aaro Toomela is one of the most important researchers in the worldwide context in study of Vygotsky and Luria's works. Due to its Estonian origin, Russian is the language he masters (which allows the access to the original works of Vygotsky), besides English. However, he has advanced regarding some topics of the historic cultural theory, as well as challenged others.

Toomela has developed his own theory, with one of the basis of the Cultural-Historical Psychology. Nowadays is a Professor of Cultural and Neuropsychology at the Tallinn University, Estonia. His research interests cover all the main fields of psychology—cognitive, developmental, cultural, social, personality, biological, evolutionary, and applied—as well as philosophy, history and methodology of psychology. He has authored scientific papers in all these fields. He is a member of the editorial boards of several journals (including *Culture & Psychology* and *Integrative Psychological and Behavioral Science*).

He is graduated in medicine at University of Tartu (1986). Later, worked for seven years as a pediatric neurologist in the Department of Neurorehabilitation at the Tartu Children's clinic. From 1993 to 2000, was a lecturer specializing in neuropsychology in the Department of Psychology at the University of Tartu. Research from that time concerned the consequences of brain damage, the development of memory and drawings, and the role of culture in the development of the human mind. He received his [M.Sc.](#) (1996) and his Ph.D. (2000) in Psychology.

Still little known in Brazil, Aaro Toomela can contribute to the conceptual understanding of Historic Cultural Psychology, considering that the translations which he has access in the West are marked by improprieties and tampering that can lead to a mistaken conceptual and methodological understanding.

The present narrative interview with Professor Aaro Toomela was granted to Professor Bento Selau and to Professor Aliciene Machado Cordeiro in 09/11/2021. The questioning emerge from joint meetings and works among researcher from the researchers from research groups "Vygotsky's

Psychology and Education", linked to Unipampa, coordinated by Professor Bento Selau and "GETRAFOR – Study and Research Group about the Teachers Work and Education", linked to UNIVILLE, under the coordination of Professor Aliciene Cordeiro.

Anyway, is remarkable the unconventionality and extent of Toomela's work, so that recognizing his contributions can promote a significant deepening in the work of Vygotsky and Luria. His most important works, published in different areas, are:

Aaro Toomela's more important works in different areas

General Theory of Psyche

Books

Toomela, A. (2020). *Culture, speech and My Self*. Sepamãe: Porcos ante Margaritas. (Originally published in Estonian in 2016)

Toomela, A. (2017). *Minu lse areng: inimlapsest Inimeseks. (The Development of My Self: From Child of Man to Human Being)*. Väike Vanker. (Will be translated into English; expected publishing date July 2022)

Articles and Book Chapters

Toomela, A. (2007). Unifying psychology: absolutely necessary, not only useful. In A. V. B. Bastos, & N. M. D. Rocha (Eds.), *Psicologia: Novas direcoes no dialogo com outros campos de saber* (pp. 449-464). Casa do Psicologo.

Toomela, A. (2017). Towards general-unifying theory of psychology: Engelsted and beyond. In N. Engelsted (Ed.), *Catching up with Aristotle. A journey in quest for general psychology* (pp. 137-150). Springer.

Methodology

Toomela, A. (2007). Culture of science: Strange history of the methodological thinking in psychology. *Integrative Psychological and Behavioral Science*, 41(1), 6-20. <https://doi.org/10.1007/s12124-007-9004-0>.

Toomela, A. (2008). Variables in psychology: A critique of quantitative psychology. *Integrative Psychological and Behavioral Science*, 42(3), 245-265. <https://doi.org/10.1007/s12124-008-9059-6>.

Toomela, A. (2010). Methodology of idiographic science: Limits of single-case studies and the role of typology. In S. Salvatore, J. Valsiner, J. T. Simon, & A. Gennaro (Eds.), *Yearbook of Idiographic Science*, Vol. 2/2009 (pp. 13-33). Firera & Liuzzo Publishing.

