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REGULAR ARTICLE

From Inner Speech to Mind-Wandering: Developing a Comprehensive Model of Inner Mental Activity Trajectories

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Abstract

The objective of this work was to develop a comprehensive model of inner mental activity's trajectories. For this purpose, a review of updated research was conducted on the wandering mind topic - a phenomenon that has been recently conceptualized and that has become a focus of interest in cognitive sciences - alongside early psychological postulates on the inner speech phenomenon that were brought back to the surface of scientific literature. In summary, this article presents a reformulation of the spontaneous thought model by Andrews-Hanna et al. (2017), broadening its scope to approach inner mental activity in all its forms and transitions. It is concluded that modern cognitive research has overlooked the full complexity of different types and forms of consciousness' expressions, understanding them as isolated phenomena and sub-dimensioning their trajectories during the flow of experience. This, mainly, due to a scarce incorporation of temporality and morphology to current theoretical models. It is proposed that cognitive acts described in modern research (spontaneous, controlled, involuntary, etc.) are, in synthesis, different symbolic and expressive natures of inner mental activity or thought phenomenon, which current literature has failed to understand as a whole. This article constitutes a contribution to future theoretical and experimental research that seeks out to explore the nature of thought and its development during a cognitive act.

Keywords Mind-wandering · Inner speech · Thinking transitions · Inner mental activity · Thought's morphology · Spontaneous thought

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Introduction

In recent decades, mind-wandering has established itself as an object of interest to cognitive sciences. This phenomenon refers to the content of thought moving freely in the absence of strong constraints on it, and was first understood as a deviation of thought; in which attention shifts away from an external task to an internal train of thoughts arising from the persons' motivations. (Seli et al. 2015, 2017; Christoff et al. 2016). This phenomenon was conceptualized for the first time by observing the inattention of participants during experimental tasks (Smallwood and Schooler 2006). Being a daily phenomenon and inherent to human experience, the topic has been capturing the attention of researchers since 2006. Different studies have explored the relationship between mind-wandering and the brain networks' activation (default mode network) (Fransson 2006; Smallwood et al. 2012, among others), while other works have studied the benefits and disadvantages of the mind-wandering phenomenon during everyday life experiences (Mooneyham and Schooler 2013).

Recent work has constructed a model of what has been called *spontaneous thoughts* (Andrews-Hanna et al. 2017), which placed mind-wandering next to other types of inner mental activity (rumination, goal-oriented thinking, creative thinking, among others) and classified all of these phenomena based on their contents' constraint level.

In a review of early works from classical psychology that relate to the modern conceptualization of mind-wandering and spontaneous thought, it is inevitable to arrive at Vygotsky's work on inner speech. Vygotsky (1934), in his research, observed a particular phenomenon of consciousness that emerged in a specific evolutive stage as a product of psychological development, thus systematizing the study of a phenomenon - inner speech - that had been already studied by different philosophical and anthropological traditions without the specific research methods of contemporary psychology. Inner speech has been defined as consciousness' capacity to speak to itself. This phenomenon has also been described as non-vocalized thinking, silent language, or simply, verbal thought. From the classical perspective of Piaget's (1922) and Vygotsky's (1934) studies, inner speech would mainly have a problem-solving function. Even though contemporary research on inner speech phenomenon has followed a Vygotskian perspective, current works have demonstrated other dimensions to it, such as its voluntariness/involuntariness, controlled/non-controlled features, its symbolic nature, etc. (Rosenthal 2012; Cresswell 2013; Fossa 2017; Fossa et al. In press; Fossa In press).

In this work, a comprehensive model of inner mental activity forms and its trajectories is developed. In order to fulfill this objective, a reformulation of current cognitive models, that includes mind-wandering and spontaneous thoughts, is made by integrating classic Vygotskian postulates about inner speech.

The present work stands as a contribution to theoretical research on mind-wandering, thought and inner speech; whose main aim is to add complexity to the current understanding of inner mental activity's forms and trajectories. This article aims to contribute to the development of new experimental devices that allow a further grasp on the complexity laying underneath the evolutive development of a cognitive act and the transitions between different forms of human consciousness' expressions. Finally, this work emphasizes the importance of integrating classic postulates dating since

psychology's first moments to modern research in order to raise important questions that have still yet to be addressed through empirical data and whose answers might enrich the discipline's knowledge.

The Mind-Wandering Phenomenon in Current Research

Mind-wandering has been conceptualized as a deviation of attention from a primary task to internal information. This phenomenon occurs during a situation in which the executive control deviates from a primary task to the processing of personal goals (Smallwood and Schooler 2006). Mind-wandering has been a researched topic for several years, but it was in 2006 that it entered the field of experimental studies with the help of cognitive psychology. The concept of mind-wandering made its first appearance in the field of experimental psychology through the work of Smallwood and Schooler (2006), which aimed to explore and give a cognitive explanation to a phenomenon that is present in a large percentage of the journal life and was barely considered by research. Researchers observed that in several experimental procedures people diverted their thinking away from the task at hand, a phenomenon which they decided to call "noise" and that subsequently became a topic of study when observed in a large portion of persons and in different daily life activities. Current research has continued the exploration of this phenomenon establishing relationships between it and different psychological disorders (eg, Depression, ADHD, OCD) (Seli et al. 2015, 2017; Christoff et al. 2016).

The first approaches that ventured to define the term of mind-wandering proposed that it was a phenomenon in which attention was redirected from a primary task to other focuses. In the words of Smallwood and Schooler (2006): "we propose that mind wandering is a situation in which executive control shifts away from a primary task to the processing of personal goals" (Smallwood and Schooler 2006, p. 946). Other works have defined mind-wandering as an unintended attentional decoupling between an external stimulus and an internal thought (Smallwood et al. 2003; Smallwood and Schooler 2006; Kopp and D'Mello 2016; Maillet et al. 2017). Smallwood and Schooler (2015), in an updated definition, posited the subject of mind-wandering as thought variation, which drifts away from a task in execution or an external environment and is redirected towards self-generated thoughts and feelings. By self-generated thinking, the authors understand any internal movement caused by the person's own motivations and not by external stimulation.

This view on mind-wandering proposed that the phenomenon differs from thought control for two specific reasons. On one hand, in spite of being similar as for the intention of reaching or pursuing a desired goal, they are differentiated from one another due that mind-wandering is involuntary, while thought control is intentional. The absence of explicit and deliberate intentions associated with mind-wandering can be conceived by the simple fact that there is commonly a lack of explicit awareness of the present content of experience during an episode of this phenomenon (Smallwood and Schooler 2006).

When mind-wandering takes place during the execution of a task, a deficit in the performance of such task can be noted; this happens because there are fewer available cognitive resources left to complete the primary task at hand. In addition, during the

experience of mind-wandering there is a reduction in awareness of external information. That is, the focus on the task diminishes because mind-wandering involves a deviation of attention away from the external world. In short, mind-wandering is an attentional shift away from the external world and towards the internal world (Smallwood and Schooler 2006).

Most literature has assumed that human beings have a hierarchy of goals (Smallwood et al. 2003; Smallwood and Schooler 2006; Kopp and D'Mello 2016; Maillet et al. 2017). Following this perspective, it is possible to think that mind-wandering diverts attention away from a primary activity because an alternative goal is activated on top of this primary activity (Irving 2016).

Statistics have suggested that the tendency to engage in thoughts unrelated to external events, as opposite to the mind staying in the "here and now", constitutes approximately 50% of a person's work hours (Mooneyham and Schooler 2013; Killingsworth and Gilbert 2010). These "interruptions" have been considered to entail a significant cost because they impair the performance of many activities ranging from the most banal to the most demanding of them. Thus, mind-wandering has been proposed as a failure of cognitive control with important costs for the person (Mooneyham and Schooler 2013). However, recent work by Mills et al. (2018) has demonstrated not all of the "off task" thought is, in fact, "freely moving" and, therefore, susceptible of falling into the mind-wandering category. These results show that around 40% of thoughts had been misclassified by previous literature as being freely moving, while they were not.

