Obutchénie
Revista de Didática e Psicologia Pedagógica
DOI: http://dx.doi.org/10.14393/OBv1n2a2017-9

Life and academic achievements of G. K. Sereda (1925-1995)

Vida e obra acadêmica de G. K. Sereda (1925-1995)

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ABSTRACT
The article introduces main biographical facts and academic achievements of Ukrainian Soviet psychologist, G. K Sereda. After brief description of Sereda's life and career, the four stages of his investigations in the field of psychology were analyzed. At the first stage he examined the conditions of effective learning and memorizing. He was interested especially in the possibilities of using involuntary memory in the process of education. Authors pay special attention to the experiments conducted in that period, that its conclusions can be applied in practice to improve system of education. Second stage included profounder experimental studies on the memory, which led scientist to formulate a concept of memory as integrating mechanism of human experience, which aim is to prepare organism to future challenges. Last part of the article says about Sereda's other studies

RESUMO
Este artigo objetiva introduzir os principais fatos biográficos e resultados acadêmicos do psicólogo ucraniano, G. K. Sereda. Depois de uma descrição breve sobre a vida e a carreira de Sereda, analisar-se-á as quatro fases de suas investigações em Psicologia. Na primeira fase, ele pesquisou as condições mais adequadas de aprendizagem e memorização. Seu principal interesse era as possibilidades de usar a memória involuntária no processo educacional. Os autores desse artigo se aterão principalmente aos experimentos realizado nessa fase, tendo em vista que os resultados obtidos podem ser aplicados na prática escolar para melhorar o sistema educacional. A segunda fase incluiu estudos aprofundados sobre memória, os quais levaram o cientista a formular a natureza da memória no futuro. Na última fase, estão outros estudos de Sereda, os quais incluem, também, personalidade e atenção.

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DOI: http://dx.doi.org/10.14393/OBv1n2a2017-9

and theoretical proposals about memory connections with other psychological functions, e.g. personality or attention.

Keywords: Memory. Psychology. Sereda. Learning process.

Palavras-chave: Memória. Processo de Aprendizagem. Psicologia. Sereda.

1 Biography

Grygoriy Kuzmych Sereda was born on 25th November 1925 in the village Welyka Danyliwka, close to Kharkiv[3]. During his childhood, few members of his family were considered to be kurkuls[4] and were subjected to repression. At that time in the Soviet Union having such a state enemies between relatives limited any development opportunities and maintained the stigma for lifetime (Іванова, 2005). Due to the start of Second World War and the occupation of Kharkiv by the Nazis, Sereda wasn't able to finish his schooling. In 1942 (just before his 16th birthday) he was transported to Germany to do forced labour, where he also was imprisoned in concentration camp. When the war has finished he returned home, where despite promises of politicians about rights and freedom, the real status of repatriate persons was similar to criminal offenders status (Пастушенко, 2010). According to recalls of Sereda, specifically this post-war time was the most difficult to survive (Yasnitsky e Ivanova, 2011).

After finishing night school in 1948 he was accepted to study Philosophy at Kharkiv University, which he completed in 1953. Because of his suspicious past he wasn't able to continue his science career, or even work in Kharkiv - he was directed to a city named Kupiansk, where he was working as a Russian language teacher for 10 years. Here he started to be interested in the psychological subjects - thinking how the process of education can be improved. Following his interests he got in touch with professor Petr Ivanovych Zinchenko - who was a

[3]Kharkiv (Russian spell – Kharkov) was first capital of Soviet Ukraine in 1919-1934.
[4]Kurkul (kulak) – the term for richer villager in Russian Empire. During the forced collectivization in the early 30's those villagers were considered to be enemies of State – their lands and tools were taken away for joined ownerships, and themselves - were displaced or killed. Criteria of being *kur*kul were very blurred, so lot of poor villagers were considered to be *kurkuls* (Романець, 2009).

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founder of Psychology Department at Kharkiv University, an outstanding and well-known scientist, a specialist in the branch of memory. Thanks to Zinchenko's patronage, Sereda started his doctoral degree in 1963. He took part in the beginning work of Kharkiv research group, which made research in field of developmental teaching, later known as Elkoin-Davydov method, together with the Repkin marriage (Repkin, 2003). Later he concentrated on exploring memory, especially overlooked in education involuntary memory, which he considered to be a source of hidden capabilities in education. In 1967 he submitted dissertations as a Candidate of Sciences, and the subject was "Involuntary memory and education."