Toomela, A. (2010). Quantitative methods in psychology: Inevitable and useless. *Frontiers in Psychology*, 1(29), 1-14. <https://doi.org/10.3389/fpsyg.2010.00029>.

Toomela, A. (2011). Travel into a fairy land: A critique of modern qualitative and mixed methods psychologies. *Integrative Psychological and Behavioral Science*, 45(1), 21-47. <https://doi.org/10.1007/s12124-010-9152-5>.

Toomela, A. (2014). A structural systemic theory of causality and catalysis. In K. R. Cabell, & J. Valsiner (Eds.), *The catalyzing mind. Beyond models of causality* (pp. 271-292). Springer.

Toomela, A. (2016). The ways of scientific anticipation: from guesses to probabilities and from there to certainty. In M. Nadin (Ed.), *Anticipation across disciplines* (pp. 255-273). Springer.

Toomela, A. (2019). *The Psychology of Scientific Inquiry*. Springer Nature.

Vygotsky's Theory and Beyond

Toomela, A. (1996). How culture transforms mind: A process of internalization. *Culture and Psychology*, 2(3), 285-305. <https://doi.org/10.1177/1354067X9600200305>.

Toomela, A. (1996). What characterizes language that can be internalized: A reply to Tomasello. *Culture and Psychology*, 2(3), 319-322. <https://doi.org/10.1177/1354067X9600200307>.

Toomela, A. (2000). Activity theory is a dead end for cultural-historical psychology. *Culture and Psychology*, 6(3), 353-364. <https://doi.org/10.1177/1354067X0063005>.

Toomela, A. (2003). How should culture be studied? *Culture and Psychology*, 9(1), 35-45. <https://doi.org/10.1177/1354067X03009001003>.

Toomela, A. (2003). Culture as a semiosphere: On the role of culture in the culture-individual relationship. In I. E. Josephs (Ed.), *Dialogicality in development* (pp. 129-163). Praeger.

Toomela, A. (2008). Activity theory is a dead end for methodological thinking in cultural psychology too. *Culture and Psychology*, 14(3), 289-303. <https://doi.org/10.1177/1354067X08088558>.

Toomela, A. (2014). Methodology of cultural-historical psychology. In A. Yasnitsky, R. van der Veer, & M. Ferrari (Eds.), *The Cambridge Handbook of Cultural-Historical Psychology* (pp. 99-125). Cambridge University Press.

Toomela, A. (2015). Vygotsky's theory on the Procrustes' bed of linear thinking: Looking for structural-systemic Theseus to save the idea of 'social formation of mind'. *Culture and Psychology*, 21(3), 318-339. <https://doi.org/10.1177/1354067X15570490>.

Toomela, A. (2016). What are higher psychological functions? *Integrative Psychological and Behavioral Science*, 50(1), 91-121.

Toomela, A. (2018). Vygotskian (but only partly Vygotsky's) understanding of special education. *Educacao: Revista Quadrimestral. Porto Alegre*, 41(3), 347-361. <https://doi.org/10.15448/1981-2582.2018.3.31795>.

Child Development

Toomela, A. (1999). Drawing development: Stages in the representation of a cube and a cylinder. *Child Development*, 70(5), 1141-1150. <https://doi.org/10.1111/1467-8624.00083>.

Toomela, A. (2000). Stages of mental development: Where to look? *Trames: Journal of the Humanities and Social Sciences*, 4(1), 21-52.

Toomela, A. (2003). Development of symbol meaning and the emergence of the semiotically mediated mind. In A. Toomela (Ed.), *Cultural guidance in the development of the human mind* (pp. 163-209). Ablex Publishing.

Toomela, A. (2003). Developmental stages in children's drawings of a cube and a doll. *Trames: Journal of the Humanities and Social Sciences*, 7(3), 164-182.

Toomela, A. (2006). Generic representations in children's drawings. *Trames: Journal of the Humanities and Social Sciences*, 10(4), 341-354.

