

## MEDIATED MEMORY: EXPLORATORY RESEARCH ON DEVELOPMENT POSSIBILITIES IN PRESCHOOL CHILDREN

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### ABSTRACT

This article presents results of exploratory research aimed at identifying ways in which pre-school children can learn to use semiotic elements to improve their mediated memory. The method used was a card game, planned especially for the research and carried out with 6 groups of 3 children (18 participants) aged between 5 and 6 years old, belonging to a kindergarten class at a municipal school. The results allowed us to reflect on the appropriation of memory mediation strategies in human development. These results are contrasted with the stages of constitution of mediated memory presented by L. S. Vigotski and collaborators, highlighting the importance of the mediation of the researcher and peers, and their effects on the displacement between the levels of memory. It is expected that the study will allow the advancement of research on the topic and contribute to support powerful pedagogical practices for the development of higher psychic functions.

**Keywords:** Memory; Historical-Cultural Psychology; preschool age children.

### Memoria mediada: investigación exploratoria sobre posibilidades de desarrollo en niños preescolares

#### RESUMEN

Se presentan resultados de investigación exploratoria con objetivo de identificar modos por los cuales niños preescolares pueden aprender a utilizar elementos semióticos en el mejoramiento de su memoria mediada. El método utilizado fue un juego de barajas, planeado especialmente para la investigación y realizado con 6 grupos de 3 niños (18 participantes) de la franja de edad entre 5 y 6 años, pertenecientes a un grupo de Educación Infantil de una escuela municipal. Los resultados permitieron pensar sobre la apropiación de estrategias de mediación de la memoria en el desarrollo humano. Estos resultados son contrastados con las etapas de constitución de la memoria mediada presentadas por L. S. Vygotsky y colaboradores, destacándose la importancia de la mediación del investigador y de los pares y sus efectos sobre el desplazamiento entre los niveles de memoria. Se espera que el estudio permita el avance de investigaciones sobre el tema y colabore a fundamentar prácticas pedagógicas potentes al desarrollo de las funciones psíquicas superiores.

**Palabras clave:** Memoria; Psicología Histórico-cultural; niños en edad preescolar.

### Memória mediada: pesquisa exploratória sobre possibilidades de desenvolvimento em crianças pré-escolares

#### RESUMO

No presente artigo apresentam-se resultados de pesquisa exploratória visando identificar modos pelos quais crianças pré-escolares podem aprender a utilizar elementos semióticos no aprimoramento de sua memória mediada. O método utilizado foi um jogo de cartas, planejado especialmente para a pesquisa e realizado com 6 grupos de 3 crianças (18 participantes) da faixa etária entre 5 e 6 anos, pertencentes a uma turma de Educação Infantil de uma escola municipal. Os resultados permitiram refletir sobre a apropriação de estratégias de mediação da memória no desenvolvimento humano. Esses resultados são contrastados com as etapas de constituição da memória mediada apresentadas por L. S. Vigotski e colaboradores, destacando-se a importância da mediação do pesquisador e dos pares e seus efeitos sobre o deslocamento entre os níveis de memória. Espera-se que o estudo permita o avanço de pesquisas sobre o tema e contribua para fundamentar práticas pedagógicas potentes para o desenvolvimento das funções psíquicas superiores.

**Palavras-chave:** Memória; Psicologia histórico-cultural; crianças em idade pré-escolar.

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## INTRODUCTION

Memory is a vital psychological function for human beings, for their insertion in the social, cultural world and in history. In the surroundings of all subjects, a myriad of semiotic artifacts and instruments are available to learn and remember who they are and what they should do. We are surrounded by cultural marks constituting us and affecting our memory: monuments, museums, the varied cultural ways of recording time, cemeteries, photographs, literature... In schools, agendas, posters, diaries for school-family communication... Throughout the development process, however, it will be necessary for each subject, from their social relationships, to appropriate these instruments and, in addition, to appropriate their multiple forms of production and use that allow to regulate his/her own memory.

Historical-Cultural theory, when dealing with the constitution and development of memory, distinguishes the natural from cultural or mediated memory. To theorize about these two concepts, L. S. Vigotski, founder of this theoretical model, critically dialogues with other approaches of Psychology and builds an original way of investigating this function. Rejecting the classic principles and methods of psychological science of his time, this author and his collaborators seek to understand not only the structure and the quantitative expansion of the capacity to remember, but mainly the origin of qualitative transformations of memory, in the history of humanity and in the life of each subject.