After the death of Zinchenko in 1969, Sereda was a supervisor at the Department of Psychology and this position he maintained almost without any breaks until 1995. In 1972 he was managing as well to change the Psychology Department to a Faculty. In 1986 he submitted his doctoral dissertation - the highest academic degree in USSR entitled, “Memory and activity (theoretical and experimental research of human memory nature as a functional psychological system)” (Иванова, 2009). In 1990 he was chosen to join the board of the Journal of Russian and East European Psychology.

He died tragically in a car accident 18th November 1995, a week before his 70th birthday.

2 Characteristics of the scientific environment (background)

Kharkiv psychological School in current understanding, started to form in the 30's of 20th century, when a group of talented and young scientists ran away from repressions, at same time saving their lives, from Moscov to Kharkiv. Within this group there were: A.N. Leontiew, A.R. Luria, A.V. Zaporozhets. When they arrived, they started to work in various academic institutions in the city. Inspired with Vygostkian ideas local young scientists: V.I. Asnin, P.I. Galperin, P.I. Zinchenko, O.M. Kontsevaia, G.D. Lukov, K.E. Khomenko, L.I. Bozhovich and others, with whom they had formed good organised research group

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(Laktionov e Sereda, 1993). Their methodology, which they have used to explore the psyche, was called "action approach", that later became "activity theory" - a leading model in Soviet Psychology (Середа, Густяков e Заика, 1984).

Second World War stopped all works, after which some of scientists went back to Moscow, and new leader of Kharkiv School become Zinchenko. They still continued an intensive collaboration between Kharkiv and Moscow - most of professors have met each others, as well some of students were sent to take some of knowledge from the partners (marriage of Repkin, Zhitnikova, Liaudis and others). As a result, although Kharkiv's school wasn't as prestigious as Moscow's one, scientists from that time recall that: “the Muscovites took pleasure in calling themselves representatives of the Kharkiv School, while the Kharkovites, who had never studied in Moscow, called themselves representatives of the Moscow School(…)” (Laktionov e Sereda, 1993, p. 7).

More detailed descriptions and review about scientific environment, where the career of Sereda had developed, like the history of the Kharkiv school and as well names of scientists, who had created, inspired and conducted their researches, can be found in the English-written surveys of Yasnitsky and Ferrari (Yasnitsky e Ferrari, 2008a; b).

3 Analysis of scientific achievements

Below is description and analysis of scientific achievements of G. K. Sereda according to works published in his parent university journal – “Naukovyy Visnyk”. Other analyses and overviews of Sereda's science career could be found in English (Yasnitsky e Ivanova, 2011) or in Russian works (Иванова, 2009). In 1980 Sereda divided all his team researches in three steps. First one - practical studies about memory and education that were carried out in leadership by Zinchenko between 1963 and 1968. Second – laboratory experiments performed between 1968 and 1973, about the organization influence of sequential actions to involuntary memory, based on which Sereda formed hypothesis about future nature of a memory. The third step, between 1973-1979 was concentrated on

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mnemonic effects exploration, and lead to the original theory of memory as an integrating mechanism of human experience (Середа, 1980). In the 80's and 90's Sereda was concentrated on wider questions - connections between memory and the other main mental concepts, like personality or attention; likewise he has tried to mark future ways of science development about memory. From the perspective of the time, we can count it as a fourth step of his work as a scientist.

We would like to separate the next part of this article into three sections: in a first one we will present with more detailed research in a field of education, resuming three main guidelines for the quality of teaching. This part will be interesting mostly for people, who are interested in pedagogy or psychology of education. In the second part - laboratory experimental researches about memory and mnemonic effects with theoretical conclusions: original concept of memory as oriented not to the past but toward future and original theory, which understands memory as a process of individual experience organisation. The third section will be about the revision of Sereda's last articles, and ideas about the wider context, which shows connections between different psychic functions: memory and personality, memory and attention, memory and functional brain lateralization.

It needs to be remembered that performed sections have an arbitrary character; it was created for the better understanding of the scientific achievements of Sereda. In practice, we can say that every single element of his professional activity is connected to a system, where, similar to a principle within Sereda's model of effective teaching - answers the questions of previous actions (achieved aims) are becoming sources for achieving future ones.

Reading the article one needs to remember, that Sereda maintained his empiric searches and theoretical investigations in the context of concept in the psychology of activity and in every one of his explorations we need to look at it through this lens.

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4 Research in education and memory

The beginnings of G. K. Sereda's science career were empirical researches under the management of Zinchenko. They had practical aim – the improvement of educational system. They were kind of field researches, in experimental classes at the schools in Kharkiv, Kupiansk and Belgorod.

