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Types and Properties of Attention: Theoretical Subsidies for the Organization of Teaching[1]

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ABSTRACT

In the educational environment, complaints about students' lack of attention during classes are recurrent. Although it is highly demanded by teachers, attention is not well known in its functioning. Given the importance of this psychological function in the learning process, this theoretical study aimed to gather propositions from the Historical-Cultural Theory regarding attention. For this purpose, theoretical contributions were sought from the works of classical authors in this psychological approach (Luria, 1979; Smirnov and Gonobolin, 1960; Petrovski, 1980 and Rubinstein, 1978) as well as Brazilian authors dedicated to studying this psychological function. In the article, the types of attention are differentiated (voluntary or involuntary) and their properties are highlighted (tenacity, intensity, stability, surveillance, distribution and switching). It is concluded that the knowledge about the types of attention makes it possible to identify teaching situations that may hinder or favor students' attention to the object of study.

KEY-WORDS: Attention; Historical-Cultural Theory; Teaching; Learning.

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Tipos e propriedades da atenção: subsídios teóricos para a organização do ensino

RESUMO

No meio educacional, é recorrente a queixa acerca da falta de atenção dos estudantes durante as aulas. Apesar de bastante requerida pelos docentes, a atenção é pouco conhecida em seu funcionamento. Tendo em vista a importância dessa função psíquica no processo de aprendizagem, este estudo, de natureza teórica, teve como objetivo reunir proposições da Teoria Histórico-Cultural acerca da atenção. Para isso, buscou-se aportes teóricos na produção de autores clássicos dessa vertente psicológica (Luria, 1979; Smirnov e Gonobolin, 1960; , Petrovski, 1980 e Rubinstein, 1978) , bem como de autores brasileiros que se dedicaram ao estudo dessa função psíquica. No artigo, são diferenciados os tipos de atenção (voluntária e involuntária) e destacadas as suas propriedades (tenacidade, intensidade, estabilidade, vigilância, distribuição e comutação). Conclui-se que o conhecimento acerca dos tipos e propriedades atencionais possibilita identificar situações de ensino que podem dificultar ou favorecer a atenção dos estudantes sobre o objeto de estudo.

PALAVRAS-CHAVE: Atenção; Teoria Histórico-Cultural; Ensino; Aprendizagem.

Tipos y propiedades de la atención: subsidios teóricos para la organización de la enseñanza

RESUMEN

En el ámbito educativo, es usual la queja sobre la falta de atención de los estudiantes durante las clases. A pesar de ser muy requerida por los docentes, la atención es poco conocida en su funcionamiento. Teniendo en cuenta la importancia de esta función psíquica en el proceso de aprendizaje, este estudio, de naturaleza teórica, tuvo como objetivo reunir proposiciones de la Teoría Histórico-Cultural acerca de la atención. Para eso, se buscaron aportes teóricos en la producción de autores clásicos de esta vertiente psicológica (Luria, 1979; Smirnov y Gonobolin, 1960; , Petrovski, 1980 y Rubinstein, 1978), así como de autores brasileños que se dedicaron al estudio de esta función psíquica.

En el artículo, se diferencian los tipos de atención (voluntaria e involuntaria) y destacadas sus propiedades (tenacidad, intensidad, estabilidad, vigilancia, distribución y conmutación). Se concluye que el conocimiento acerca de los tipos y propiedades de atención posibilita identificar situaciones de enseñanza que pueden dificultar o favorecer la misma en los estudiantes sobre el objeto de estudio.

PALABRAS CLAVE: Atención; Teoría Histórico-Cultural; Enseñanza; Aprendizaje.

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Introduction

"Pay attention to the content of the text!" "You didn't pay attention to the problem statement!" "I couldn't concentrate on what the teacher explained..." "My child doesn't learn because he's very inattentive." Statements like these are common in educational settings, demonstrating that the connection between attention and learning is widely acknowledged by parents, teachers, and students. But what exactly is attention? Why is it that we cannot always control it?

Understanding the types and properties of attention, the focus of this article, helps us answer these questions. This subject is part of a broader academic study that investigated the relationship between the organization of teaching and the development of voluntary attention. Knowledge of the properties and functioning of attention is a valuable element for didactics, as it offers pathways to design teaching strategies that make attention an ally of curricular learning and contribute to its development.