For the study of memory, Vigotski conducted microgenetic analysis<sup>1</sup> based on empirical material produced through the so-called "double stimulation method", qualified by the author as "a fundamental method that is habitually used when studying the cultural conduct of children" (Vygotski, 1995, p. 161). The basic format of this method consisted of placing subjects in a structured situation in which there was a task to be performed and the participants were instructed to build the means to reach their resolution. A situation typically built to analyze the constitution of mediated memory was to ask children to press specific keys responding to certain stimuli (for example, pressing the red key when presented with the figure of a horse, the green key in the case of the presentation of the figure of a bread, and so on). In the course of the experiments, cards with figures were offered (called in various ways by Vigotski: means-stimuli, means-cards, sign-stimuli) and participants were suggested to use them as an auxiliary resource to remember which key to

<sup>1</sup> According to Góes, "the methodological guidelines that [Vigotski] explored, included the detailed analysis of a process, in order to configure its social genesis and the transformations of the course of events. This way of thinking about the investigation was called by his followers as "microgenetic analysis". (Góes, 2000, p. 11).

press. Then, the uses that the children made (or not) of the cards and their effects on the general performance and on the improvement (or not) of the memory were analyzed. Several versions of these experiments were used in studies on memory, depending on specific objectives that were aimed at achieving. One of the resources used by Vigotski and collaborators to analyze children's performance was to quantify the successes in the task and, from that, compare results, considering ages and levels of education, relate these results to the ways in which the cards had been incorporated (or not) in the course of the experiment and trace the lines of development of "natural memory" and "cultural memory", comparing them as well.

Vigotski's intention, therefore, is to go against the simplification of the process, arguing that Associationist Psychology was insufficient to clarify it<sup>2</sup>. With these experiments, it was possible to see how children gradually became capable of reorganizing the functioning of their memory with the support of semiotic resources. In these studies, therefore, foundations are presented to explain the cultural development of mediated memory and the function of the sign in the elaboration of new mnemonic structures. One of these foundations concerns certain regularities identified in successive reorganizations regarding the use of external resources and their relationship with the ability to remember. These regularities were systematized in stages and presented by Vygotski (1995) as follows:

1. Mechanical memorization, referring to the basic ability of children to memorize, from an early age; it can be identified in the repetition of motor actions, in the learning and retention of the name of a large number of objects, animals, etc.;

2. Naive psychology: in this stage, children already use mediational resources, but still do not fully understand their function; for example, having been successful in choosing the card with the image of a knife to remember the word bread, they choose it again, to remember the word sofa; they begin to use signs, without understanding, in a more consistent way, how they operate;

3. External mnemotechnical memorization: school-age children begin to make systematic use of mediational resources, as long as there is a simple connection between them and the words to remember; gradually, they become able to create new and less

<sup>2</sup> For Associationist Psychology, all psychic functions should be investigated, looking for the process of association stimulus - response (S - R). One of the first contributions of Historical-Cultural Psychology was to show the importance of inserting a mediating element (the sign) in this relationship, in order to understand the human psychism; in several works Vigotski outlines this thesis, with a triangle image, placing the elements S - S - R at the vertices of the triangle.

evident relationships between the elements, to help them remember;

4. Internalization and logical memory: the external handling of external signs is replaced by internal mental activity; it is the peak of the use of cultural means and the development of mediated memory.

Although studies on mediated memory are central to the works of Vygotski (1995), A. R. Luria (1979) and A. N. Leontiev (1978), there are no significant repercussions in contemporary scientific literature. The bibliographic review<sup>3</sup> seeking studies on memory revealed the prevalence of works not based on this theoretical model; in these studies the procedures are strictly controlled, using tests and scales, developed from well-defined hypotheses; studies on mediated memory made from the contributions of Historical-Cultural theory have been infrequent in the contemporary scientific context. In the set of studies analyzed, considering those that were referenced in this theoretical model, memory was mentioned in a peripheral way and only in one exception (Solovieva & Quintanar, 2013), the researchers participated as triggers for new modes of psychological functioning. The concepts of operational or working memory, short and long-term memory, recognition memory and sensory memory, have been the most frequently used and, primarily, related to the so-called neurosciences<sup>4</sup>. We highlight approaches that choose quantitative aspects in the study of memory, analyzed in two axes: number of elements recorded and recalled and amount of time in their operation. In addition, according to Silva, Sirgado and Tavira (2012), it is emphasized that

The biggest problem with this widespread way of conceiving human memory (something that also applies to other psychological functions) is to see in it the result of the mere organic development of the individual in interaction with the environment, ignoring the cultural and historical conditions of the constitution of the human, in which culture and social reality play a fundamental role. (p. 267).