The traditional form of teaching is based on the draft: PERCEPTION → UNDERSTANDING → REMEMBERING → APPLICATION. Knowledge is passed by the gradual build-up of empirical facts. As a result, it creates a permanent attitude that limits the education to just 'keep in mind', without the necessity of understanding the material. Students are forced to storage lots of unstructured information. As an effect of this approach there are problems connected with formalism and caducity of achieved knowledge, delaying the development of thinking, logical reasoning and creating concepts.

In a series of experiments scientists used Elkonin and Davydov's proposition, that instead of progressively increasing the difficulty of already prepared material, we should teach children "the ways of dealing with this knowledge, elaborated by people" first. Besides, there was proposed an original idea of using involuntary memorization. The exercises were constructed in such way, that students didn't have to learn everything by heart, just adapt new information within the activity. Two main aims of the conducted experiments are:

1) Explore the possibilities and sense of using involuntary memory within school education.
2) Scheduling the most important conditions of effectiveness of using involuntary memory at school.

Below three of conducted researches are described, as an example of how Sereda applied the idea of teaching by activity in a practice of primary school education.

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Experiment 1: Conducted in second grade. The subject was the morphology of a word – the stem. First task for students was to answer the question: "What I have told you?" (by telling any word). Later, teacher repeated the same word but in plural. Students had to show the difference between the first and second word. The conclusion was that word gives the information not just about objects, but about quantity as well. The next question was: "How do we know about it?". Students could give another conclusion that the word is organised by some parts, and each one of them gives different information. This is how children understood what the 'stem' is. Now, they only need to be shown a good term to describe it. In a similar way they are shown other parts of the word, as well as characteristics and properties of the stem. This way children get used to mark the stem, and they understand that the stem is a shared part of words which have similar meaning, just by solving tasks, without necessity of memorisation. When the knowledge was checked, it appeared that children, who learned this way, had a better theoretical knowledge (answer to "what is a stem?") and gave correct answers in 88% cases, what outnumbered level of children even three years older - from 5th grade (80%) and definitely better than children from 3rd grade (16%) that was a control group. This ability was very stable (after 5 months - 100%, after 12 months - 96%, after 2 years - 100%) when it was compared to the control group (15% after 5 months), wherein experimental groups didn't repeat the material to consolidate the information. A similar difference in results were reached with the theoretical question; "How to find a stem?". Children have also better completed practical exercises - less mistakes were made while showing connected words (selecting an option from the list), selecting words connected to the shown one (the word is shown and children have to write another one by themselves), or finding the stem in the shown words (Zinchenko e Sereda, 2011; Середа, 1968).

Experiment 2. Also conducted within second grade pupils, was focused on learning multiplication table. Like in experiment 1, there were a list of exercises,

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where the result of the previous exercise, was a source to complete next one. Doing the first exercise children experienced “the sense” or “merit of” multiplication – the task was to measure length of the classroom using a match. Quite quickly they have realised the irrationality of this task, and then they received a mediate task: find out more rational way to measure the room, by using measure of larger scale. Now children had to transform it to the quantity of matches, what is expected of the next two meditate tasks: 1. Calculate the amount of matches in a measure → 2. calculate number of matches in a length of the room by adding them as many times as the number of measures the room had. Here the children finally achieved the point of multiplication: estimating the quantity not by direct measurement, but by the ratio of the two measures. Next step was to understand influence of particular numbers on the multiplication effect (“What would change, if we had a bigger measure?") and other tasks.
Results were following: experimental classes faster reproduced multiplication table (3,5 minutes compared to 4min), they made less mistakes per person (2,0 compared to 3,2) and had less delays in answers (5,2 compared to 9,0). In next checking test, the results were similar (Середа, 1968).

Experiment 3: Was the research on using opportunities of involuntary memory to the work with artistic material - a poem. The first task for students was to appoint a general feeling, which the poem aroused. Second, was to mark “the key points" - words that in the best way can describe the mood of poem. Third task was to analyse every word of a poem in respect of its adequacy to the poem's mood.