Correlations have been shown between mind-wandering and reading comprehension problems, sustained attention difficulties, daily accidents, academic failure and low mood, among other difficulties (Mooneyham and Schooler 2013). In the same line of thinking, it has been proposed that mind-wandering that focuses on the past (compared to mind-wandering focused on the present or the future) tends to be associated with a decrease in happiness (Poerio et al. 2013; Ruby et al. 2013; Smallwood and O'Connor 2011). In other studies, it has been shown that perseverative or ruminative types of mind-wandering tend to be associated with pathological states such as depression and anxiety (Ottaviani and Couyoumdjian 2013). However, its association with important benefits has also been proven. Research has found positive correlations between mind-wandering and future thinking, planning, creativity and imagination (Monneyham & Schooler, 2013).

Mind-wandering has been associated with a brain network located in the middle surface of the cortex called the neural network by default (Smallwood and Schooler 2015), along with executive networks as well (Kam and Handy 2014; Andrews-Hanna et al. 2017). This default mode network has also been further parceled into subsystems that converge on core hubs, where a late research has proposed that "rather than being a unified system, the core nodes of the default network might reflect a summation of converging activity from different intrinsic connectivity networks" (Mittner et al. 2016, p. 572), which can be interpreted as integrative and transmodal processing units (Andrews-Hanna et al. 2017; Mittner et al. 2016). It has also been proposed that the driving force behind attentional focus and the activity of mind-wandering related brain networks is the locus coeruleus norepinephrine system (Mittner et al. 2016).

From a different perspective, and addressing various issues that arose from the fist cognitive definitions of mind-wandering, such as the narrowness of its

scope, Irving (2016) defined the mind-wandering phenomenon as unguided attention. This means, that when the mind wanders, attentional focus moves without guidance from one subject to the next. According to this point of view, mind-wandering is a motivated phenomenon lacking both purpose and guidance. In the same line of thinking, a more recent work has proposed mind-wandering as being part of a larger cognitive process named *spontaneous thought*. Spontaneous thought constitutes a "mental state or sequence of mental states that arises relatively free due to an absence of strong constraints on the contents of each state and on the transitions from one mental state to another" (Christoff et al. 2016, p.719) .

According to Christoff et al. (2016) there are two general ways in which the content of mental states and the transition between them may be restricted. The first is exercised by cognitive control, which is deliberate; and the second refers to an automatic type, which operates involuntarily but also limits the flow of thoughts. In this way, mind-wandering is a phenomenon that emerges and evolves in consciousness during the absence of these two restrictions; namely, cognitive control on thought (deliberate constraints) and affective or sensory salience of a specific thought (automatic constraints). In this sense, deliberate and automatic constraints can be assimilated to voluntary and involuntary types of cognition.

Some works in literature have tried to explain the wandering mind phenomenon. One of these models (1) has been called the executive control failure model (McVay and Kane 2010). This model suggests that mind-wandering occurs due to a failure of working memory when it is needed to control mind-wandering and the prioritization of personal concerns. On another hand, there is a decoupling model (2) (Smallwood and Schooler 2006), which suggests that instances of mind-wandering reflect an uncoupling of attention from an ongoing task to an internal train of thoughts. According to this model, attentional resources then support the internal train of thoughts, so it can continue (Smallwood et al. 2012). As such, the decoupling model suggests that working memory resources are also required to support the occurrence of mind-wandering episodes (Banks et al. 2016).

In the same line, another work (3) has argued that working memory could have a double implication in mind-wandering. First, to prevent mind-wandering in tasks that demand the focus of attention to be placed on the outside and, secondly, to support mind-wandering once it is deployed (Banks et al. 2016).

Thomson et al. (2015) has recently developed a proposal (4) for sustained attention resource control that unites mind-wandering's decoupling and executive control failure models. This model has been called the resource control model and suggests that resources allocated into a primary task may be less than the person's total resources available. In these cases, the additional resources (beyond those required by the task) can be directed towards mind-wandering. Thus, according to this argument, mind-wandering can occur simultaneously alongside the primary task without detriment of such a task's performance. However, when the resources available for the task are less than those required to complete it, performance of the primary task will logically be impaired; as might be a frequent case when mind-wandering occurs (Banks et al. 2016).

On another subject, recent work has proven the existence of intentional and unintentional types of mind-wandering episodes. In this sense, mind-wandering can differ in

terms of process (referring to spontaneous v/s deliberate mechanisms). In this proposition, Seli et al. (2017), homologates voluntary and involuntary types of mind-wandering to voluntary and non-voluntary kinds of cognition.

Undoubtedly, episodes of spontaneous and deliberate mind-wandering could, at times, consist of an identical sequence of thoughts. Nevertheless, these types of mind-wandering differ as for one is initiated with intention and the other in spite of it (Seli et al. 2014). Research has shown that mind-wandering can occur unintentionally, despite people's efforts of not engaging in such activity, and also with deliberate intent of experiencing it (Seli et al. 2017).

The fact that mind-wandering occurs with unintended executive control can be resolved by adding two assumptions to standardized executive models: (a) the assumption that individuals possess multiple goals, some of which can be automatically activated by a relevant stimulus and, (b) the assumption that awareness and meta-awareness are different from each other (Smallwood and Schooler 2006).

Levinson et al. (2012) and Thomson et al. (2015) have shown that people tend to have more episodes of mind-wandering during simpler tests, as opposite to the more difficult ones; and that, in both cases, people are able to effectively adjust their levels of mind-wandering to prevent noticeable costs in performance. Since, by definition, deliberate mind-wandering is under the person's control and spontaneous mind-wandering is not, the present finding suggests that, in the aforementioned studies, the adjustments reflect a variation of deliberate mind-wandering's levels (Seli et al. 2014).

A well-documented finding in mind-wandering literature is that the phenomenon is mainly future-oriented (Baird et al. 2012); both deliberate and unintended episodes have proven to be more future than past oriented. On another hand, recent results add nuances to literature, where it has been shown that deliberate episodes of mind-wandering tend to be more future-oriented than non-deliberate episodes, while at the same time that both types of mind-wandering have a similar probability of being oriented towards the past (Seli et al. 2015).

It is plausible that future-oriented thinking in deliberate mind-wandering is different than future-oriented thinking in non-deliberate mind-wandering; the first one being possibly associated to planning, while the second one to a propensity to worry about potential outcomes (Seli et al. 2017).

Regarding emotional valence, recent work has shown congruence between mood and the content of mind-wandering, so much that sadness prior to an episode predicts mind-wandering with sad contents and anxiety prior to an episode predicts mind-wandering with anxious - but not sad - content (Poerio et al. 2013). In the same way, mind-wandering with positive content predicts subsequent positive moods (Ruby et al. 2013). Either way, the impact of mind-wandering's emotional valence on future moods can be altered by thought's temporal orientation, to the point that thoughts about the past and other people are predictors of mood downfalls, even when the emotional valence of those thoughts is positive. On the other hand, mind-wandering centered on the future and the own person is related to increases in positive affects, even when the emotional valence of the thoughts is negative (Ruby et al. 2013).

Recent research has proposed that mind-wandering belongs and relates to other phenomena of consciousness. Andrews-Hanna et al. (2017) have built a model that

shows the most up-to-date understanding on cognitive science. According to this model, the wandering mind phenomenon – along with other types of thinking – is determined by constraints on the unfolding thought's dynamics, as shown in Fig. 1.