<sup>3</sup> The bibliographic search was carried out in the Scopus-Elsevier database searching for the title, keywords or abstract, using the descriptor "memory". Then, only articles were selected, written in English, Spanish or Portuguese, published in the period 2011-2017 and using filters for the sub-areas "Arts and Humanities", "Social Sciences" and "Psychology". We found 11,670 articles. Selecting the articles that referenced at least one of the three main authors in the Historical-Cultural theory (L. S. Vygotsky, A. R. Luria and A. N. Leontiev), 171 works remained. Of these, we analyzed those who developed empirical research with children within the age group of 3 to 12 years, with 52 articles remaining (Lisboa; Rocha, 2016).

<sup>4</sup> The works of Jaeger, Galera, Stein and Lopes (2016) and Mourão Júnior and Faria (2015) are examples in this field, as they are proposed as theoretical reviews of what the authors consider the most important topics and concepts regarding the study of memory.

Therefore, it is considered relevant to return to the experiments developed by Vigotski and, taking inspiration from them, to investigate the possibility of improving knowledge about the development of mediated memory.

## METHOD

This was an exploratory research conducted with a group of Childhood Education in a unit of the municipal network of the city of Campinas, state of São Paulo, with the objective of investigating the use of external systems of representation and the contributions of pedagogical practices in the social constitution of memory. In collaboration with the class teacher, possibilities of building new systems and/or transforming some that were already part of the school routine were investigated. In this way, posters with the students' names, a list of songs, a calendar and a card game were built and used with the children. In the present article, the results of this last procedure are presented.

### Participants

The research was conducted with 18 children (11 girls and 9 boys), aged between 5 and 6 years. Before its beginning, the study was submitted to the Research Ethics Committee and approved under protocol number 19092613.6.0000.5481.

### Local

The procedure was carried out in a regular classroom of Childhood Education class in a municipal school.

### Material

A Memory Game was used, built especially for the development of the investigation, consisting of 15 cards with pictures representing the words that should be remembered by the children and 25 mini-cards with pictures that could be used by the participants as mediators to remember the words. Of these mini-cards, 15 had images with a more explicit relationship to the words to remember and 10 had images not explicitly related to the words. Box 1 presents the list of chosen images, separated by categories defined by the researchers as related or not to the cards. Figure 1 illustrates examples of cards and mini-cards that made up the game.

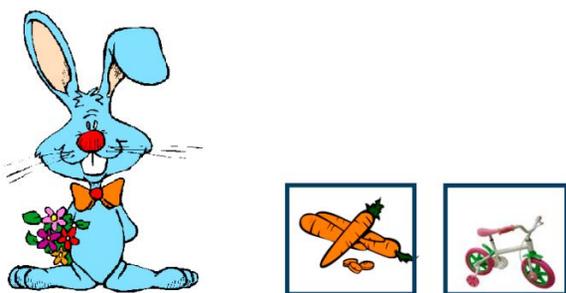
### Procedure

The game was applied in the period after the initial circle of the day and before interval, with groups composed of three children at a time; each game had three rounds. In total, we worked with 6 groups, totaling 18 rounds.