Toomela, A., Kikas, E., & Möttus, E. (2006). Ability grouping in schools: A study of academic achievement in five schools in Estonia. *Trames: Journal of the Humanities and Social Sciences*, 10(1), 32-43.

Neuropsychology

Toomela, A. (2012). Short-term memory in young adults with spastic diplegic cerebral palsy. *Developmental Neuropsychology*, 37(4), 317-332.

Toomela, A. (2014). There can be no cultural-historical psychology without neuropsychology. And vice versa. In A. Yasnitsky, R. van der Veer, & M. Ferrari (Eds.), *The Cambridge Handbook of Cultural-Historical Psychology* (pp. 315-349). Cambridge University Press.

Toomela, A. (2017). Neuroscience: Can it become developmental? In D. Carre, J. Valsiner, & S. Hampl (Eds.), *Representing development: The social construction of models of change* (pp. 107-120). Routledge.

Toomela, A., Pulver, A., Tomberg, T., Orasson, A., Tikk, A., & Asser, T. (2004). Possible interpretation of subjective complaints in patients with spontaneous subarachnoid haemorrhage. *Journal of Rehabilitation Medicine*, 36(2), 63-69. <https://doi.org/10.1080/16501970310017414>.

Toomela, A., Tomberg, T., Orasson, A., Tikk, A., & Nömm, M. (1999). Paradoxical facilitation of a free recall of nonwords in persons with traumatic brain injury. *Brain and Cognition*, 39, 187-201. <https://doi.org/10.1006/brcg.1999.1077>.

Cognitive Psychology

Tammik, V., & Toomela, A. (2013). Relationships between visual figure discrimination, verbal abilities, and gender. *Perception*, 42(9), 971-984. doi: 10.1068/p7607.

Tammik, V., & Toomela, A. (2017). Dominant structure of word meanings moderates aging related decline in visual figure discrimination. *Journal of Cognitive Psychology*, 29(3), 279-288. <https://doi.org/10.1080/20445911.2016.1272604>.

Toomela, A. (2008). Word meaning structure as a predictor of depression in Estonian defense forces. *Military Psychology*, 20(2), 103-114. <https://doi.org/10.1080/08995600701869551>.

Toomela, A., & Allik, J. (1999). Components of verbal working memory. *Behavioral and Brain Sciences*, 22(1), 110. <https://doi.org/10.1017/S0140525X99391780>.

Toomela, A., Nõmm, S., Kõnnussaar, T., & Tammik, V. (2019). Why behavioral indicators may fail to reveal mental states: Individual differences in arousal-movement pattern relationships. *Frontiers in Psychology*, 10(270), 1-8. <https://doi.org/10.3389/fpsyg.2019.00270>.

Empirical Studies of Cultural Development

Toomela, A. (2020). Studies in the mentality of literates: Searching for the cultural Great Divide at the individual level of analysis. *Integrative Psychological and Behavioral Science*, 54(1), 1-29. <https://doi.org/10.1007/s12124-019-09503-5>.

Toomela, A., Barros-Filho, D., Bastos, A. C., Chaves, A. M., Ristum, M., Chaves, S., & Salomão, S. J. (2020). Studies in the mentality of literates: 2. Conceptual structure, cognitive inhibition and verbal regulation of behavior. *Integrative Psychological and Behavioral Science*, 54(4), 880-902. <https://doi.org/10.1007/s12124-020-09517-4>.

Toomela, A., Barros-Filho, D., Bastos, A. C., Chaves, A. M., Ristum, M., Chaves Santos, S., & Salomão, S. J. (2020). Studies in the mentality of literates: 1. Conceptual structure and aspects of visual perception. *Integrative Psychological and Behavioral Science*, 54(2), 465-493. <https://doi.org/10.1007/s12124-019-09511-5>.

Miscellaneous

Toomela, A. (2003). Relationships between personality structure, structure of word meaning, and cognitive ability: A study of cultural mechanisms of personality. *Journal of Personality and Social Psychology*, 85(4), 723-735. <https://doi.org/10.1037/0022-3514.85.4.723>.