This study is grounded in Historical-Cultural Theory and was developed through a literature review. In conducting a state-of-the-art analysis (reference to be included after evaluation), we found recent research on attention, including works by Leite (2015), Leite and Ferracioli (2019), Lucena (2016), Ferracioli (2018), Ferracioli, Trindade, and Magalhães (2020), and Graciliano (2019). From these studies, we identified the principal authors

referenced as theoretical foundations in the study of attention and its properties: Ballone and Moura (2008), Luria (1979), Petrovski (1980), Rubinstein (1978), Smirnov and Gonobolin (1960).

Although this study focuses on attention, we do not regard it as an isolated function, as conscious activity is interfunctional (Vygotsky, 2004). Each psychic function—perception, attention, memory, imagination, etc.—has its own specificity; however, none of them alone is sufficient for structuring consciousness (Martins, 2013). They operate in close synergy, such that any alteration in one function affects the others (Palangana, Galuch, & Goulart, 2006). Therefore, our effort to understand attention more specifically does not disregard its interfunctional role within the psychic system.

Attention: What Kind of Psychic Function Is It?

In his work The Nature of Human Conflicts, Luria (1979) explains that human beings receive an immense number of stimuli but select only those essential to their conscious activity, ignoring the rest. This selective nature of conscious activity is identified by the author as one of the functions of attention.

> "The selection of necessary information, the maintenance of selective action programs, and constant control over them are conventionally called attention. [...] Without this selectivity, the unfiltered quantity of information would be so disorganized and vast that no activity would be possible. If there were no inhibition of all the uncontrolled associations, organized thinking directed at solving the problems faced by humans would be inaccessible" (Luria, 1979, p. 1–2).

To illustrate Luria's point, we will use an example that will be revisited throughout this article. On a busy street, multiple events can occur simultaneously: moving vehicles, engine noise, honking, the sound of a siren, barking dogs, ringing cell phones, people talking, and changing traffic lights. This environment typically also includes crosswalks, signs with text and images, lights, and billboards. Without attention acting interfunctionally to filter the essential stimuli in this scene, it would be impossible to perform the simple task of crossing the street safely.

On this selective nature of attention, Luria (1979) notes that all types of conscious activity involve the selection of dominant processes—the objects of human attention—and the establishment of a "background" composed of secondary processes retained in consciousness that may become dominant if a corresponding task arises.

Regarding this "figure and ground" dynamic, Smirnov and Gonobolin (1960) explain that many objects and phenomena go unnoticed or are only vaguely perceived because "attention to some objects is the selective reflection of them, which implies the simultaneous disregard of all others" (Smirnov & Gonobolin, 1960, p. 177). Certain stimuli emerge as dominant in consciousness (figure), while others remain in the background (ground). Thus, "the selection of figure over ground corresponds to the establishment of the focus of attention" (Martins, 2013, p. 143).

In other words, to attend is, above all, to establish the figure/ground dynamic, in which attention, in close connection with the sensory-perceptual apparatus, creates focal points over internal and/or external stimuli relevant to the current activity while backgrounding the others (Ferracioli, 2018).

To illustrate this figure-ground dynamic, let us revisit the earlier example. Suppose a person is engaged in an enjoyable conversation while crossing a busy street. The content of the conversation (figure) is the focus of consciousness, while all other phenomena are in the background. However, if a car suddenly brakes to avoid hitting an animal, that event immediately

becomes the focus of attention (figure), and the conversation shifts to the background (ground).

On the functioning of attention, Luria (1979) identifies at least two groups of factors that ensure the selective nature of psychic processes and determine both the direction and properties of attention. These are: (1) the structure of external stimuli (the external field), and (2) the subject's own activity (the internal field).

The first group—external stimuli—determines the direction, object, and stability of attention. However, according to Smirnov and Gonobolin (1960), for a stimulus to become the object of attention, it must possess specific qualities that distinguish it from others. This group includes the intensity and novelty of the stimulus. Regarding intensity, Luria (1979) notes that stimuli must be strong (bright lights, vivid colors, loud sounds, intense odors) because the greater the stimulus intensity, the stronger the excitation and, consequently, the orienting reflex toward it.