At the beginning of each game, the researcher said: "This is a different memory game. Each of you will have to remember 5 words in your turn to play". The researcher showed the 15 letters to the children

CARTAS	FICHAS com figuras relacionadas	FICHAS com figuras não relacionadas
macaco	banana	
bola	gol	
faca	garfo	
fogão	panela	
copo	jarra	
caderno	lápis	
coelho	cenoura	
sapato	meia	
cachorro	osso	
mesa	cadeira	
palhaço	circo	
carro	pneu	
ovo	galinha	
vaso	flor	
pasta de dente	escova de dente	
		rato
		ventilador
		boneca
		pipa
		árvore
		peixe
		bicicleta
		fada
		televisão
		maçã

**Box 1.** List of images that made up the card game.



**Figure 1.** Examples of images in cards and mini-cards.

and explored the names of the figures with them. Then, she collected the cards and placed all the mini-cards on the table, with the figures visible. Then, the following instructions were given: “These cards have other drawings that you can use, which can help you remember the words. Every word you get right, you get a card”. The researcher separated 5 cards and spoke the names of the figures to the first child who was going to play and recalled that he/she could use the mini-cards on the table. The researcher repeated the names of the

figures, slowly, and waited for the choice of mini-cards. She then asked the child to repeat the 5 words. With each correct word, the child won the corresponding card. Then, the researcher repeated the procedure for the second and third participating children. At the end of the first round, the cards each player had were counted and recorded on a sheet. This was followed by a new round.

During the matches, due to the ease with which the children understood the game, some changes were made. First, the children started to hear the names of the five cards, choose the mini-cards and wait for all the participants to do the same. Only after everyone had chosen the mini-cards the second stage began, in which they talked about the cards. This change in the procedure aimed to make recalling more difficult and the use of mini-cards more necessary.

As a result of these changes, the variety of mini-cards decreased for participants who were not the first to take them, which may affect their choices. For example, a child would not be able to choose the banana mini-card

if it had already been chosen by previous players. The collection of mini-cards was tripled, with each image being repeated 3 times. These new rules did not cause significant changes in the final scores of the matches; most of the children went on, showing that they had mastered the strategy of mediating their memory with mini-cards.

## RESULTS

Since the first round, children had a very easy time memorizing the cards distributed; this is evidenced by the high number of times they reached the maximum score or missed only one card. Observations in the field and the analysis of the videos make it possible to highlight the high involvement with the game: when the activity was presented, they explored the material with interest, sought to understand the rules, know the pieces, talk about the cards and mini-cards. In some situations, we identify competitiveness among children; however, this happened as a sporadic joke, like the one transcribed in episode 01.

### Episode 01

Marcy manifests when Daniela hits the third image.

Marcy: *Aiiiiiiii! Daniela!!!!!!*

Daniela and Mariana smile.

Daniela [responds to the researcher]: *Vase.*

The researcher hands over the corresponding card, showing that Daniela got it right again. Marcy speaks before Daniela makes her last move.

Marcy: *Damn!! Miss, miss, please miss! Miss it!!*

Another conduct recorded in a punctual and more frequent way in the first contacts with the material were the children's comments on the images:

### Episode 02

Marcy: *Oh how cute! Cute!!!*

Researcher: *What is it?*

Marcy shows the doll's card.

Researcher: *Ah, the doll. These mini-cards help us to remember the cards.*

Marcy: *Will you give me that one?*

The following is the analytical work focusing, initially, on the group in which the biggest changes in terms of results were identified. This group was composed by Marcy, Daniela and Mariana who reached, respectively, the following scores, in each match: Mariana (0, 1, 4), Marcy (1, 1, 5) and Daniela (4, 3, 5).

### Episode 03

Researcher: [...] *there are five cards for Mariana, five cards for Marcy and five cards for Daniela. I will read these cards; I will tell you what they are. I'll start with Mariana. Fine? Can be? You will look here* (points the

mini-cards) *and see which cards help you to remember the ones I am speaking.*

Marcy: *I don't remember those* (points the cards).

Researcher: *But I'm still going to talk ... These mini-cards help us to think.*

Marcy: *Is that why you brought these?*

Researcher: *That's why I brought these. To help us remember.*

Marcy: *I hope those two don't choose the one I want.*

Marcy, Mariana and Daniela laugh.

Researcher: *So, go.* (looks at Mariana). *Cooker.*

Mariana points to the image of the doll and looks at the researcher

Researcher: *Pick the ones that you think will help you remember the stove.*

Mariana takes the mini-card with the image of the doll; Daniela looks at Marcy, who, in turn, was looking at the card Mariana chose.

Researcher: *Mariana, look! I will speak and then you have to remember the cards that I spoke.*

Mariana: *But I don't remember.*

Researcher: *These letters* (points to mini-cards) *are here to help you remember. Oh, what is it here that reminds you of a stove?*

Mariana continues to look at the researcher.