This kind of work has reached high results in involuntary memorizing the poem, not to mention the comprehension of it. In two control classes there were conducted the classic analysis of the text and the poem was learnt by heart. The results of reproduction after a short time were similar, but after reciting the poem, comprised of 53 words, after 6 months, the experimental group managed much better (33,75 words correct compare to 20,84 in the control group). Similar effects were found in other poems, for example the correctness playback of the

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text including 25 words, tested 2,5 months later became 23,3 compared to 17,2 correctly remembered words in a control group; and 14,5 a month later - 16,7 compared to 8,45 (Середа, 1968)

Later Sereda has expanded investigations and methodology of teaching based on involuntary memory to the level of high school and universities. He expand the range of subjects as well. One of his researches conducted in college involved performing a one-year experimental course of general physics in a middle specialized school. Four academic groups took part, each of them had 30 members. Both the control and the experimental group used the same methodology containing activity tasks and learning by experience. The only variable that differed them was giving a strategic task to the experimental group. Results at the end of the year in both groups were divided according to the normal distribution, but in the experimental group it was moved to the right side: middle grades were 3,79 +/- 0,14 compared to 3,15 +/- 0,13 , $p<0,05$ in the control groups. Better results were also achieved in mid-year testing of knowledge (Середа е Тюрина, 1981, 1984).

In a higher education he carried out a study on assimilating the issues from psychology (thinking), informatics (learning new symbols), and foreign language.

Studies under the subject of thinking from psychology concentrated on problematic learning - instead of delivering ready definitions, students were asked to give their owns. After analysing those definitions, together with a leader, they were discovering what was the main characteristic of a definition etc. Achieved results comparing to control group were much higher. The correct indication of three basic characteristics of thinking were as follows: 100% to 63,6%; 94,7% to 45,4% and 89,5% to 21,5% (Середа е Бейдер, 1977).

Learning new symbols designating known and new concepts is very important in programming. In a study on learning informatics, the numbers from 1 - 12 were substituted with symbols, where students were given only the “translation" of number one (1=∆). Subjects from the experimental group did

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some tasks such as addition and subtraction using those symbols (Ex.: △+△=□; □+□ = □), and this way they discovered the meaning of the rest of them. In a control group subjects were memorising the meaning of all symbols. Time to prepare was 20 min for both groups, after which the level of memorized material was checked. Results in a control test were received by making mathematical operations other than additions and subtractions (for example multiplication), with neither experimental nor control group did at the learning stage. It turned out that students from the experimental group gave their answers in an average 2,4 sec, and from control group in 10,5 sec (for comparison - resolving this kind of tasks using numbers not transformed to symbols took around 1,2 sec for everyone). The experimental group remembered the material quite well too (95% to 83%) (Середа е Бейдер, 1977).

A similar experiment was concluded while learning a foreign language. The experimental group (Gr1) were given the translation of number '1' in English and later in the same way they were learning to resolve a mathematical quest. Control groups compared the meaning of numbers in English with pictures (Gr2), or just translated names of the numbers (Gr3). Time of learning was 25min in all groups. Checking had a form of oral test, where the tasks were presented for three different lengths of time (1,7, 3,4 or 5,1 sec). It turned out that in 1,7 second presentation only Group 1 was able to give an answer - which took them about 2,3 sec; while in the longer presentations (3,4 ecs) experimental group's reaction time was approximately 1,9 sec, when just 60% of Gr2 and Gr3 gave the answers, which took around 7,3 and 8,1 sec. In the condition of the longest presentation (5,1sec) almost all of the students gave answers, but the first group still had a significant advantage in terms of reaction time (1,5 sec Gr2 and Gr3 - 7,0 and 7,8 sec accordingly) (Середа е Бейдер, 1977).

Another example of research in the effective use of involuntary memory in learning foreign languages was an experimental English course conducted in a technical school. The aim of the course was to enable students to read and understand specialized technical texts in English. At the beginning they have been shown a graphic model of all course (graphic strategic aim). Also they

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resigned from giving ready-made definitions and replaced them with problematic tasks.

Results proved for much better organisation of all topics (for example the order of words in a sentence - 98,1% correct answers compared to 56,2% in control group; asking questions - 50,6% to 28,1% and others). Besides the much higher results, this way of learning appeared to be much more economical – a minimum of grammar from a normal programme for a year of study was mastered within a month by the experimental group (Середа е Сергеева, 1981).

Summarizing the studies about education and memory, some important practical conclusions can be made. First, the knowledge must be self-acquired by the student (and not passed in the "ready-made" form). Secondly, it is necessary to appoint the strategic aim of teaching. Thirdly, all the elements of teaching must be combined into one well-structured system.

The transfer of “ready knowledge” produces weak results and sometimes has even harmful effects on the development of the student. It creates a mismatch motivation (obtaining high grade) with the aim of learning (gaining knowledge). Definitely a better way is the task-request (problem-solving) learning, while student solves the problem – he will reach the desired result. During learning through understanding, the student creates the current need for knowledge and the gained knowledge is seen necessary in the longer term (Середа е Бейдер, 1977).