Furthermore, Smirnov and Gonobolin (1960) emphasize that not only absolute strength matters, but also relative strength—that is, the relation between simultaneously acting stimuli. A strong stimulus may go unnoticed if it is backgrounded by other strong stimuli. For example, the noise of a jackhammer may be ignored if a bomb explodes nearby.

Besides intensity, the novelty of objects and phenomena is another decisive feature in capturing attention. According to Smirnov and Gonobolin (1960), anything common and frequently repeated does not trigger involuntary attention. New stimuli easily attract attention, but it is sustained only if the stimulus is understood and prompts reflection. This requires relating the new stimulus to a previous experience; otherwise, attention is brief. For instance, when a person enters a dimly lit room and a lamp suddenly turns on, their attention is drawn to it for a moment (Luria, 1979). Similarly, in the example above, a car's sudden braking captures involuntary attention due to the novelty or the loud noise it produces (stimulus intensity).

The second group consists of internal factors, which are not tied to the external environment but to the subject and their activity structure: "This group of factors includes, above all, the influence of the subject's needs, interests, and goals on their perception and activity" (Luria, 1979, p. 4). These factors also drive the attention of other animals. For example, a dog's attention is drawn by the need for food—it reacts to the sound of a food bag opening but ignores the sound of a chair being moved. Thus, needs are factors that direct the dog's attention, which is always linked to vital and instinctual drives: feeding, reproducing, and self-protection.

In humans, however, in addition to these instinctual needs, attention is also driven by socially constructed interests and goals formed throughout human history—such as interest in sports, reading, or the arts.

Types of Attention: Voluntary and Involuntary

Like all psychic functions, attention has both elementary and higher forms. Elementary forms are found in both humans and other animals, while higher forms are exclusively human. Attention as an elementary psychological function is involuntary attention, which is biologically rooted—we are born with the capacity to attend to something.

To clarify this, consider animals' needs. According to Luria (1979), animals can pay attention, but they are guided by needs and interests, reacting to biologically significant stimuli—that is, those related to survival or reproduction. For instance, a duck responds to the smell of plants, a kestrel to the smell of decay, and a cat reacts vividly to the noise of a mouse but ignores the rustling of book pages.

Thus, animal attention is directly shaped by environmental stimuli and is not self-directed, which is why it is called involuntary attention. Smirnov and Gonobolin (1960) characterize it as an orienting reflex prompted by interactions with the external environment.

According to Luria (1979), human infants show signs of involuntary attention in their first weeks of life. The initial signs of the orienting reflex appear in response to sufficiently strong stimuli—the infant stares at brightly colored objects or stops sucking when hearing a loud noise. At first, involuntary attention serves an adaptive function. However, young and preschool-aged children quickly lose their focus because this type of attention is unstable and has a relatively small span (i.e., limited number of objects that can be perceived simultaneously).

Involuntary attention is tied to the present situation when the stimulus acts directly and immediately on the subject, without voluntary control. This type of attention remains present throughout a person's life, even as voluntary attention develops. For example, while reading a book, a person may focus on the author's ideas voluntarily. However, a loud noise can abruptly capture their attention involuntarily, even against their intention. The reaction is automatic, and the behavior is not self-controlled.

In contrast, attention focused during reading is a higher form—voluntary attention—which is unique to humans and developed through cultural appropriation, a process absent in other animals. This type of attention involves deliberate concentration—that is, "[...] conscious, directed, and goal-oriented, in which the human being consciously selects an object of attention" (Rubinstein, 1978, p. 498). According to Petrovski (1980), this form of attention is an expression of human will. In other words, in voluntary attention, the individual actively selects the objects or phenomena to focus on (Rubinstein, 1978). In involuntary attention, the subject's action is always passive, driven by factors beyond their control (a sudden noise, a bright color, a feeling of hunger) (Rubinstein, 1978). Smirnov and Gonobolin (1960) emphasize that voluntary attention differs from involuntary attention because it is driven by consciously directed goals.