Researcher: *Look at these cards* (mini-cards). *Is there anything here that helps you remember the stove?*

Marcy: *Something like a stove.*

Mariana watches the cards. Marcy and Daniela look at each other.

Researcher: *You can search... You can take the ones that help you remember the stove.*

Mariana: *The ones that look like stoves?*

Researcher: *The ones that remind you.*

Marcy: *Take a kitchen thing then, to remember, right?*

Researcher: *What does stove remind you of? Kitchen thing remind you of stove?*

Marcy: *Yes.*

Mariana places her finger next to the figure of the pot, and slowly pulls the mini-card close to her and hands it to the researcher. She seems to be quite in doubt about the choice.

This fragment is the three girls' first experience with the game and they deal with the material in a way that seems to be approaching what Vigotski called "naive psychology", the second level proposed by the author on the development of mediated memory. Initially, both Marcy and Mariana demonstrate awareness of

the limits of their memory, saying “*I don’t remember these*” and “*But I don’t remember*”. The power of mini-cards is not clear. Mariana’s first choice, taking the doll after the researcher said the word stove, is most likely circumstantial due to the previous manifestations of Marcy, emphasizing aesthetic aspects of the image, when she said: “*Oh how cute! Cute!!!*” and show that she would like to choose that image. The possibility of using mediational resources, such as the pot to remember the stove, is gradually being built and as a function of the interactions between the child who plays with her colleagues and the researcher. What each participant says makes a difference in the way they all interpret the situation and refine their understanding of the game. Mariana chooses the pot, without seeming to fully understand its function, without knowing how, in a more precise way, she will be able to continue using these mini-cards, after that choice. The mini-cards chosen in this first round do not allow her to succeed in remembering the cards that the researcher has in hand, although, logically, Mariana has made good choices, as can be seen in Box 02.

Following rounds, children give clues they understood the game, reproducing the questions asked by the researcher. The first rounds in which Marcy (episode 04) and Daniela (episode 05) should hear the words, choose the mini-cards and remember the images of the cards, occurred as transcribed below.

#### **Episode 04**

Researcher: *Car.*

Marcy looks at the images.

Mariana: *What does the car look like?*

Marcy chooses the television mini-card.

Researcher: *Egg.*

Mariana: *Yeah. What reminds you of egg?*

Then Mariana looks at the television image in Marcy’s hand

Mariana: *Tv reminds you of a car?!?*

Marcy takes the figure of a fork.

#### **Episode 05**

Researcher: *What reminds you of a rabbit?*

Mariana: *Not dog. It’s not a dog. She can also choose a carrot. Carrot reminds me of a rabbit.*

Marcy: *Carrot reminds me of a rabbit.*

Daniela takes the image of a rat, puts it together with the other mini-cards that she had separated. Look at the researcher.

Marcy: *Rat?!?*

Researcher: *Did you choose?* (Question to Daniela).

Daniela says yes with her head, looking at her

colleague. Mariana laughs and criticizes the choice.

Mariana: *A rat! (laughs) It’s the carrot!!*

Researcher: *Go Daniela. What reminds you of a vase?*

Daniela looks at the images and chooses a tire.

Although the researcher instructed the children not to interfere with the plays of others, control over this was never complete. Most of the time, the children intervened to help their classmates: if Marcy, in episode 01, keeps hoping that Daniela makes a mistake, in episode 05 she assists her, suggesting the rabbit - carrot pair. It is also important to highlight that, throughout the round, Mariana refines her way of thinking about the game, a refinement indicted/sustained by replacing the verb look like (from the statement “*What looks like a car*”) with the verb remind (from the statements “*What reminds you of an egg?*”, “*Tv reminds you of a car?!?*” and “*Carrot reminds me of a rabbit*”). The unusual choices of the car - tv, rabbit - rat pairs are a source of astonishment and irony. But the same is not true for the vase-tire pair.

During the matches, several children chose the image of the tire to remember the card with a vase, later managing to make the association correctly: when looking at the image of the tire, they said vase. A possible explanation for this is that in the park area and in the school garden there were several vases made with tires. There was, therefore, the possibility that children could relate the image of the tire to that of the vase, based on this experience. It can be seen, therefore, that children actively establish their own relationships, starting from and supported by the experiences they have in their specific socio-cultural contexts; they make new associations between the cards and the mini-cards, in addition to the expected and/or more obvious ones.