Andrews-Hanna et al. (2017) proposed that spontaneous thinking encompasses a conceptual space which includes sleep, mind-wandering and creative thinking, and that it lacks two types of restrictions: 1) deliberate constraints (x axis) and 2) automatic constraints (y axis). On the other hand, obsessive and reflexive thinking are stable meaning zones of cognition, determined by either a high level of deliberate, automatic or both kinds of constraints.

The authors propose that shifts in the content of thought happen faster over time in the lower left corner of the quadrant, that is, when thought is free from both automatic and deliberate constraints. Whereas, on the contrary, thought's flow is slower in terms content variation over time when it lays near the upper right side of the quadrant. This means constrained thinking tends to have a longer duration under the same content before changing to another thematic axis.

Current research on mind-wandering and the model developed by Andrews-Hanna et al. (2017) about spontaneous thoughts constitutes, without a doubt, a contribution to the understanding of the phenomenon. Temporality, on the other hand, is scarcely incorporated into the model, which emphasizes mainly in the content of thought and, therefore, neglects the trajectories or transitions that thought takes in the course of experience; also leaving thoughts symbolic nature off the picture. This void can be filled by approaching classical literature on inner mental activity and thoughts'

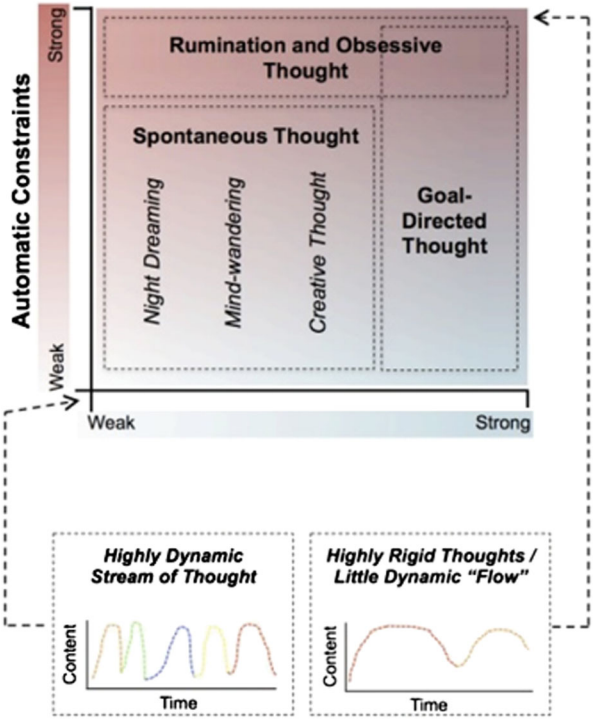

Fig. 1 A dynamic model of spontaneous thought (Andrews-Hanna et al. 2017)

symbolic natures, which is observed in Vygotsky's inner speech theory. That means, in this proposal hereon developed, mind-wandering and inner speech's theories can be understood as complementary approaches to different dimensions of a same process: thought. Mind-wandering, in this frame, refers to a content classification or dimension of thought, while inner speech alludes to a form or morphological dimension of thought, which will be fully elaborated through this article's argument.

Inner Speech in Human Experience from Cultural-Historical Psychology Perspective

Inner speech corresponds to the experience of speaking to oneself in silence. It constitutes language without a sound, a sub-vocalized speech. It is a phenomenon that, although has captured the scientific interest of psychology only since the beginning of the twentieth century, has been referred to since early on in western philosophical works.

However, it is not until the works of Piaget (1922) and Vygotsky (1934) that inner speech begins its journey as an object of empirical research in contemporary psychology. In Piagetian theory, the study of language arises from researches on early stages of childhood, specifically from the study of egocentric thought. In his work with schoolchildren and pre-school children, Piaget (1922) observed the presence of egocentric language, understanding its self-centeredness as an absence of concern for social interaction. In this sense, egocentric language for Piaget means a language for oneself, with little or no interest at all in the listeners' understanding, but rather a language that generates pleasure by the simple fact of expressing it. In the words of Piaget (1922):

> Children's language can be divided into two groups: Egocentric and socialized. When a child utters phrases that belong to the first group, he does not bother to know who he is talking to or if he is being listened to. He speaks for himself. This language is egocentric, partly because the child speaks only about himself, but mostly because he does not try to put himself in the listener's point of view. Anyone will not serve as an audience, although he has the illusion (except, perhaps, in the pure soliloquy) of being listened to and understood. He does not feel any desire to influence his listener or tell him anything. This situation is not very different from a type of room conversation in which everyone talks about themselves and nobody listens (Piaget 1922, p.9).

From the results of his researches, Piaget (1922) proposed that egocentric language presents itself in three modalities: repetition or echolalia; monologue; and collective monologue. In repetition or echolalia, the child simply repeats syllables or words. In monologue, the child expresses different types of sentences that are addressed to himself. Finally, collective monologue refers to the phenomenon in which the child expresses words or phrases to himself in the presence of others. Egocentric language is, according to Piaget, closer to action and movement than social language. In this sense, such type of language is accompanied by concrete actions, as evidenced in the

children's game. Self-centered speech, then, supports problem's resolution during the game. According to Piaget, the form and expression of egocentric language reflects the presence of an egocentric thought in the child. This self-centered language diminishes until its disappearance at school age, which gives birth to social language as a product of development and socialization processes.

Vygotsky (1934), by reviewing Piaget's work and through new studies, interprets the phenomenon in a different way. In first place, Vygotsky (1934) deepens the study on collective egocentric speech and observes that egocentric language diminishes in solitude, while increasing in the presence of others. Vygotsky (1934) interprets that egocentric language also has a social function. On another hand, Vygotsky (1934) also criticizes Piaget's (1922) postulates on the disappearance of egocentric language and the emergence of socialized language without any genetic explanation. According to Piaget (1922), the fact that the origin of inner speech matches the disappearance moment of egocentric language does not imply a genetic hypothesis -or microgenetics- of the development of language and cognitive processes. For Vygotsky (1934), contrary to Piaget (1922), egocentric speech diminishes throughout development mediated by a process of social language differentiation until it is internalized as inner speech in human experience at school age, period in which the beginning of inner speech is evidenced in the human being. That is to say, what used to be egocentric speech, from school age onwards, will be inner speech and be differentiated from vocalized social language.

From Vygotsky's point of view, the study of inner speech is fundamental to the understanding of psychological phenomena and human development. This is because the emergence of internal speech in ontogenetic development is not merely a transition from a language that was previously external to one that will later be internal, but development and evolution implies the "internalization of psychological functions that were previously external or interpsychic" (Vygotsky 1934, p.309). From Vygotsky's perspective, in the egocentric language period the child must exchange linguistic signs to understand a line of thought. On the other hand, from school age on, the child can make use of the internalized function to explain different situations and generate new thoughts. From here arises the possible relation between internal speech and self-regulating functions of thoughts, emotions, behaviors and the expression of vocalized speech. From Vygotsky's perspective, verbal thinking in adults is, most definitely, an important aspect for theories about thinking and speech. Nevertheless, he also refers and gives importance to non-verbal thinking. To Vygotsky (1934), language is an important instrument for the *completion* of adult thinking, although he also assumes the existence of other forms of semiotic mediation for the construction and development of thought. However, due to the evident verbal predominance as an instrument for the completion of thought, it is that inner speech has also been called: verbal thought; non-vocalized language; quiet speaking; private speaking; or simply, thought.

Vygotsky (1934), in his attempt to achieve a genetic understanding of inner speech, describes the forms that the phenomenon takes from the birth of a new thought until it becomes vocalized speech. At the beginning, it is possible to consider the existence of clusters of thoughts or diffuse sensations that come from a motivational sphere of consciousness. The mediation of inner speech allows the formalization of a line of thought or a specific thought; that is, the initial thought or proto-thought takes form as

inner speech. Then, inner speech incorporates external words and their meanings. These meanings are closer to the syntactic structure of the word; so the words constitute meaning that is unique and, at the same time, shared by all. In this stage, inner speech is very similar to vocalized speech. Finally, inner speech builds up into multiple words which constitute complex discursive phrases and expressions that are presented to the outside as vocalized speech. From this perspective, thought and inner speech constitute an affective-volitional dimension of experience. That is to say, inner speech - in its most primitive forms - is not simply speech but a complete experience of images, emotions and words loaded with sense.