The second important factor is the presence of the strategic goal - the task that orients student in whole material. The strategic goal must be proposed at the beginning of lessons group, and be structured in such way, that learning entire material will allow to accomplish it.

All tasks that are asked to the student need to be organized in a well-structured system, where the answers to the previous task (achieved goal) become resources (terms) to reach the next one. Such chain of tasks can be shown like a mathematical formula: $a + b = x \rightarrow x\text{-}c = y \rightarrow y * d = z$ (Середа е Бейдер, 1977).

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5 Laboratory tests

Studying the possibility of using involuntary memory in education led to the results that can be directly used in practice. Positive effects of strategic goal and structure of related activities on memorization were observed. Though, many other theoretical questions were born. Most important of these questions concerned the mechanisms standing behind the integrating and directing function of memory.

Traditionally, the memory is tested in isolated conditions, as mental operation, unrelated to any other types of activity, and therefore understood only as a result (product of action). However, in real life the memory rarely operates in isolation from other mental operations. That's why it is necessary to change the paradigm of performing experiments, so it would be possible to understand the mechanisms linking activities and operations, which requires conducting research on the whole sequence of behaviours and focus on boundaries between them (Середа, 1973).

For this purpose a new paradigm of research was formulated. It combines three conditions: 1) organization of subject's activities should not be tested within separated tasks, but in the sequence of neighbouring activities. 2) object of research should be the impact of activity organization on mnemonic effect. 3) results should be analysed in respect of searching the main factor determining the process of remembering (Середа, 1980).

Using this paradigm the laboratory experiments were conducted, where subject had to perform various cognitive operations on a series of stimuli, and then received an unexpected request for an immediate recall of the few last objects.

The first experiment was designed to determine whether there is a correlation between the type of cognition task and the effectiveness of short-term involuntary memory. The impulse material was the recording of numbers (7, 8 or 9pcs), which were played at a speed of 1, 0.5, 0.33 or 0.25 seconds per symbol. Experimental plan consisted of four conditions: 1. background task – subject had

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to determine the speed of reading numbers recorded on the tape. Action carried out in this task were performed on a part of stimuli that should not be recalled at the stage of testing; 2. orientation task – during “equipment check” subject accidentally heard a string of numbers. In this case, the subject involuntarily explored the material that should be recalled later; 3. other orientation task – subject listen to the sequence of numbers as the sample set which was a preparation before the "proper" task. In this condition, person explored the material voluntary; 4. operating task – while listening to a string of numbers subject had to laid them on imagined matrix. A person made cognitive activity over the material which should be recalled. Each tested person performed one of these tasks, and then was unexpectedly asked to reproduce all numbers recorded on the tape. The next tasks were due to control condition, for example: request to consciously remember a string of numbers (mnemonic task).

It was found that the performance of all kinds of other cognitive tasks affected the short-term involuntary memory: the best reproduced was material from the orientation tasks - 2 and 3 at all times of the presentation and the amount of presented numbers. The results of operational tasks were comparable to memorization in mnemonic tasks (!) from control conditions (Середа е Снопик, 1969).

Further test was conducted to verify if the cognitive tasks will similarly affect also the voluntary short-term memory. Methodology of the experiment was similar to the previous one, but this time subjects in addition to performing cognitive tasks also tried to intentionally memorize stimuli.

In case of voluntary memory there was no significant influence of the type of performed cognitive task on memorizing, the overall results were similarly high as in remembering the material in orientation task in the study on involuntary memory. The results of these experiments allowed to formulate the claim that short-term memory is not a direct, passive reflection of the stimuli to which the organism is exposed, but its parameters significantly depend on the activity carried out on the material and the nature of the present human activity (Середа е Снопик, 1970).

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In another experiment, the aim was to verify this relationship in the case of visual material as a stimulus. Through tachistoscope (a device that displays an image for a specific amount of time) 9 numbers were presented (for 0.5, 0.25 and 0.1 sec). There were three kinds of tasks: the background task (compare the time distance between the presented numbers), orientation task (familiarization with the exemplary material) and operational task (determine the amount of even numbers). After that, each group received mnemonic control task (to intentionally memorize the numbers.

Significant influence of cognitive tasks on involuntary memorizing had been found at 0.5 and 0.25 second presentation. The best performance was obtained after doing the orientation task, which was comparable to the pure mnemonic task. Within the presentation lasting 0.1 s all the difference between voluntary and involuntary memory disappeared, which can be explained by reaching the lower threshold of perception(Середа е Снопик, 1971).