If in the case of the vase - tire pair we can identify a basis for the unusual relationship established, at other times this does not occur, as we will see below. In the pairs formed, there was a prevalence of relationships following the most stabilized logic, culturally. In 25 out of the 45 choices, children did this, excluding the vase - tire pair from this total. However, they choose some mini-cards for reasons that elude us, forming pairs such as: knife - television, ball - pencil, shoe - circus. It is important, however, to note that in some cases this relationship works and children are able to correctly name the image in the card. This type of performance can be seen in Mariana’s choices and successes, in the third round, shown in Box 2. It would have been very interesting to explore, after the game, the reasons for the unusual pairings, the creative possibilities of using the images. However, as this was not done, we cannot advance in the understanding of these choices.

Depending on our objectives and the theoretical

CARDS READ	MINI-CARDS CHOSEN	HIT CARDS
<b>FIRST ROUND</b>		
Stove	Pot	
Shoe	Sock	
Dog	Chicken	
Toothpaste	Toothbrush	
Clown	Circus	
<b>SECOND ROUND</b>		
Monkey	Banana	
Vase	Rose	
Clown	Circus	✓
Ball	Goal post	
Egg	Fork	
<b>THIRD ROUND</b>		
Knife	Television	
Ball	Pencil	✓
Shoe	Circus	✓
Stove	Gork	✓
Notebook	Pencil	✓

**Box 2.** Relationships between cards and mini-cards made by Mariana and correct answers.

foundations assumed, the number of correct answers matters, but, above all, it is necessary to highlight the qualitative changes that are taking place in the sequence of the matches. Although at times it was not possible to identify precisely which mini-card the children looked at before they remembered the words spoken by the researcher, the fact is that there is an increasing movement to take them into account. The actions of looking at the researcher, at colleagues or at various places, are gradually being replaced by a clear orientation of looking at the mini-cards, as well as the procedure of separating them, as they were used as mediator of the words. Records such as those of Mariana's first participation, in which she names the words "carrot, doll, a tree, chicken...", without getting any right and, mainly, looking at the researcher, disappear.

On the other hand, interventions like Marcy's for Mariana, saying "Think there, in your head, go. Can you look at these cards?", suggesting and, at the same

time asking for confirmation to the researcher or "Look here (indicating the mini-cards that the friend chose). "Put everything on the table, so, for you to see", they become more frequent and consolidate. They are small participations and gestures, but they give clues that Mariana appropriated important aspects of the situation, although in some circumstances more formal than effective, because organizing mini-cards in the field of vision is important, but it is not enough for the effective actions of memory.

Therefore, this is a crucial point, as it denotes qualitative changes in the cognitive operations at stake. However, at times, this action does not result in successes, either because the chosen mini-card does not strongly refer to the word to be remembered, or because the image of the mini-card prevails over the relationship established with the word that should be remembered. Seven times we recorded the act of naming the figure of the mini-card and not that of the card, which it should refer to. Some considerations about the role of the

researcher's mediation are pertinent.

The children's relationship with the images, in general, followed this dynamic: they chose a mini-card for each word spoken by the researcher, they were organized based on observations of other colleagues' games, appropriating their strategies, such as organizing the chosen mini-cards to observe them better and remember the words in their next turns. It was possible to notice that, as a rule, the appropriation of the mediated memory strategy improved and the successes increased in the last rounds, as exemplified in episodes 06 and 07.

### Episode 06

Researcher: *Do you want to tell me? Which do you think is here?*

Eloísa leans on the table and watches her colleagues talk.

Researcher: *Which do you think Eloísa?*

Eloísa: *I don't know.*

Eloísa looks at the mini-cards that she separated and at the researcher.

Researcher: *Look at these mini-cards to help you remember. Which ones do you remember when you look at them?*

Eloísa looks at her mini-cards, in silence. Distributes them on the table, separating them so that all are well visible; watch them. The researcher pauses for Eloísa to analyze the set of cards and then resumes.

Researcher: *What does this tire remind you of?*

Eloísa watches the images.