In relation to the above, it is important to emphasize that, from Vygotsky's (1934) perspective, the development of inner speech is produced in the microgenetic junction between thought's motives and the internalization of social-cultural language. That is to say, internalization of external words and their intersection point with thought generates inner speech. Later, when inner speech, as a psychological phenomenon, has emerged in human experience, it becomes the mediating system between experience and consciousness by itself.

Vygotsky (1934) also observed that adult inner speech maintains the same syntactic structure as infant egocentric speech in his research, namely: a tendency towards abbreviation and predication. *Abbreviation* is the tendency of inner speech to reduce the syntactic structure of expressions (condensation). For inner speech, words are filled with sense; entailing a single concept can express a complex psychological experience. It is frequent that a word or sentence is much larger than its conventional meaning. On the other hand, *predication* is the tendency of inner speech to maintain, in a sentence's syntactic structure, just the predicates and omit the subjects; given that emitter and receiver coincide. These tendencies explain why it suffices to refer to a single word in order to think a complex idea.

Adult's inner speech and children's egocentric speech maintain the same characteristics, not only in regard to their function (they fulfill the same intellectual function) and their ontogenetic development (the disappearance of egocentric speech matches school age, period in which inner speech appears), but also maintain similarities in their syntactic structure (tendency towards abbreviation and predication). Because of this, from Vygotsky's perspective, the way to approach the study of inner speech is through egocentric speech, since the first one becomes accessible to observation and experimentation through the latter.

Most of the studies on egocentric speech and inner speech, by researchers who have a theoretical and empirical origin in Piaget and Vygotsky, use methodological devices based on problematic situations (Heery 1989; Kinsbourne 2000; Ridgway 2009; Roberts 2008; Villagrán et al. 2002; Damianova et al. 2012; Silveira and Gomes 2012; among others). That is, they present participants with a specific task designed to display the inner speech function described from the very beginning of its study: problem solving. In this sense, inner speech theories based on the traditions of Piaget and Vygotsky and all modern research -that has followed, mainly, a Vygotskian orientation- have understood the phenomenon as a form of controlled, directed cognitive activity with a problem-solving function.

Of great importance is the passage of Vygotsky (1934) at the end of his work *Thought and Language*, which establishes a relationship between inner speech and an emotional-affective sphere of consciousness, an aspect that is not so clear and evident

in Piaget's approaches. This chapter contains one of the few evidences of a possible relationship between inner speech and a language's sense dimension, as an emotionally felt experience, in the authors work (Cornejo 2012).

According to Cornejo (2012), Vygotsky's concept of *sense* allows to understand that experience surpases the limits of language. The concept of sense accounts for what is moved in consciousness by the word's meaning, which is an allusion to the inner dimension of language. In the author's words: "the vocalized word constitutes a vehicle for human expressiveness, but that expressiveness can never be completed because it is a precisely dynamic, fluid and complex totality" (Cornejo 2012, p.128). From the author's perspective, Vygotsky's understanding of the word corresponds to the study of human experience as a complex and gestalt experience.

Vygotsky (1934) refers that, in addition to the syntactic (tendency towards predication and abbreviation) and phonetic (absence of vocalization) difference with external language, there is a third difference that must be contemplated when studying inner speech. This third difference is the primacy of sense over meaning, a central aspect of inner speech's expressiveness.

From a Vygotskian perspective, in traditional psychology - that is, mainstream psychology and not cultural-historical psychology - meaning is what the word connotes. In the author's words:

> From old psychology's point of view, the relation between word and meaning is a simple associative relation, thanks to the repeated coincidence of the words perception and the thing called by that word in consciousness. The word recalls of its meaning with the same accuracy that a person's coat resembles that person or as the exterior appearance of a house reminds of the people who inhabit it. From this point of view, meaning of the word, once it has been established, cannot be developed or changed at all (Vygotsky 1934, pp. 289-290).

From traditional psychology, then, meaning of the word is invariable and constitutes a part of its sense. It constitutes the connections made through the person's ontogenetic process that shapes the word or the concept. Nevertheless, Vygotskian research has managed to break down mainstream psychology's belief, succeeding at showing the evolution and development of the word's meaning throughout childhood as a product of thought structure's variation. Now, this is even more complex from Vygotsky's inner speech perspective:

> When the phasic aspect of language is reduced to a minimum, its syntax and phonetics are simplified and reduced to the maximum, the word's meaning occupies the foreground. Inner speech operates preferably with semantics and not with phonetics. This relative independence between the word's meaning and its sound stands out extraordinarily in inner speech (Vygotsky 1934, p.332).

To Vygotsky (1934), the concept of "sense", unlike "meaning", has dominance in inner speech and is related to all elements within consciousness that emerge or are evoked by the word's presence. That is, sense evokes the individual and subjective (not universal)

significance of the concept; it is a connection to a situated experience, which is referred to by language. In this direction, sense evokes an affective involvement with the current experience as a product of the emergence of past experiences and deep motivations being alluded by the present experience; which builds this sense. In Vygotsky's words:

> In inner speech there is a preponderance of the word's sense over its meaning (...) The sense of the word is a sum of all psychological events evoked in our consciousness thanks to the word. Therefore, the sense of a word is always a dynamic, variable and complex formation which has several zones of different stability. Meaning is only one of those areas of significance; the most stable, coherent and precise. A word acquires sense in its context and, as is known, changes it in different contexts. On the contrary, meaning remains unchanged and stable in all of the word's sense changes in different contexts (...) The word in its singularity has only one meaning. But this meaning is no more than a potency that is materialized in living language, in which this meaning is merely a stone in the building of sense (Vygotsky 1934, p.333).

In inner speech, the word is loaded with sense, and it varies from one context to another and from one subject to another. This feature is what makes inner speech experience a private and personal phenomenon. In Vygotsky's words: "(...) in inner speech, the word is so charged with different sense, that even to translate it into external speech, it would be necessary to use all the words condensed in it" (Vygotsky 1934, p.336). With this, Vygotsky refers to the impossibility of replicating pure inner speech as external speech, since the translation process involves adapting this inner speech to the rules of external language (in syntactic, phonetic and semantic terms).

From a Vygotskian perspective, inner speech can be understood as a phenomenon that plays an important role in expressiveness. Inner speech expresses the deepest aspects of the person's consciousness. This may have variations in regard to the context in which the person is. Nevertheless, when not engaging in a social interaction, inner speech might be a pure expression of the deepest motivational aspects of the person; in which case, its function could simply be the one of expressive discharge and not the resolution of problems or the argumentative preparation for the later vocalized language.

From the perspective of the human experience developed in the works already mentioned, inner speech would correspond, then, to an undifferentiated process between cognition and emotion; which, in its totality, expresses the complexity of the flow of consciousness in experience. This phenomenon manifests as a voice that speaks to oneself and has an interior emotional impact. At the same time, the different emotions experienced position the person in certain psychological states that allow some contents to resonate with greater probability than others. It is in this sense that the Vygotskian approach gains its relevance, since it allows to understand that the contents of inner speech come from the deepest motivational aspects of consciousness (Vygotsky 1934).

Following the previously developed ideas, recent studies have shown new dimensions of inner speech as a consciousness' phenomenon. Specifically, the existence of an expressive dimension has been proposed (Cornejo 2012; Fossa 2017; Fossa et al. 2018;

Fossa et al. In press). This expressive dimension has been understood as the deepest states of consciousness' communication function; which incorporates the affective-emotional pre-verbal sphere.