High scores in involuntary remembering in orientation tasks were the surprise at the beginning. Trying to explain them, Sereda gradually came to the conclusion that the main function of memory is to prepare people for future action. The memory acts as a filter that selects the most significant material for current events. The filters criteria can be current cognitive operations or motives. But also drawing attention to a stimulus (without competitive action programs working with them) puts it in actions goal, so the memory treats it as the most important information at the moment. Such information filtering begins at the level of short-term memory (Середа, 1973).

In subsequent studies Sereda's focus was more on the mechanism of integrating function of memory: how different actions on different materials are combined together in a memory footprint.

In the first one, subjects performed the cognitive task on the mixed string of 14 characters, including both numbers (black) and letters (red), after which they received an unexpected request for restoration of stimuli. After the break, they were asked to voluntary remember another 14 characters. The scientist manipulated cognitive task, which could be (1) simple ("unproductive"), stating

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that person is not focused on signs - eg. Setting on a piece of paper a matrix of numbers, letters or place of red and black characters. (2) complex ("productive") tasks focused on the impulse material, it was to create the words out of given letters, or to determine the number of odd and even numbers. (3) clean mnemonic task that consisted of memorizing the numbers or letters. After a minute break, people were getting a second job - which was to voluntarily remember the string of 14 characters.

As a result, Group 1 was characterized by a weak involuntary memory, mid. 2,5 characters, and voluntary memorizing was of 7.2 characters. Gr2: involuntary - 5.85 marks, and voluntary - 8.2 marks. Gr. 3: first memorizing (which also was intentional) - 7.4; second - 9.17. In developing the results Sereda hypothesized that not only the material interfered (the improve of memorization in Gr2), but also the way subjects acted on it (the improve of memorization in Gr 3). The memory trace retains information not only about object but also about its relationship to other stimuli. Therefore, when in the first part of the experiment subject's aim was to store material, it was easier for him to store the next portion of information in the second part (Середа е Снопик, 1972).

In order to test the hypothesis about the performance interference another study was conducted with more advanced experimental plan. Stimuli material - three types: numbers, letters and pictures. On each of them (part 1) were made simple dichotomous classification (number - odd / even; letters - vowels / consonants, images - live / dead), or more complex classifications, requiring more operations (number - the sum, the letter - folding of words ; items - determined according to what criteria are selected). In the second part - a common complex type task for all subjects - the classification numbers on odd / even. After performing second task – subjects were asked to recall stimuli from both tasks.

Highest scores (average of 6.88 memorized numbers from task 2) were obtained in the group that received the material in both numerical tasks and in the first part performed on the more complex operations. The lowest scores (4.07 of number) was obtained in a group which also worked twice with numerical material, but the first task performed on it was simple operations. This confirms

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that greater impact on memorization has performance interference than interference of material. The same material with the first measure in a different way interferes with the material from the other tasks depending on the type of operation performed on it.

It is interesting also that the case of a variety of activities (different purpose and method of implementation) was observed striving for averaging the amount of saved characters to about 7, which increased memory one part and slightly productivity the next, or vice versa. This phenomenon coincides with the so-called "magical number seven" of Miller, which is the maximum number of parts (chunks) of information that we are able to keep the short-term memory (Середа е Файер, 1974).

Based on studies of the filter memory and performance interference, Sereda formulated a new understanding of memory as a process aimed at the future. Information about past events is saved and rebuilt, left those, what may be useful in the future. Hence - the past is a function of the future, and the content and mechanisms of memory is best explained from the perspective of the future. This understanding Sereda called the futurogenetic concept of memory and he compares it with the support from the Elkonin's physiological theory of the functioning systems (Середа, 1978).

The main task of memory – is to support body's readiness for future interaction with outside world, constantly referring past experience to future events. This process is unconscious and performs two functions:

1. The historical - organizes all elements of the experience according to speaking time. Its subjective experience is that we remember "what it was for"
2. Functions of the evaluating filter - organizes the elements of the experience because of the importance for the survival of the individual. We do not have conscious access to the mechanism, but we can imagine it like different degrees of readiness of memories ("I remember - I remember a little - I do not remember")

DOI: http://dx.doi.org/10.14393/OBv1n2a2017-9

The mechanism of memory is an immutable process both at voluntary and involuntary memory - in fact, the memory all of time is involuntary. This what we call "free remembering" (mnemonic task) - is the deliberate use of different techniques and cognitive operations, in order to locate the material that you want to remember in the highest productivity of memory.