Eloísa: *The car.*

Researcher: *The car! You got it!*

### Episode 07

Researcher: *Now Carlos. Tell me what do you have there?*

Carlos: *Chair* (puts the mini-card on the table).

Researcher: *Chair reminds you of what?*

Carlos: *The table.*

Researcher: *The table.*

Carlos: *Pot* (puts the image of a pot on the table).

Researcher: *What does the pot remind you of?*

Carlos: *Stove.*

Researcher: *Stove.*

Carlos: *Flower* (puts the image of a flower on the table).

Researcher: *What does the flower remind you of?*

Carlos: *Vase.*

Researcher: *The vase.*

Carlos: *Brush* (put the image of a brush).

Researcher: *What does the brush remind you of?*

Carlos: *Paste.*

Researcher: *Paste.*

In the course of the plays, the researcher's proposals make a difference. In Carlos' answers, initially there is a predominance of direct naming, from viewing the mini-card, however, the use - by the researcher - of the verb remind allows a reformulation of the reasoning strategy, and he and Eloísa start to answer correctly, naming the figures that should be remembered. We emphasize here the importance that the participation of researchers is also subjected to analysis. In a different way from classic experimental designs, in which researchers should have a neutral and homogeneous role, taking inspiration from Vigotski and his collaborators, we assume the relevance of variations in the researcher's propositions in order to create the best possible conditions for psychological work for participants and, preferably, that contribute to the occurrence of transformations. The general methodological guideline of analyzing processes and not products supports this dynamic in which researchers are an integral and constitutive part of the responses that each child gives. However, this is a complex task and it was not always done in depth in the inaugural works of study of memory, at least taking into account the texts of Vigotski that we have<sup>5</sup>.

From the analysis of the modes and processes of constitution of mediated memory recorded in the course of the research, and contrasting them with the levels of mediated memory proposed by Vigotski, it is important to emphasize that in the strategies used by the children, the level three prevailed, called as External Mnemotechnical Memorization. Although the author himself suggests that there is no full stability at each level; as the results of our research demonstrate, there are variations in the use of mediating resources by children, we emphasize that in the original research that we take as a reference, extracted from the volumes of *Obras Escogidas* (especially Vygotski, 1995) and texts written in co-authorship with their collaborators (especially Vygotsky & Luria, 1993/1996), external mnemotechnical memorization operations are registered in research with children from 7 years old, beginning of school life, in the Russian context of the time. Thus, it should be noted that the participants in our study were able to perform operations using external supports for memory, most of the time, very

<sup>5</sup> As we discussed in another text, in many moments of Vigotski's work the descriptions of the experiments are done with few particularities, with little detail; with gaps in many respects; there is no clarification, for example, as to whether they were done only individually or also in groups, as to the existence of situations in which the same child participated in more than one session, if there was any type of longitudinal analysis, among other aspects (Toesca; Rocha; 2017).

efficiently, on average two years before what Vigotski's studies pointed out.

Undoubtedly, it is relevant to consider that some mediations by the researcher and colleagues contributed to more accurate cognitive operations, thus affecting game performance. However, this caveat, instead of diminishing the importance of our results, intensifies them, as they show the power of social intervention in the constitution and development of higher psychological functions.

### DISCUSSION

For Historical-Cultural theory, the understanding of the operation of the human mind at higher levels, properly human, should consider the interpenetration of psychic functions, having social experiences as a fundamental supporting status for these changes. In this work, we resume the experimental design of the research carried out by its founders; but we made changes in it that we want to highlight here: the proposition of using signs in a simple card game and in the classroom. Certainly, there are other multiple possibilities of pedagogical activities and practices that can be inserted in the daily life of early childhood education and that can contribute to enrich the mediated memory capacity. Through their own language, that of their colleagues and the researcher, the child produces meanings about the world, becoming increasingly aware of it and of him/herself and developing, in a more abstract and reflective way, his/her higher psychological functions.

We also expect that the work presented here can inspire new research of this type, which may contribute to evidence that the role of the school is even broader than that already pointed out by the authors with whom we spoke, and the possibility of enriching the pedagogical work seems to be a fruitful way to improve the capacities of those who participate in it, as well as to improve the underlying theory. The results indicate that specific and explicit work with children on their memory and ways of regulating it can lead to an important development of awareness about psychological functions.

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