On the other hand, studies have also shown inner speech's correlate to a physiognomic dimension (Werner and Kaplan 1963), which implies that the phenomenon expresses both through a cognitive-intellectual and controlled function (Fossa et al. In press) and a pre-verbal dimension; the latter being an affective, diffuse and involuntary function (Fossa In press).

The expressive dimension of language has been understood as the presentation of the emitter's subjectivity through vocalized language (Bühler 1933, 1934). In updated literature, this dimension of language has also been observed and described within inner speech. In this last aspect, the expressive function of inner speech implies the presentation of human cognition in its first stages, a pre-verbal cognitive-affective integration that accounts for the first impact of reality on consciousness (Fossa 2017; Fossa In press; Fossa et al. In press). That is, a sense-filled pre-verbal and embodied experience (Bertau 2008). As mentioned above, this dimension of inner speech is observed both in self-contemplative inner speech and in task-oriented controlled inner speech in different proportions (Fossa et al. In press).

In summary, some of the works mentioned make it possible to understand a cognitive-intellectual, controlled and directed dimension of inner speech; whose main function, as described in classic Vygotskian theory, is related to problem resolution. While other works, following the Vygotskian line that connects inner speech with the affective-volitional sphere of consciousness, allow the comprehension of an involuntary and uncontrolled dimension; which has a greater affective, verbal and pre-verbal domain and whose function is mainly related to expressiveness. This last dimension aspects meet the mind-wandering phenomenon in the way it has been conceptualized by modern cognitive literature (Irving 2016; Kopp and D'Mello 2016; McVay and Kane 2010; Maillet et al. 2017; Mooneyham and Schooler 2013; Levinson et al. 2012; Poerio et al. 2013; Seli et al. 2015; Smallwood and Schooler 2006, 2015; among others).

Comprehensive Model of Inner Mental Activity Trajectories

Due to everything previously elaborated, considering updated literature on mind-wandering along with early traditions in psychology that developed a systematization of the inner speech experience, an integration of the positions described above is presented in order to build a comprehensive model of inner mental activity forms within human experience.

Figure 2 presents a reformulation of the *Dynamic Model of Spontaneous Thought* proposed by Andrews-Hanna et al. (2017). This model approaches mind-wandering as a type of spontaneous thought and categorizes it, as such, along with night dreaming and creative thought due to their low deliberate (x axis) and automatic (y axis) constraint levels. Alongside these criteria for sorting out spontaneous thought, a line is drawn between spontaneous and other types of cognition such as rumination and obsessive thought, which is high in automatic constraints; and goal directed thought, which is high in deliberate constraints.

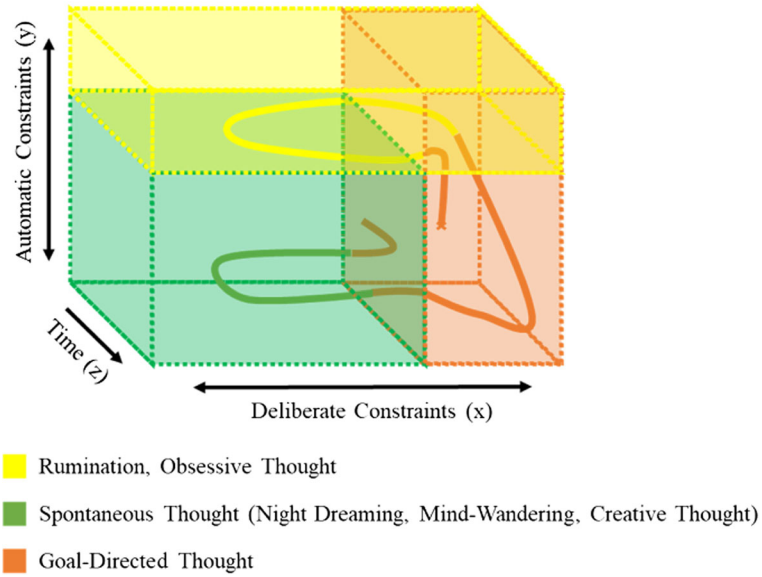

Fig. 2 Reformulation of the spontaneous thought's model (Andrews-Hanna et al. 2017)

Given the great importance of dynamics - or the way thoughts evolve and transit over time - to this model; an adjustment was made to broaden its scope through three-dimensionality by adding a time dimension (z axis). A line was included inside the diagram to show how thought content unfolds and transits over time, changing from one type of thought to another as it happens in a daily context.

It is to be noted that this graphic approach of thought's content unfolding over time must be interpreted as a retrospective picture of experience, since thought's process full dynamics, simultaneous and successive aspects, possibilities, directions, and interactions in the immediate present are far too broad and complex to be diagrammed; and therefore, not susceptible to this kind of graphic approach.

As shown in Fig. 2, the thought line starts at a point in which deliberate constraints are high and automatic constraints are low, so it falls into the category of goal-directed thought and is colored orange. As it moves forward, deliberate constraints lower in intensity so the line crosses over to the category of spontaneous thought and its color changes to green to match the corresponding position in the diagram. After a while, it circles back to goal-directed thought due to an increase of deliberate constraints and from there on automatic constraints increase as well, making it cross over to rumination and obsessive thought's category. At that point, the color of the line changes to yellow for it's the color given to that category. Approaching the end of the timeline set in the diagram, the line circles back again to goal directed thought and finally meets a universe of possibilities to keep going on from, for time is a non-stopping dimension.

Even though the model proposed by Andrews Hanna et al. (2017) stands as a "state of the art" cognitive representation of thought, while encompassing the mind-wandering phenomenon, not every aspect of constraints has been thoroughly explained yet. No approach has been made to the way the constraint processes interact between themselves and the contents of thought.

Over the premise that thought, in all its types and forms, implies the use of a person's executive resources (e.g. Smallwood and Schooler 2006; Christoff et al. 2009; Kam and Handy 2014; Thomson et al. 2015; Banks et al. 2016), the model was rearranged from one with eight vertices to another with only six; given the activation of one type of constraint implies there are less available resources to be employed by the other type.

Figure 3 shows a reformulation of Fig. 2, with the difference of the upper right vertices which have been removed, giving it a pyramidal shape; unlike previous cubical shape. Deliberate and automatic constraints are a result of interdependent processes that share resources, but whose aims can be different from one another. Take the example of a student trying hard to focus on an exercise in class but fails to do so because he is being overwhelmed by thoughts of self-doubt about his career choice. Even though he is making a real effort to muster his resources and direct them towards the class (deliberate constraints), he finds himself being defeated by other thoughts (automatic constraints) in the battle for attention. This example shows how the processes that inflict the two types of constraints on thoughts operate interdependently by sharing resources (the student cannot find enough room in his head to handle both thoughts simultaneously), but at the same time are able to have their own target; even when it conflicts with the other one. This explanation accounts for why thought is not always an effective neither efficient capacity.

This model, in spite of being one of the most comprehensive current cognitive models about thought so far, and of its use for classifying human cognition based on its contents, still lacks an explanation for the shape or form in which these contents manifest themselves through the thinking experience.