Such a statement is heavily counter-intuitive, that's why Sereda makes a comparison to the process of forgetting. Each of us knows that freely forget something is impossible to implement. If we find that we want to forget about the white elephant, the more we try to do it - the more we will get back to his thoughts. However, we can use different kinds of cognitive or behavioral strategies, due to which increases the chance of forgetting unwanted material. We can avoid the stimulus, avoid places where happened the unpleasant event, to make a symbolic break with the past (change the life goals). The strategies that we use for any memorizing are basically similar to those which can be used for "any forgetting."

Sereda highlights some theoretical confusions relating to the activity and memory. Classically free memory was considered as an action, and involuntary – as an product of action. For clarity Sereda proposes to see the whole mechanism of memory as a continuous activity of the unconscious, which is the same. And in the case of free memory we are dealing with a more complex process: cognitive action (Action 1), that we are trying to direct the automatic process of memory (Action 2) at specified by us direction (Середа, 1975, 1979).

Now it can be better understood the mechanism of strategic goal in education - it always puts memory filter to elements that are associated with our goal, and when it doesn't exist - the filter memory is focused on a variety of less important things. Also in the case of orientation tasks with involuntary remembering - their high level of remembering is due to the fact that they are focusing on the stimuli (not having purpose to memorize), subjects have placed them in the center of the memory filter (unintentionally). Therefore, the results of involuntary orientation memory are as high as the voluntary remembering.

This understanding of memory also allows to understand what are

DOI: http://dx.doi.org/10.14393/OBv1n2a2017-9

described by many scientists as "memory effects", such as the serial position effect, the effect of freshness, "von Restorff effect" and others. Those effects were tested in isolation and each sought a separate explanation. However, taking futurogenic concept of memory, you can consider all of these effects as signs of the same mechanism that directs our memory filter to what is essential for the future functioning, so they are stored. Thus the serial positions effect could be explained by the fact that the first and last parts of the material are usually the most important for the integration into the already existing information. Although, the effect resulted from Restorff is that things are in some way distinguished from the environment often turn out to be very important. From this it follows that the appropriate manipulating and change of condition which directs our memory filter will freely modify these effects: amplify or mitigate them.

To verify this assumption, numerous of laboratory tests on various effects of memory were conducted. In one, people in 1.5 minutes performed various cognitive tasks (an arithmetic, classification, and others) over series of 10 two-digit numbers, then unexpectedly asked to recall all the numbers. In the case of unstructured cognitive tasks primacy was visible the serial position effect. However, when a person had to do with the given numbers more complex operations, which focused their attention more to carry over to the central or extreme numbers over, it turned out that those parts of string were better remembered. The task of the respondents in this case, was to choose the order of these numbers, adding and subtracting to get the highest score (for adding it was necessary to take the greatest, and to subtract the smallest). When presented with these numbers were respectively edges obtained an even greater serial position effect, and when in the middle, achieved better storage of the central parts, similar to the effect Restoff (Середа е Соловьева, 1980).

The results of these and subsequent studies on the effects of memory testify to the fact that by changing the type of activity performed on the target stimuli can modify these effects, which confirms the hypothesis of the unity of the memory mechanism (Середа, 1986). On the basis of these experiments it also

DOI: http://dx.doi.org/10.14393/OBv1n2a2017-9

erected innovative proposals, including that interference is possible not only between objects standing close together in time, but also between the activities separated in time, but having a common goal, which would explain the Zeigarnik effect (Середа е Соловьева, 1980).

As a summary of empirical research, expanding the hypothesis of futuregenic character of memory, Sereda creates a new theory of memory. Memory is defined this way: the psychological mechanism of systemic organization of individual experience as a indispensable condition of future activities (Середа, 1982, 1984). This theory can be described through the next assertions:

1. Memory is uninterrupted, constantly redesigned and unconscious process of organizing individual experience in the system.
2. The leading system-creation (pointing direction) factor is the general motivational orientation activities - the semantic level, directed for the future. From it are derived targets the spot, directly guiding unit changes, so the level of purposeful, directed for the present. Result of which realization is the operational level, encoded experience, which occurred in the past. For this reason, the memory is a multi-level hierarchical structure.
3. The mechanism of rebuilding the contents of memory is self-organizing, new content is included in a string operation. With this level mechanisms mnemonic, memory is a hierarchic structure.
4. The system is self-regulatory, organizing themselves according to two trends: intentional and reconstructive. Intentional is semantic level, with top-down character, which targets the memories "field of view" to the important, in terms of future, material. Rebuilding all levels of memory by incorporating new materials, with a bottom-up character is the reconstructive tendency (Середа, 1984).