To compare the types of attention, we will use a chart developed by Mesquita and Pasqualini (2008), expanded with elements from Smirnov and Gonobolin (1960), Luria (1991), Petrovski (1980), and Rubinstein (1978).

TABLE 1: Types of Attention in Their Elementary and Higher Forms

	Involuntary Attention	**Voluntary Attention**
Genesis	Natural	Cultural
Structure	Immediate reaction	Reaction mediated by signs
Functioning	Determined by environmental stimuli	Voluntarily controlled
Properties	Tenacity[4], intensity, stability, vigilance, and distribution	Tenacity, intensity, stability, vigilance, and distribution, and switching, driven by volitional actions

Source: prepared by the authors bases on Mesquita e Pasqualini (2008); Smirnov e Gonobolin (1960) e Luria (1991).

As we can observe, the genesis of involuntary attention is natural, whereas the genesis of voluntary attention is cultural. In other words, voluntary attention is not innate, nor does it result from the evolutionary development of involuntary attention. According to Mesquita and Pasqualini (2008), they are essentially different in kind, not in degree of development. That is, voluntary attention is not a more developed form of involuntary attention; rather, it is the result of the appropriation of human culture and, therefore, is shaped through educational processes.

As shown in Table 1, the structure of involuntary attention involves immediate reaction, and its functioning is determined by environmental stimuli. In contrast, the structure of voluntary attention involves mediated

[4] The term *tenacity* is maintained in its literal form as used by the original authors, in order to preserve the conceptual fidelity of their theoretical framework.

reaction. This mediation is carried out through signs (various forms of language) appropriated by the subject, and its functioning can be voluntarily controlled. Thus, in voluntary attention, the relationship with reality is intentional and mediated by signs—primarily by words. Language transforms human attention.

Finally, the table presents the properties of attention: tenacity, intensity, stability, vigilance, distribution, and switching—which will be discussed in more detail below.

Properties of Attention

The literature on the functional process of attention attributes to this psychological function a range of different characteristics or properties. According to Petrovski (1980), attention is a multifaceted process—that is, it comprises many features that enable the execution of everyday activities. This understanding is crucial because, as Ferracioli (2018) points out, it dismantles the common-sense notion that attention is merely the ability to focus on something.

According to Ferracioli (2018), the literature on the properties of attention presents different approaches and terminologies, which may suffer from translation distortions and thus generate confusion regarding the subject. To highlight both the differences and similarities in terminology, we have prepared Table 2. Different colors were used to mark the properties in order to make their similarities across different authors more explicit. Attention properties presented in the same color, despite terminological differences, share the same meaning.

TABLE 2: Comparison of the Properties of Attention

Author	Ballone e Moura (2008)	Luria (1979)	Petrovski (1980)	Rubinstein (1978)	Smirnov e Gonobolin (1960)
Attention Proper-ties	Tenacity		Concentra-tion	Concentra-tion	Concentra-tion
					Intensity or Tension
	Vigilance	Attention stability	Stability	Constancy or Fixation	Constancy or Fixation
			Fluctuation		
	Span	Attention distribu-tion	Distribution	Distribution	Distribution
		Attention volume			
		Attention Switching	Attention Switching	Attitude toward change	Ability to Shift from one object to another

Source: prepared by the authors.

Ballone and Moura (2008) define the properties of attention as tenacity, vigilance, and span. Luria (1979) distinguished attention by its volume, stability, distribution, and switching capacity. Petrovski (1980), in turn, attributed to attention the properties of concentration, stability, fluctuation, distribution, and switching. Rubinstein (1978) characterized the attentional properties as concentration, constancy or fixation, distribution, and attitude toward change. Finally, Smirnov and Gonobolin (1960) referred to the properties of attention as concentration, intensity or tension, constancy or fixation, distribution, and the capacity to shift from one object to another.

We will examine each of these attentional properties, establishing relationships between the different terminologies used by the authors. To

facilitate understanding of these attentional properties, we will use examples. However, it is important to emphasize that these examples, for the most part, refer to the functioning of these properties in a volitional context—in other words, in the realm of voluntary attention.