Figure 4 shows a coronal cut of the thought line taken from figures above and has for objective to approach the morphologic dimension of thought. This model intends to incorporate the contributions that the cultural-historical perspective can make to the current understanding of mind-wandering and, even more broadly, thought in cognitive psychology. The notion of form, here elaborated, alludes to a dynamic and idealistic perspective, that is evidenced in the work of Goethe (Goethe, 1790/2009; Bertau and Tures in press). Form, then, is presented as a dynamic and changing structure in permanent development, evolution and interaction with a situated social reality

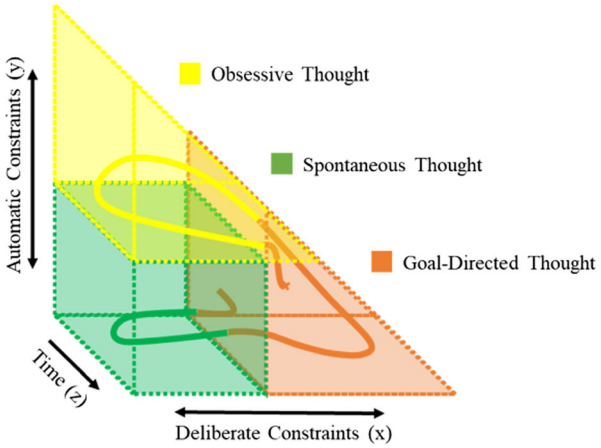

Fig 3 A new approach to the model of spontaneous thought (Andrews-Hanna et al. 2017)

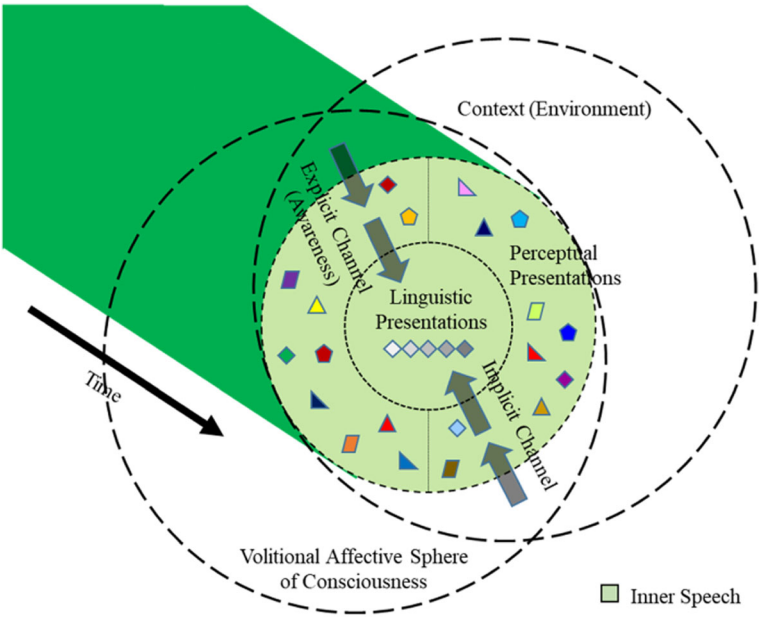

Fig. 4 Model of perceptual and linguistic presentations as forms of inner speech. Morphological model of thought

(Goethe, 1790/2009; Bertau and Tures in press). This means that the study of thought's morphology does not constitute the study of an isolated internal cognitive process, but of the interaction between an individual and a socio-cultural phenomenon (Bertau 2008; Bertau and Tures in press).

To explain this item, it is necessary to use the concept of inner speech, previously elaborated in this article. Inner speech, understood as the forms in which consciousness expresses to itself, must be located in the space of interaction between an environment and a person's volitional affective sphere of consciousness. This is, from Vygotsky's perspective, the space of interaction between socio-cultural stimulation and the motives that constitute thoughts' foundations in consciousness (namely, impulses, affective needs, etc.). This model proposes a two-level structure through which thoughts can be manifested; constructs that belong to the inner speech phenomenon's domain. In the first place, there is a perceptual presentational level, which contains multimodally symbolized information based on the experience of senses: smell, touch, taste, sight, hearing, among which physiological correlates of emotions (variations in breathing, muscular tone, facial expressions, among others) are included. In the diagram, each modality of information is designated with a geometric figure and its content with a color.

At this point of the argument, there is an inevitable clash between the cognitive sciences and the cultural-historical perspective about language that has to be addressed. This paradigmatic difference can be summarized by explaining the traditions that arise from it: representationalism and presentationalism (Shanon 2008). In cognitive sciences and research related to mind-wandering, thought has been considered to be "represented" through language; meaning that thought is first elaborated and then put into words that act as a container for it; hence the frequent use of the notion of representation (Reddy 1979; Wertsch 1991).

As for the cultural-historical perspective, Vygotsky's (1934) designated term of "completion" is most relevant to the understanding of the relationship between thought and language. Vygotsky (1934) conceives thought as a process that is not expressed, but completed, through language; meaning that the word is the part of the process at which the cognitive action culminates. According to this notion, then, language is a phenomenon that constitutes or "presents" a person's subjectivity and that does not merely serve the externalization ("re-presentation") of an internally conceived or framed thought.

Resuming the model, there is also a linguistic presentational level, which is non-vocalized and unimodal. Linguistic presentations correspond to a subsequent, or second order, symbolization process of perceptual presentations into linguistic structures that refer or connote the named of group of perceptual presentations at one point of the continuum. These types of presentations are shown in the diagram with the same geometric figure because of the modality they share (modality of linguistic presentations may vary for different persons or even at different moments) and with a scale of color because of the narrative structure they follow. Nevertheless, they are governed by rules other than those of vocalized language in its semantic and syntactic structure. According to Vygotsky (1934), inner speech has a tendency towards abbreviation and predication. It is frequent that a word or concept concentrates a great number of ideas; that is why, within the frame of inner speech, it is enough to refer to one word in order to think a complex idea. This implies a preponderance of the word's sense over its meaning. Resuming Vygotsky's words:

> In inner speech there is a preponderance of the words sense over its meaning (...) The sense of the word is a sum of all psychological events evoked in our consciousness thanks to the word. Therefore, the sense of a word is always a dynamic, variable and complex formation, which has several zones of different stability. Meaning is only one of those areas of significance; the most stable, coherent and precise. A word acquires sense in its context and, as is known, changes it in different contexts. On the contrary, meaning remains unchanged and stable through of the words sense changes in different contexts (...) The word in its singularity has only one meaning. But this meaning is no more than a potency that is materialized in living language, in which this meaning is merely a stone in the building of sense (Vygotsky 1934, p.333).

This entails the word is loaded with sense; at the same time maintaining a tendency to eliminate the subject and keeping only the predicates of a sentence, for transmitter and receptor coincide within inner speech. Resuming this articles model, the sense of a word or phrase concentrates all perceptual presentations that it accompanies at any given moment within experience.

Within the linguistic presentational level, the existence of various degrees of complexity of presentations can also be propound in terms of their structure and the amount of information they are constituted of.

According to this model, every thought presented within experience is semiotically mediated by some form of sign; whether it is in a basic or perceptual nature, or a more complex, hence, linguistic nature.

The proposal also accounts for the channels through which thoughts, on the levels described, are formed and present themselves. On one side, there is information laying outside the attentional scope of the person, which can be catalogued as part of an implicit channel; and, on the other side, there is information laying within the attentional scope of the person, which - therefore - can be catalogued as part of an explicit channel that unfolds along with the awareness phenomenon. This division means that there can be varied percentages of explicit and implicit thought, regarding the whole thinking experience, at different times.

Everything mentioned above, has repercussions in the way awareness is understood. Under the notion that explicit thinking is aware, as opposite to implicit thinking, awareness is no longer a dichotomous nor absolute category (as it was understood in previous cognitive literature), but a measure in which the total amount of awareness (in the frame of a whole thought process) is set by the relation in information afference from both channels previously described. In other words, there are always both explicit and implicit elements in thought whose relation shapes the awareness perception.