Toomela, A. (2005). Decision-making with incomplete information: Systemic and non-systemic ways of thinking in medicine. In R. Bibace, J. Laird, & J. Valsiner (Eds.), *Science and medicine in dialogue: Thinking through particulars and universals* (pp. 231-241). Greenwood/Praeger.

Toomela, A. (2007). Sometimes one is more than two: When collaboration inhibits knowledge construction. *Integrative Psychological and Behavioral Science*, 41(2), 198-207. <https://doi.org/10.1007/s12124-007-9015-x>.

Toomela, A. (2010). Biological roots of foresight and mental time travel. *Integrative Psychological and Behavioral Science*, 44(2), 97-125. <https://doi.org/10.1007/s12124-010-9120-0>.

Toomela, A. (2010). Poverty of modern mainstream psychology in autobiography. *Reflections on A History of Psychology in Autobiography, Volume IX. Culture and Psychology*, 16(1), 127-144. <https://doi.org/10.1177/1354067X09344892>.

Toomela, A. (2016). Six meanings of the history of science: The case of psychology. In S. H. Klempe, & R. Smith (Eds.), *Centrality of history for theory construction in psychology* (pp. 47-73). Springer.

Toomela, A. (2019). Religion as a form of everyday conceptual thought: Evidence from Orthodox icons. In S. Brown, & L. Tateo (Eds.), *The method of imagination* (pp. 191-224). Information Age Publishing.

The Interview

The transcription of the interview was returned to Professor Toomela, so he could review and alter what he considered necessary. The interviewers thought about the suggestions of alteration and talked about them with the interviewed. Then, Professor Toomela has authorized the publication. Professors Bento Selau e Aliciene Cordeiro sincerely thank Professor Aaro Toomela for his cooperation and trust in the work.

Professor Toomela, we would like you to talk about your basic life course, so far.

I think the main important moments of my professional life have been already described. Maybe some personal notes are relevant here. I remember how exciting it was to be a child neurologist. Yet after about five years I began to feel that I miss challenges. Medicine is very advanced science today and develops in an astonishing speed. But nothing really new emerges there. Accidentally in 1989 I got an invitation to teach neuropsychology at the Tartu University Department of Psychology. This pushed me to discover areas I was not acquainted with before. First of all it was neuropsychology, an area that is very remote even to neurologists, as I learned after. The first author to study in details was obviously Luria. But his works needed some ground that could be felt in his texts but not sufficiently elaborated to my taste. Luria was also very clear about what and where to search for this ground – it was Vygotsky. From there I began to realize that psychology is incomparably more challen-

ging than medicine in particular of physics and biology in general. Thirty years ago – and still today – psychology has not answered even the most basic questions. Most psychologist seem to have even troubles to say what is psyche, they are studying. There is practically no psychological phenomenon that would have more or less agreed upon definition. This is a clear symptom that psychology faces fundamental challenges as a science, challenges that are worthy to take up. So I moved into psychology and I have not regretted this decision. I still think that psychology is the most challenging of all sciences.

You have started your career in neuropsychiatry, being your initial emphasis on neuropsychology. When did you start to study Vygotsky's work? Between so many theories, why have you decided to go deeper into this approach specifically?

As I mentioned in the previous answer, the first reason to study Vygotsky emerged from reading Luria. But there were more reasons as I discovered very soon. As a child neurologist I was working with children who had suffered from early brain damage. The more I worked with these children, the more I realized that the kind of support they need is not something medicine can provide. Rather, what is needed is a kind of special education, because the consequences of brain damage are related to mental and movement problems which cannot be solved with the help of some pharmaceutical or physical procedures used in medicine efficiently for treating other health problems. Vygotsky's theory, among other powerful potentials, creates a justified ground for building special education that is needed to support people with different forms of brain damage.