The attentional property referred to as **tenacity or concentration**, according to Luria (1978), relates to the ability to maintain certain signals or associations within a clear field of attention, making them dominant. According to the author, these received signals or associations that are maintained as dominant are referred to as the volume of attention. In other words, tenacity is the act of limiting focus to a particular object or phenomenon and maintaining it as dominant.

To illustrate this attentional property, let us return to the example of a busy street. Among all the signals perceived while crossing the street, the content of a conversation may, for a certain period, remain dominant—if it is of interest to the listener. That is, driven by volitional interests, the individual's focus of attention is the other person's speech, despite all the other stimuli present in the street environment. We can also reflect on our own current situation as readers of this article: countless surrounding stimuli may be reaching us, but to properly understand the ideas presented in the text, it is necessary to inhibit them and concentrate on the written content.

According to Smirnov and Gonobolin (1960), the fewer the objects or phenomena present before the subject, the more concentrated their attention becomes. For example, if while reading a book, the television is on, people nearby are performing other activities, or the phone receives messages, attention to the reading will likely be less concentrated. Thus, reducing the number of stimuli during a task improves the intensity of attention. The authors assert that intensity is closely related to concentration or tenacity and refers to the strength of attention, meaning the degree of focus directed toward dominant objects and phenomena, and the simultaneous abstraction from other stimuli.

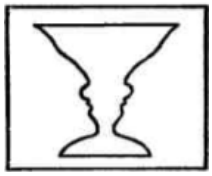
To understand how this property functions, imagine two individuals watching the same movie at a cinema. Both are focused on the film, but one of them has such intense attention that they remain unfazed even by people moving around or the sounds of others eating. In short, tenacity/concentration and intensity enable the ability to maintain a specific attentional focus—even in highly distracting environments.

Inversely proportional to the tenacity or constancy of attention, the authors Petrovski (1980), and Ballone and Moura (2008), respectively name another attentional property: **fluctuation or vigilance**. This property refers to the capacity of attention to shift toward one or more objects, especially in response to external environmental stimuli (Ballone & Moura, 2008). In the words of Petrovski (1980, p. 180), this property refers to "[…] periodic, involuntary, short-duration changes in the degree of intensity (tension) of attention."

It is triggered by momentary and instinctive interest in one particular stimulus among many—for instance, the ticking of a clock, which at one moment becomes noticeable, and at another fades into the background, as if it did not exist (Petrovski, 1980). In other words, vigilance or fluctuation highlights a single event among many and, subsequently, attention to this event may instinctively transition into intentional, voluntary attention. Let us return to the example of people watching a movie. Now imagine that one of them briefly notices an emblem on an actor's costume—among many possible stimuli. The viewer may continue watching the film without registering that emblem again, as if it never existed, since the intensity of attention to it was brief. However, the emblem may also become an object of voluntary attention.

According to Petrovski (1980), this property also manifests in perception and can be illustrated through the observation of ambiguous images. For example, in the image of two faces that form a vase—or a vase that forms two faces—at one moment we perceive the vase and inhibit the human faces, and at another we no longer see the vase but instead focus only on the faces.

FIGURE 1: Ambiguous figure- vase or faces.



Source: Rubinstein (1978).

According to Ballone and Moura (2008), the properties of vigilance/fluctuation and tenacity/constancy of attention manifest in an antagonistic manner; that is, the greater the tenacity directed toward a given object, the less fluctuation there is, and vice versa.

Other authors highlight a property that interacts with and mobilizes all other attentional properties, referred to as stability or constancy. According to Luria (1979), this property concerns attention over time—that is, the period during which dominant stimuli remain at the center of attention. This property involves the duration for which objects or phenomena are maintained as dominant. In the words of Petrovski (1980, p. 179): "[...] it is determined by the duration of the maintenance of intensive (concentrated) attention." Returning to the example of the busy street, the stability or constancy of attention refers to the duration in which the content of the conversation with the interlocutor remains distinct from the other surrounding stimuli.