Within the perceptual presentational level, information proceeding from both channels is divided by the capacity of a person to direct her or his attention to the presentations; unlike within the linguistic presentational level, when the second order symbolization process integrates information coming from both channels. This means that the picture becomes somewhat more complex when trying to approach awareness perception on the second level of the model. Take, for example, a student who knows the answer to a question her teacher just asked, but is afraid to raise her hand in class and, therefore, decides not to do so. The thought or reasoning underlying the raising hand behavior suppression could be: "I may get the answer wrong and everyone is going to think I am dumb, for which they will stop valuing me, will make fun of me behind my back as it has happened before and I will lose my chance of having friends". This thought has a background of experiences in which the student probably felt or had the expectation of feeling foolish, ignored, rejected or humiliated in front of others for expressing her ideas, which left her with a special sensitivity towards public speaking that leads her to avoid situations in which she infers the past suffering could be repeated or the expectation formed about it could be fulfilled. Out of this situation comes off a crucial query for this model's argument, which is: How does this thought present itself exactly around the time the student is faced with the decision of raising, or not, her hand in front of the class? Certainly, in the middle of a situation that awakens her anxiety, the student is not able to make a thorough meditation about the origins of her fear and elaborate them to herself as clearly as was done in the example (otherwise her problem would be already halfway resolved), which means the total amount of the linguistically elaborated content was not in her attentional scope or part of her experience by the time she made the decision of not raising her hand.

As a result, two possible hypotheses emerge. The first, and simplest, is that there are linguistic presentations manifested implicitly in thought and, therefore, the total amount of linguistically elaborated content that explains the behavior of the student is divided between the two channels. The second, based on inner speech's theory, is that the linguistic presentation is formed by, but does not correspond to, the whole reasoning narrated as example. The underlying text that was proposed as an explanation for the student's behavior in this case is subject to the rules of vocalized or written language and logical reasoning, while linguistic presentations are governed by rules of inner speech. Based on this, the linguistic presentation of the student during the episode of

anxiety could have been just her voice telling her: "I may get the answer wrong", which is explicitly presented, and the rest of the thought that completes the narrated experience could have been constructed by perceptual presentations filled with reminiscent sensations of the painful moments she lived or pictured herself living times before when being faced by a similar situation. According to this hypothesis, linguistic presentations are explicit and, therefore, awareful forms of thought; but the possibility of cognitively elaborating the sense carried by the word or internal expression depends on a later analysis of experience.

Figure 5 presents a diagram that shows the dimensionality of awareness. The horizontal line stands for the full range of thought of a person and is divided by a dotted vertical line that draws the separation between explicit and implicit forms of thought from left to right, respectively. It could be argued that what has been considered awareness in cognitive literature so far has been the crossing of an explicit thought threshold from which on the person gets a sense of monitoring and has the capacity to coherently explain and communicate a part of the content of his or her thoughts, which is why an additional vertical line was included to illustrate this awareness threshold. On the other side, it could also be argued that situations in which explicit content is poor, vague or disorganized have been considered in cognitive research as lacking awareness at all.

One last distinction that must be established is the one between patterns of habituated behavior and behavior mediated by thought or inner speech. All behavior has an origin, but not necessarily an "in situ" thought, as a volitive cognitive-affective process. Continuing with the example situation previously elaborated, it could be that the student who suppresses the act of raising her hand during class because of the fear and anxiety she feels towards public speaking generates a behavioral pattern by which she eventually stops considering the possibility of participating in class at all. In such case, the action of keeping silence would no longer happen by suppression, but instead would start happening by omission and, therefore, without an active cognitive-affective choice making process. Therefore, the next time a teacher invites the students to share their opinion or the results of their work, the student referred and her thoughts may well be focused on the next exercise, in the joke her classmate is telling or she just might be experiencing an episode of mind-wandering, just to name a few possibilities. This does not mean the analyzed behavior loses its reason to be nor its historical context in the person's memory, but in an automation process its contents stop taking over thought resources every time it happens.

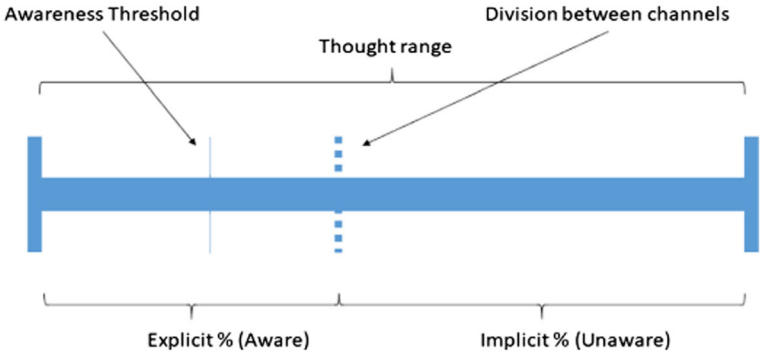

Fig. 5 Explicit and implicit thought during everyday experience

Discussion

This paper has developed a comprehensive model of the trajectories of thought process or inner mental activity. Through a theoretical exploration that integrates the work of Andrews-Hanna et al. (2017) about spontaneous thought, Seli et al. (2017) and Smallwood and Schooler (2006) about mind-wandering and previous authors' work (Fossa 2017; Fossa et al. In press), this article makes a critical analysis of current scientific literature on the topics and argues that the way spontaneous thought and other types of cognition have been described explains only part of what inner mental activity is in a larger thought process' framework. This gap in the understanding of thought as a broader mental activity was addressed by introducing what in classical psychology's literature has been conceptualized as inner speech.

Ideas elaborated in this work allow a further comprehension of thought, acknowledging that there is not only executive control and thought deviation, but rather a complex transitive flow in the continuum of consciousness. This implies the existence of multiple trajectories and transitions between different types of inner mental activity and their symbolic nature or the way they present themselves in daily experience. The study of thought phenomenon's inherent complexity must necessarily include the understanding of inner speech, its transitions and the different ways it can be expressed.

Thought deviations and ruptures, which have guided the comprehension of mind-wandering until recently, constitute moments when the conscious experience flow shifts and are determined by the influence of a physical and social context and the deepest spheres of consciousness, in Vygotsky's understanding of the concept (motivation, impulse, affection, among others).

Propositions developed so far in cognitive scientific literature (see Andrews-Hanna et al. 2017; among others) have understood thought as an a-historic, a-temporal and amorphous phenomenon. Integration of current models on spontaneous thought and mind-wandering theory with classical postulates from psychology's history has allowed a growing complexity in the comprehension of inner mental activity and its trajectories by adding dynamics, hierarchy and shape to its understanding.

The present article enlarges the understanding on dynamics of thought by adding temporality, it introduces the topic of thought morphology in the search of advancing to a fuller comprehension of a whole thought process and, within that model, also proposes a new way of conceptualizing awareness as a dimensional category.

The proposed model entails some assumptions that will have to be tested by future research efforts and empirical data: for example, the two level structure within thought's morphological model and the relation between implicit and explicit thinking. To this end, the development of experimental designs that are sensitive to different thought's symbolic natures and how they present themselves in experience becomes of paramount importance; designs which current research is lacking. A promising possibility would be to approach this research challenge by exploring how the symbolic nature of thought changes between individuals and, especially, between people with different sensory disabilities; mainly sight and hearing loss, for those are the primary senses by which human language is coded.

From this articles perspective, a key to add complexity to the study of psychological phenomena, specially thought, and deal with current research challenges lies in bringing back to the surface traditional and old-established ideas from classical texts and

make them dialogue with modern ideas proposed by updated research literature. This view raises the importance of giving context to the highly specified phenomena being studied, which have been reduced until being objects of variable controlling, through broader frameworks that allow congruence and orientation of scientific efforts to be assessed. This does not mean all traditional thinking should be considered as completely accurate material under whose standards current articles should be tested. Having endured the test of time or coming from a famous, admired and important figure in science history is not as valuable as their ability to guide and shed light onto topics or aspects of topics present scientists tend to overlook in the current frame of scientific research.