And why Vygotsky and not someone else? I think here the answer is also quite in front of our eyes. Vygotsky has been one of the very few in the history of psychology who understood that the only way to understand psyche is to keep in mind that psyche is a certain whole that must be studied from multiple perspectives – always

remembering that each of the perspectives must complement what has been discovered in others. Today psychology is fragmented to the extreme. Developmental psychology, for example, is a fully separate field that seems to have not connection to cognitive or neuropsychology. Yet what develop are cognitive processes. And the development of cognitive processes is constrained by dynamically changing potential that is determined partly by brain and partly by the environment where children develop. So cultural psychology, another separate field in psychology today, turns out to be also absolutely necessary if we aim at understanding human psyche. Vygotsky's psychology is not fragmentary. It helps to understand how different approaches to understand one and the same phenomenon, the (human) psyche, can complement each other so that truly coherent understanding of it can emerge.

In your studies, you say the perspective Vygotsky's cultural-historical psychology has been used is not the same as the original one, and that the contemporary alterations are not always based on strong facts or conceptual improvements. Can you talk about your worries towards these inadequate appropriations?

As I have tried to show also in several of my publications, I think there are strong reasons to suggest that the Vygotsky's theory as a whole has not been understood in psychology today. Usually some "great" ideas from his theory, such as zone of proximal development, social formation of mind, egocentric-private speech and perhaps also the idea that thought is mediated by language are discussed and considered to be of utmost importance. Yet these ideas are essentially trivial and self-evident consequences of Vygotsky's theory proper. As a rule, it is not even realized that the mentioned ideas are interrelated in Vygotsky's theory; instead they are taken as if independent one from another.

It would take a book to discuss in details the differences between Vygotsky's theory as I understand it (I admit that my understanding can

be wrong also) and theoretical ideas attributed to Vygotsky in psychology today. So I mention only the most fundamental of these theoretical differences. Vygotsky's theory differs from almost all psychological theories of today by its epistemological foundation. Vygotsky was very clear about what he considers to be the essence of scientific explanation, that is, what he aims to know when studying psyche. He proposed, following several other scholars of his time, that psychology should aim to reveal the parts or elements of the studied phenomenon and the whole qualitatively novel structure that emerges in the synthesis of the elements. In addition, it must be realized that psychic structures, after emergence, do not remain unchanged, they develop. I have called this epistemological approach structural-systemic (to distinguish it from atomist structural theories and nonstructural systems theories). Both Vygotsky and Luria consistently relied on this epistemology in all their studies and theories. Today many psychologists even do not realize that they follow certain epistemology. And those who are aware of their epistemology assume that science aims at revealing only linear cause-effect relationships. This epistemology is incompatible with Vygotsky's (and Luria's) theory – the theory that cannot be understood in principle if its epistemological ground is not explicitly taken into account.

In your studies, you distinguish the cultural-historical neuropsychology from other contemporary approaches pointing it according to a systemic-structural approach, introducing the concept of cultural-historical neuropsychology. What are the main differences that characterize the cultural-historical neuropsychology? Why is it still so currently used?

Indeed, there are fundamental differences between neuropsychology dominating today and neuropsychology that was based on Vygotsky-Luria's theory. I think two very important ideas of Vygotsky-Luria's structural-systemic neuropsychology can be pointed out. First of them is related to epistemology that underlies their