However, attentional stability/constancy is not static; it is possible to change actions while maintaining the intensity of attention (Petrovski, 1980). For example, during a conversation, one can shift topics while preserving intensive concentration on the interlocutor. Or, consider a student who engages in different actions toward the same goal, such as reading a text, discussing it with classmates, highlighting important or supplementary sections, formulating questions about the text, and summarizing its central ideas. In this case, although the actions differ, the student's stability/constancy of attention may remain extended, since the changes lie

in the actions aligned with the tasks—not in the overarching activity of understanding the text's content.

According to Petrovski (1980), the degree of attentional stability increases with the complexity of the attentional object. Nevertheless, the duration of intensive concentration depends on several conditions, including: "[...] the nature and content of the activity being carried out, the attitude toward the object of attention, and the strength of interest in the object (or activity)" (Petrovski, 1980, p. 179). This passage clearly highlights the influence of content and interest in the activity on the duration of attention.

However, it is important to emphasize that sustaining attention on an activity for an extended period is not an easy task. According to Rubinstein (1978), it is necessary to discover new details within the activity, introduce different problems, and execute varied actions. In the words of Petrovski (1980, p. 180): "One of the most important conditions for constant attention is the incorporation of new partial and intentional tasks to solve within the same activity."

This strategy for maintaining attention is, in fact, widely employed in cinematic narratives. Even when a major conflict is presented to be resolved at the end of a film, it is usually insufficient to sustain the viewer's attention throughout. For this reason, new elements and partial conflicts within the overarching conflict are introduced throughout the narrative to maintain the viewer's constant attention.

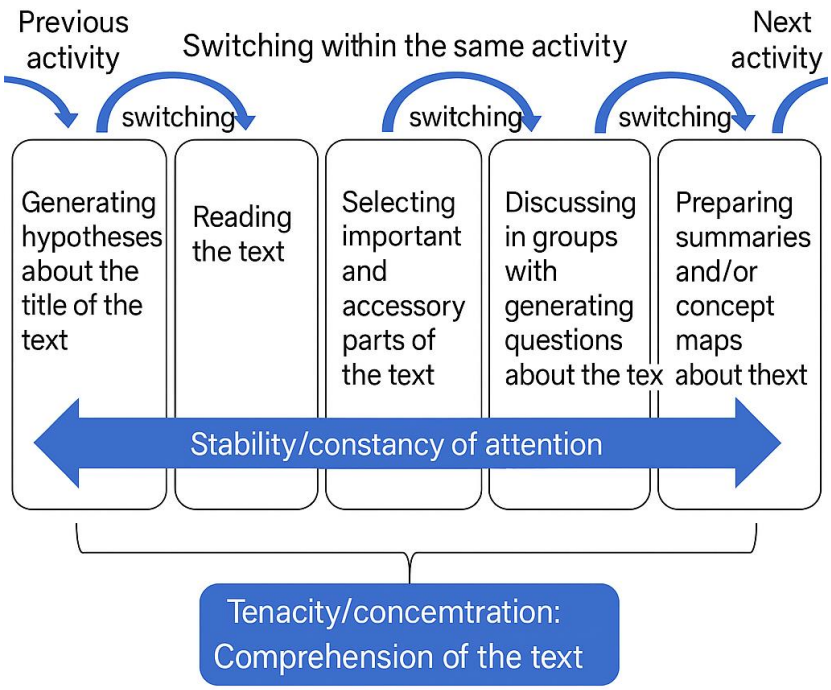
The authors studied also identify two additional properties of attention referred to as **switching/substitution of attention, attitude toward switching, or the exchange of one object for another, and distribution.** These two properties are so interconnected that distinguishing between them is not a simple task.

The ability to rapidly and consciously shift the focus of attention from one object to another is referred to by various terms. Following Petrovski (1980), we will use the term switching. This attentional

property manifests in the rapid transition from one activity to another (Rubinstein, 1978). This swift change in attentional focus is prompted by a new conscious and deliberate task (Petrovski, 1980). For instance, one might stop watching a video and become engaged in conversation with someone who has just arrived unexpectedly.

According to Petrovski (1980), attentional switching can also occur within the same activity. As in the example mentioned earlier, a student engaged in understanding a text may perform several actions while maintaining attentional stability or constancy across them. This occurs because the objects and/or actions are being consciously shifted, which allows for prolonged attentional stability throughout the activity. In Figure 2, the arrows represent the movement between attentional foci from one action to another within the same activity.