The problem for this model remained how the memory trace is "stored". The proposal of Sereda is also original - he denied the existence of "drawers" of

DOI: http://dx.doi.org/10.14393/OBv1n2a2017-9

memory, or the use of the term "storage". He proposed instead to use the terms "translation", or "replication". The whole of our experience is constantly reproduced and applied to any current event. This is done by keeping a complete picture of the experience in the form of "psychological integral". At any time, the memory operates two elements - a comprehensive system of previous experience and the current material. With respect to present purposes - part "integral" decoding with different levels of detail, and may become available consciousness. At all levels it is dependent on general motivational-semantic orientation. Sereda understood that such a solution is speculative, but considered them to be valuable because of the demarcation of routes of new empirical research (Середа, 1982).

Recognizing the problem of scattering science, obtaining a very large amount of empirical data, Sereda looked for links and attempt to integrate isolated areas of science, such as memory and attention, memory and personality or memory and the physiology of the brain. He puts the hypothesis about their connections, tracing the lines of future empirical research. Also he saw the importance of such analyzes for practical reasons - because it helped to put the “strategic goal” for psychology studies, and unite into a single structure all the scattered academic courses, which would allow to greatly improve the level of education.

Memory and attention - common features of both processes: 1) they are incorporated as elements of systems operating in any mental process. 2) Unlike other processes (eg. Perception, thinking) do not have an "exclusive" products. But they differ in that the specific function. Memory is a systematic organization entirely experience for further actions, when attention performs the function of isolating the elements for the current actions. This function execution ends with the end of the action. Referring to the theory of memory - attention is the attribute “goal” level in the present, and the memory is the attribute of motivational-semantic level (Середа, 1988).

Sereda proposed hypothesis links the physiology of the brain to different parts of the functional memory based on the analysis of the lateralization of the

DOI: http://dx.doi.org/10.14393/OBv1n2a2017-9

cerebral hemispheres. In his theory the whole memory is divided into two parts - an integrated life experience ("Integral memory") and the currently available content, which are analyzed and incorporated into the life experience. The proposed hypothesis claims that "integral memory" is related to the functioning of the right, synthetic hemisphere, and analyzing current experience - from the left, analytical hemisphere. While the experience rebuilding is the result of cooperation between the hemispheres. Therefore linking brain function and memory well describes and explains the mnemonic effects, both their kind and direction. Sereda suggested using modern methods of psycho-physiological and neuro-chemical to conduct experiments that verify this hypothesis (Середа, 1989).

In analyze of personality and memory Sereda indicates a small amount of research on this subject, which mainly limited to the study of influence the personality on memorization (eg. Individual differences in remembering). Sereda proposes a completely new understanding of personality, derived from his theory of memory. Personality is understood as a whole "integral memory" integrating the whole of human experience, especially motivational-semantic software. On the other hand, he pointed out that including this new experience in "integral memory" - the memory rebuilds personality. The researcher proposed plans longitudinal studies, which could verify these assumptions (Середа, 1990).

6 Summary

Analyzing the stages of scientific G. K. Sereda, we can see a smooth transition from a series of application experiments, investigating various segments of functioning, to the theory of integrating different psychological processes, including the theory of personality. The results of studies on the role of involuntary memory in education have forced researcher to a deeper reflection on the very nature of memory, resulting the next series of experiments. Their results do not let easily be explained by current theories regarding the functioning of memory, so the need was established to develop a new theory. On the other hand,

DOI: http://dx.doi.org/10.14393/OBv1n2a2017-9

during the verification of the assumptions of the model was discovered that it might explain not only the memory effect, but also its interaction with other mental functions.

The scientific career of Sereda thus reflects in some way on the current trends of psychology and science as a whole. Modern scholars have a huge amount of detailed data from a very specialized area. Currently they focused on combining them into a coherent system, to create a theory, which would incorporate that information and put it in a broader context. In psychology, it can be seen that the trend to integrate various theories concerning, among other personalities, which dealt with Sereda, for example theories Costa and McCrae (McCrae *et al.*, 2000) or (McAdams, 2001). Rapidly developing the entire scientific fields, such as cognitive science, or neuropsychology, aimed at integrating research results from different areas in a comprehensive manner in order to explain the functioning of the human psyche. Therefore it can be concluded that Sereda made no mistake in the definition of the route which in the near future will tend to psychology.

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Recebido em setembro de 2016.
Aprovado em outubro de 2016.