approach. In studies of brain-mind relationships Luria followed principles formulated by Vygotsky. This is a theory of systemic dynamic localization of higher psychological functions (HPF). Thus, it was assumed, first, that all HPFs can be distinguished into a set of interrelated qualitatively different subfunctions or elements. Each of these elements is localized in a different region of the brain whereas the HPF in question requires all these elements working together. Therefore the HPF itself cannot be localized but each of its elements is localized. Today neuropsychology rarely, if at all, uses research methods that are absolutely necessary to study brain-mind relationships systemically. Luria did not use only tests to assess one or another psychic function. He began studies of a patient with a comprehensive test battery that allowed to map the overall state of cognitive functions. This allowed to distinguish the specific cognitive function or functions that seemed to be affected by the brain dysfunction. And only then specialized tests were used to establish the precise nature of the cognitive dysfunction in that particular area. Today the whole state of cognitive functioning is usually not studied in neuropsychological research. If only tests are used to study some special cognitive function, it is not possible to know whether that particular function is affected by brain damage or some other subfunction that is also necessary to perform the selected task. Let us take a hypothetical example. A researcher may use tests that are supposed to assess verbal short-term memory. Yet, performance on that test may also decline when auditory perception is dysfunctioning. The problem may also be related to difficulties in creating movement programs that underlie creation of the response. If it is not demonstrated first that other cognitive processes necessary for performing a test are functioning without problems then low level of performance on one or another specific cognitive test cannot be interpreted. Shortly, there can be no memory test or perceptual test or thinking test or any other psychological test that could be used to assess this or that specific function. Performance on all (!) cognitive tests relies on the functioning of the

psyche as a whole. Discovering which particular area of cognitive functioning is affected by brain damage is possible only in the context of the performance of the complex test battery.

Another important difference between Vygotsky-Luria's approach and that of mainstream psychology today is in understanding the nature of the psychic processes that are studied and which relation to the brain is aimed to understand. It is *higher* psychological functions that are studied. Their psychological structure is qualitatively different. First of all, HPFs are semiotically mediated, verbal functions are *always* parts of the human cultural psychic processes. It follows, for instance, that there can be no "nonverbal" tests. It is indeed so. The tests that are called nonverbal do necessarily contain verbal processes. It is often forgotten that instruction of a test is part of it. And instructions of so-called nonverbal tests are, as a rule, verbal. Another important idea that follows from understanding that it is HPFs that are studied is acknowledgement that HPFs develop, their structure changes in time. Therefore one and the same task can be solved by different means at different stages of development. Thus the mind-brain relations do not remain unchanged, they also change during the course of development.

Why Vygotsky-Luria's approach is not followed today? It is hard to understand. I suppose that there are two main reasons. First is historical and geographical blindness of the psychology today. It is just assumed that today psychology is more advanced than it was half a century or more ago. This assumption is wrong. And another reason is epistemology that underlies mainstream psychology. This is not structural-systemic, it is linear cause-effect epistemology. It is impossible to understand Vygotsky-Luria's approach from the linear causality perspective.

According to Vygotsky, the higher mental functions are not individual abilities originally speaking. They derive from the social and cultural environment, based on extracerebral interactions. Having this in mind, you say the interaction with sciences as history, anthropo-

logy, sociology, semiotics is important for the development of neuropsychology. Can you talk more about this?

Yes, neuropsychology should be informed about all other sciences that help to understand psyche, especially cultural psyche of humans. As I mentioned in the answer to the previous question, Vygotsky-Luria's neuropsychology aimed at understanding relationships between the brain and higher psychological functions, semiotically mediated functions that emerge only in the interaction with the culturally structured environment. All sciences that study cultural environment and the ways humans relate to it, help to understand what are the psychical functions which relationship to the brain is studied. In other words, the structure of the brain changes in the interaction with the world. Patterns of relationships between the neurons are determined by the patterns of relationships experienced in the world. Therefore it is not possible to understand brain-mind relationships without understanding social-cultural organization of the world in which one or another individuals has developed and became cultural human being.

Recently, you have published a set of texts entitled "Studies in the Mentality" (Toomela, 2019, Toomela et al., 2019a, Toomela et al. 2019b). You have highlighted the idea of great divide thinking on the development of the word meaning structure, mainly pointing out that your studies may represent a progress towards Vygotsky and Luria's theoretical ideas. Can you talk more about this, especially in the way how culture compounds the mind?