FIGURE 2: Switching in a Reading Activity.



Source: prepared by the authors.

Figure 2 expresses the idea of switching [commutation] within the framework of attention stability, as the goal of each action with the text is connected to the activity of understanding it. This activity, in turn, is part of the attentional volume—that is, the object of tenacity/concentration of attention.

According to Rubinstein (1978), the ease of switching between different attentional foci varies by individual. Some people can easily move from one task to another, while others require greater effort initially to direct their attention to a new activity.

Additionally, Rubinstein explains that the ease or difficulty in switching between activities depends on the relationship between the current and upcoming tasks, as well as the individual's relationship to both. For example, it may be more difficult for someone to switch from watching their favorite show to cleaning the house than the other way around. In the earlier example of text comprehension, for a student to begin this activity, they must disengage from the previous one. To facilitate this transition, the new activity [text comprehension] must be more engaging than the preceding one and present new challenges.

According to Petrovski (1980), Rubinstein (1978), and Smirnov and Gonobolin (1960), conscious switching of attention should not be confused with distraction. Distraction is the opposite of attention—it refers to a state of complete disorganization in which the subject cannot sustain attention on any single task, constantly switching from one object to another (Smirnov & Gonobolin, 1960). Rubinstein (1978) adds that distraction also reflects a deficiency in the agility to shift attentional foci effectively. In other words, distraction is not only an inability to focus but also involves inappropriate or ineffective transitions between attentional targets.

Smirnov and Gonobolin (1960) note that distraction disrupts the current activity due to external stimuli, while in switching, the shift from one task to another is conscious.

Beyond the agility to shift attention, there is also the ability to distribute attention when performing simultaneous activities. This attentional property, called **distribution,** allows attention to orient toward two or more focal points simultaneously (Rubinstein, 1978). As a result, it is possible to perform several actions and monitor various independent processes without losing track of any of them (Smirnov & Gonobolin, 1960).

Petrovski (1980) notes that many professions demand that individuals distribute their attention—that is, concentrate simultaneously on different actions. For instance, a driver must divide their attention among other vehicles, road curves, and handling the car itself (Smirnov & Gonobolin, 1960). Similarly, a teacher, while explaining a topic, monitors their thought process and observes student behavior (Rubinstein, 1978), distributing attention across these and other actions.

Regarding the conditions necessary for effective distribution of attention, Smirnov and Gonobolin (1960) emphasize the importance of the relationship between simultaneous actions—if the actions are unrelated, performing them together becomes more difficult. Petrovski (1980) states that the primary condition for attention distribution is that all concurrent activities are familiar to the individual, and at least one is automated to some degree. The less automated one of the actions is, the harder it is to distribute attention effectively.

> For example, an inexperienced pilot during landing cannot simultaneously perceive approach speed, altitude, angle, etc. In this case, attention is rapidly *switching* from one element to another. For an experienced pilot, however, all these elements form a unified situation and are perceived simultaneously, defining the volume of attention (Petrovski, 1980, p. 184, emphasis in original).

In other words, automated actions influence both attention distribution and switching. Returning to the text interpretation example: the more automated the actions involving the text, the more clearly defined the attentional volume will be. For instance, writing this section generally involved two continuous actions: reading printed materials on attentional properties and typing the main ideas into the computer. The switching of focus (commutation) between objects (computer and printed materials) and internal actions (decoding, understanding, interpreting, and writing) occurred consciously. However, this required that the operations enabling these actions be automated. If written language or keyboard typing were not fully mastered, it would have been difficult to distribute attention between processing the bibliographic content and recording it for the purpose of writing this article.

According to Petrovski (1980), in everyday life and work activities, attentional properties such as distribution, volume, and switching are inextricably linked, interpenetrate one another, and form aspects of the unified process of attention. He notes that attentional volume (i.e., the number of objects that can be perceived simultaneously) and distribution (i.e., the ability to direct attention to multiple tasks at once) are closely related and "can be cataloged together as the scope of attention" (Petrovski, 1980, p. 183, our translation). For this reason, in the table, the attentional property scope is represented with two colors (blue and pink), indicating that it results from the combination of distribution and volume.