One of the very important ideas of Vygotsky's theory is that semiotically mediated thinking does not remain the same after it emerges. He distinguished three (in some works fourth is also mentioned) stages of the development of word meaning structure. Vygotsky proposed that in semiotically mediated thinking words can be organized differently depending on the stage of

development; each next stage allows to construct more complex ideas that cannot be understood at the previous stage of development. I have developed this theory further (this theory is elaborated in another book in Estonian that is translated into English at the moment). I think there are five hierarchical stages of verbal thinking development. I also added description of the basic structure of verbal thought at each stage of development (what are the basic elements that are organized in thinking and what kinds of relationships can be constructed at each stage) together with the explanation how exactly development proceeds from one stage to the next. Obviously for any Vygotskian, it is clear that such development can happen only in the social-cultural environment. It follows that if the developmental environment of a person has not supported the development of higher stages of thinking, these higher stages are not going to be achieved by them. Adults with no formal schooling turn out to be qualitatively different from individuals who have had the opportunity to acquire formal education.

Theoretically, each of the stages is not so much about what exactly is the content of thinking but rather what kinds of thought operations are possible at all. If Vygotsky was correct, the kind of word meaning structure that is available to a person constrains what can be thought about, what kinds of problems can be solved (and what not). Furthermore, Vygotsky and some of his followers have demonstrated that dominant type of word meaning structure is related to different cognitive processes (such as categorization, solving logical problems, etc.). Yet, it follows from his theory that it is not only cognitive processes that change with the development of the verbal thinking: the psyche as a whole must change in all its aspects, including personality, attitudes, values. The series of studies conducted in parallel in Estonia and in Brazil the results of which we are publishing step by step is to demonstrate that it is indeed the whole psyche that changes in the course of development qualitatively. We focus on the development from so-called everyday conceptual thinking to logical conceptual thinking

(Vygotsky called the latter "scientific concepts"). So far we have shown that the list of cognitive processes that change in development is wider. Conceptual change is also related to visual perception and verbal regulation of behavior. Next paper, submitted for publication we can show that performance on the personality tests is different depending on the dominant type of word meaning structure. Interestingly, our data allow also to demonstrate that performance on personality questionnaires cannot be interpreted in the ways it is usually done.

We want to better understand two Vygotsky's theoretical ideas. How can we comprehend the scientific methodology used by Vygotsky in his studies? What are the theoretical conceptions involved in the scientific methodology used by Vygotsky?

It is one of the very important aspects of Vygotsky's theory that it was based on methodology. It may seem that obviously any science is based on methodology, but it is not so. It is necessary to distinguish methods and methodology. The latter is not a recipe-book or list of methods that can be used for study. Rather, methodology is a theory of the method, this theory does not exist in mainstream psychology today. When a scientist selects a method for study, the choice of the method should follow from the question that is to be answered. It can be said that method, and underlying it methodology, is part of the theory of whatever is studied. Sciences aim at understanding the world that is not directly available for senses. This applies also to psychology – psyche cannot be experienced directly through senses, it cannot be seen, touched, heard, etc. We study psyche through its manifestation, through studying observable phenomena that, theoretically, reflect underlying psychic processes. Method is a systematic way to connect psyche to behaviors and consequences of behaviors we can observe. Therefore method is based on the theory how the studied non-sensory phenomenon can be manifested.

Such theory of method does not exist in mainstream psychology today. Vygotsky's theory, on the contrary, contains complex theory of method, that is, methodology. Vygotsky, as I also mentioned above, began from the most general level of analysis. He described what is scientific explanation in principle: we understand something if we know the parts or elements it is composed, the structure of the way how these elements are related one to another, and qualities of the whole that emerged in the synthesis of the elements. He also formulated the main methodological principle: in order to understand psyche, the methods must be developmental. His approach is even better grounded. He also analyzed the history of science and identified through this analysis the main aim of his studies, the creation of the unifying theory of psyche. He suggested that without such unifying theory psychology will never lead to understanding psyche. When conducting studies to answer specific questions, methods were created on the theoretical basis. He never decided before formulating the question what the method should be.