In the same vein, Ballone and Moura (2008) define attentional scope as the maximum number of objects that can be immediately perceived. Thus, this property (volume + distribution) refers to the ability to maintain more than two attentional foci. However, as Ferracioli (2018) emphasizes, it is not about paying attention to many things at the same time, but about expanding the attentional field to include multiple necessary foci within a given activity.

These properties do not operate in isolation or in a fixed manner. Despite their specificities, they are interconnected. According to

Ferracioli (2018), at any given moment, one property may predominate, but they are in constant alternation and interaction due to the dynamic and complex nature of the activity itself. Therefore, in the organization of teaching, it is essential to consider not only the content being taught but also the learner's cognitive processes, so that the tasks proposed support, rather than hinder, voluntary attention.

Final Considerations

Understanding the types and properties of attention allows us to recognize the complexity of this function—so often demanded by teachers and so essential to learning.

In study activities, it is not enough to have concentration alone; one must also be capable of maintaining attention over time (stability), distributing it across various tasks common in the school routine (distribution), and switching attention from one object to another (switching) without distraction. All these properties belong to voluntary attention. However, this form of attention is not fully developed when children begin school. It is precisely through schooling, with the demands of systematic learning, that attention acquires this new quality.

Learning systematized content requires students to direct their attention to a conceptual system, which means controlling other stimuli present in the same time and space as the taught content.

The way in which knowledge is presented to students can either facilitate or hinder voluntary attention (Sforni, 2019). Since the *concentration* of attention is determined by the selection of a limited number of objects, if the learning object is unclear due to an overload of stimuli, the student's concentration will decrease. If *intensity* and *concentration* are related, then the more objects encompassed by attention, the harder it is to achieve intensity. Therefore, it is crucial that teaching makes the object of learning clear and avoids burying it beneath excessive stimuli—as can happen with

overloaded textbooks or projects in which multiple appealing activities overshadow conceptual content.

Teacher guidance is essential; through spoken or written language, the teacher highlights the primary stimulus among others. In this way, the teacher's discourse directs the student's attention so that, among the various perceived stimuli, those essential for understanding the concept at hand are selected. Language enables the student to focus on what is essential within the perceptual field.

While intensity and concentration are important, so too is the ability to distribute attention—that is, to direct it to more than one object at once. In studying, for example, a student may simultaneously listen to the teacher explain content and take notes to aid memory. Here, attention is distributed between the teacher's explanation and the act of writing. This is only possible if the writing process is already automated and the student's only "new" task is understanding the content.

Multiple actions can be performed well at the same time if some of them are automated and do not demand deliberate attention. However, when two or more tasks require conscious control, attention tends to focus on only one, or becomes scattered. Therefore, understanding what students already master and what they struggle with is crucial for teachers when planning instruction.

With regard to attentional *stability*—that is, sustained focus—research suggests that it is unrealistic to expect students to maintain focus on a single action for long periods, especially when the action is repetitive. To maintain stability, actions must change while keeping the same learning object, ensuring the continued focus on that object. Hence, lesson planning should include diverse tasks centered on the same content.

We also saw that switching, or the ability to shift attentional foci, is a necessary skill for students. The school routine demands multiple shifts in learning objects over the course of a school day, requiring students to switch focus multiple times. Being able to do this without

becoming distracted reflects strong attentional control. This raises important questions about highly fragmented class schedules, especially in the early years of schooling.

Understanding that the duration of intensive concentration depends on the content and the learner's interest in the learning object further reinforces the importance of making content engaging. Students must be cognitively active in relation to the concepts being taught in order to generate interest, which in turn supports sustained concentration.

In short, research on attention opens new avenues for reflecting on teaching and learning processes, including the quality of didactic materials, the tasks proposed to students, and the importance of teacher guidance. However, what occurs within the classroom is not limited to these aspects. It also involves the school's structure and functioning—its architecture, routines, timetables for subjects, recess, and other events. Analyzing how these factors affect the development of students' voluntary attention can provide valuable insights for pedagogical planning and school management.

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