Today the opposite approach characterizes psychology. First it is decided which methods will be used. It is decided that the data are going to be analyzed with statistical tools or with certain qualitative methods (data interpretation is part of methods); this decision determines the basic form of the method in the narrow sense, whether it is a questionnaire, an interview, or some other specific procedure. The choice of the study procedure is decided on the basis of what data interpretation methods are going to be used and only secondarily, if at all, what is the scientific question that is aimed to answer. On the one hand this approach has ended with a situation where the questions asked cannot be in principle answered because the methods do not correspond to the question. On the other hand, the kinds of questions that are asked, are a priori limited by the methods; many important questions are never asked because the preselected methods are obviously inappropriate. For instance, statistical data analysis is useless to study qualitative

differences; therefore qualitative differences are not studied. Curiously, such approach has ended with denying any qualitative differences between humans at different levels of development or between species. Even octopuses are supposed to have consciousness (what is nonsense in the context of the Vygotsky's theory) and there are no qualitative differences in the ways of thinking, feeling, experiencing and adapting to the world. Such ideas do not follow from studies (which, as we also have demonstrated, clearly demonstrate that there are qualitatively different ways how psyche is functioning) but from the lack of methodology and ungrounded narrow selection of research methods that do not allow in principle to reveal qualitative differences.

The last question, so we can finish the interview. How up-to-date is Luria and Vygotsky's work for these areas, separately: psychology, education, and neurology?

Perhaps it is not necessary to think about the position of the Vygotsky-Luria's theory in relation to the state of different fields of psychology separately. Vygotsky's theory, developed further especially in the field of neuropsychology by Luria, is the only psychological theory I am aware of that can ground a coherent unifying theory of the psyche as a whole and, at the same time, explain particulars of human behavior and psychic development. As such, this theory is not just far ahead of the most recent "achievements" of psychology, this theory is at a qualitatively different level. Thus, it is more than up to date. It is true that this theory (as any good theory in any science) is not "ready", it can be developed further (as I have also attempted to do). Yet there is no need to revise its basic principles, that cannot be said at all about psychological theories of today.

As Vygotsky's theory is still the most promising approach to the study of psyche, the very same theory is also far ahead of theories of any particular field where psychology is applied – education, rehabilitation of people with brain dysfunction, also organizational psychology, cli-

nical psychology, etc.

Perhaps it is worth mentioning in the end, that all this is, in my opinion, correct only if Vygotsky's theory is taken as a whole, from the basic epistemological and ontological principles to specific propositions about the (human) psyche. Theories that ignore the epistemological and ontological ground of his theory, even if they claim to be Vygotskian (such as activity theories today), are in no sense more advanced than other modern theories of psychology.

Thank you so much, Professor Aaro Toomela!

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Aliciene Fusca Machado Cordeiro

Doutora em Educação (Psicologia da Educação) pela Pontifícia Universidade Católica de São Paulo (PUC-SP), em São Paulo, SP, Brasil. Professora-pesquisadora da Universidade da Região de Joinville (UNIVILLE), em Joinville, SC, Brasil.

Bento Selau

Doutor em Educação pela Universidade Federal de Pelotas (UFPEL), em Pelotas, RS, Brasil. Mestre em Educação pela Pontifícia Universidade Católica do Rio Grande do Sul (PUCRS), em Porto Alegre, RS, Brasil. Professor da Universidade Federal do Pampa (Unipampa), em Jaguarão, RS, Brasil. Bolsista de Produtividade em Pesquisa do CNPq.

Mailing address

Aliciene Fusca Machado Cordeiro
Universidade da Região de Joinville
Programa de Pós-Graduação em Educação
Rua José Boiteux, 297
Glória, 89216-275
Joinville, SC, Brasil

Bento Selau
Universidade Federal do Pampa
Programa de Pós-Graduação em Educação
Rua Conselheiro Diana s/n
96300-000
Jaguarão, RS, Brasil

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