In this line of integrative thinking, the article considers how modern literature has described different phenomena of consciousness delimiting various aspects of them: their willfulness/involuntariness, level of control, orientation or directionality (goal or inner need), level of awareness in consciousness, content (words, images), or even repeatability (rumination). All of these features or dimensions are ways in which consciousness expresses to itself, namely, forms of inner mental activity upon which thought transits. These forms of expression allow the description of transitions and trajectories that experience takes in the flow of consciousness.

Nevertheless, these dimensions, features or forms of expression constitute a single and unique phenomenon. This means language is present in all phenomena described, or better said, every thought is an expressive display of consciousness communicating something to itself.

This way, if the phenomenon is not reduced to its components or specific categories, all that is left is thought as a psychological process in every one of its possible expressions. This complexity of expressions and displays of consciousness is what makes it challenging to create scenarios and experimental devices that can approach such a comprehensive phenomenon. It is due to that reason, the great difficulty for variable controlling, that the phenomenon must be segmented and studied as differentiated things; even though, in strict rigor, it constitutes a single experience in consciousness.

Because of the great challenge that stands by explaining such a wide phenomenon, different classifications in modern literature enter a state of tension or conflict with one another when explored in depth altogether. For example, mind-wandering has been conceptualized as a product of thought being redirected towards inner experience due to an activation of personal goals (Smallwood and Schooler 2006, 2015). Yet, some research has been made on its temporal features, creating the distinction between future and past oriented mind-wandering, depending on its contents (Seli et al. 2014, 2017). Logically, these statements are not congruent between each other, since a goal always refers to a desired situation in the future. Therefore, either mind-wandering is not always goal related or the phenomenon described as mind-wandering with past temporal orientation actually has been poorly named (perhaps should have been described as rumination, for example), affecting the knowledge about mind-wandering.

Something similar happens when taking a look at articles that explore the link between mind-wandering and various mental illnesses; stating, for example,

correlations between types of mind-wandering and disorders such as OCD and ADHD (Seli et al. 2017). At least in case of OCD, the ground for the link established cannot sustain itself, since OCD is in its own definition characterized by the presence of obsessive or ruminative thoughts, which have been recently differentiated from the mind-wandering state in literature (Andrews-Hanna et al. 2017). These are just a few examples that illustrate how a lot of the findings and experimental designs currently related to the wandering mind topic may have actually been addressing something other than what they intended, and it could all be viewed just as a consequence of how the phenomenon has been defined and understood from its own bases and foundations (Mills et al. 2018).

This article's proposal calls for further theoretical work that increases the complexity -instead of reducing it - of understanding on consciousness' dimensions and forms of expression. This implies, without a doubt, a methodological challenge to researchers, given the found necessity of generating new experimental designs that allow a further grasp of the phenomenon's inherent complexity. That is a path which will surely lead to new knowledge and the development of the discipline.

The present work constitutes an input to cognitive sciences, for it has elaborated a dynamic model that allows the comprehension of transitivity of thought in its many forms. On another hand, it sets the groundwork for new ideas in educational frames and the study of cognitive development. Besides, new theoretical approaches on thought trajectories like the one presented could lay the foundations for further questions in clinical and therapeutic research settings, with the purpose of exploring and understanding cognitive disturbances.

This view on thought process also affects the way therapy can be understood from the patients' experience. Morphological explanation of thought opens up the door to a fuller comprehension of timings, contents and shapes that constitute human and the consultant's inner mental activity. The fact that a patient's experience is predominantly not elaborated or, according to the model presented, has a predominant perceptual shape compels one to understand it as a far more raw, vague, confuse and convoluted experience than could have been originally imagined under the old-established and ingrained notion that reasoning is human race's most distinctive attribute. This raises a challenge to therapists, given that the main way in which the they can relate to the patients' experiences is through narration and, therefore, spoken language, logic and structure applied over brute information and feelings the mind yet does not make sense of through reason. Such a gap between levels of thought also accounts for anxiety and frustration during the process of longing and searching for meaning; and it is in this frame that the insight phenomenon, as the mind being relieved of its struggle, could be understood.

Future theoretical and empirical research should explore proposals here exposed, whether it leads to confirmation, remodeling or plain dismissal of the structures that have been built. However, importance of incorporating temporality and historicity of thought to cognitive research, along with the transitions and the different morphologies it can adopt, has been established in order to push forward the way in which mind-wandering and other cognitive phenomena here mentioned are understood.

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Compliance with Ethical Standards

Conflict of Interest The authors declare that they have no conflict of interest.

Ethical Approval This article does not contain any studies with human participants or animals performed by any of the authors.

References

Andrews-Hanna, J., Irving, Z., Fox, K., Spreng, N., & Christoff, K. (2017). *The Neuroscience of Spontaneous Thought: An evolving, interdisciplinary field*. In K. C. R. Fox & K. Christoff (Eds.), *The Oxford Handbook of Spontaneous Thought*. New York: Oxford University Press.

Baird, B., Smallwood, J., Mrazek, M. D., Kam, J. W., Franklin, M. S., & Schooler, J. W. (2012). Inspired by distraction mind wandering facilitates creative incubation. *Psychological Science, 23*, 1117–1122.

Banks, J. B., Welhaf, M. S., Hood, A. V., Boals, A., & Tartar, J. L. (2016). Examining the role of emotional valence of mind wandering: All mind wandering is not equal. *Consciousness and Cognition, 43*, 167–176.

Bertau, M. C. (2008). Voice: A pathway to consciousness as "social contact to oneself". *Integr Psych Behav, 42*, 92–113.

Bertau, M. C. & Tures, A. (in press). Becoming professional through dialogical learning: How language activity shapes and (re-) organizes the dialogical self's voicings and positions. *Learning,* Culture and Social Interaction. https://doi.org/10.1016/j.lcsi.2017.10.005

Bühler, K. (1933). *Theory of expression*. Madrid: Alianza Editorial.

Bühler, K. (1934). *Theory of language. The representational function of language*. Amsterdam: John Benjamins Publishing Company.

Christoff, K., Gordonb, A., Smallwood, J., Smitha, R., & Schooler, J. (2009). Experience sampling during fMRI reveals default network and executive system contributions to mind wandering. *PNAS, 106*(21), 8719–8724.

Christoff, K., Irving, Z., Fox, K., Spreng, N., & Andrews-Hanna, J. (2016). Mind-wandering as spontaneous thought: A dynamic framework. *Nature Reviews*, 1–10.

Cornejo, C. (2012). Contrasting Vygotsky's and Bakhtin's approaches to consciousness. *Culture & Psychology, 18*(1), 109–120.

Cresswell, J. (2013). Experience and socio-cultural psychodynamics: Comment on Larrain and Haye's "the discursive nature of inner speech". *Theory & Psychology, 23*(1), 123–130.

Damianova, M. K., Lucas, M., & Sullivan, G. B. (2012). Verbal mediation of problem solving in pre-primary and junior primary school children. *South Africa Journal of Psychology, 42*(3), 445–455.

Fossa, P. (2017). The expressive dimension of inner speech. *Psicología USP, 28*(3), 318–326.

Fossa, P. (In press). Lo representacional y lo expresivo: Dos funciones del lenguaje interior. Teoría e Pesquissa.

Fossa, P., Molina, Y., Awad, N., Ramos, F. & De la Puerta, S. (2018). The interaction between thought and environmental stimulation: Revisiting the theory of thought with images and thought without images. International Journal of Current Research, 10(2), 65618–65621.

Fossa, P., Awad, N., Ramos, F., Molina, Y., De la Puerta, S. & Cornejo, C. (In press). Control del pensamiento, esfuerzo cognitivo y lenguaje fisionómico-organísmico: Tres manifestaciones expresivas del lenguaje interior en la experiencia humana. Universitas Psychologica.

Fransson, P. (2006). How default is the default mode of brain function? Further evidence from intrinsic BOLD signal fluctuations. *Neuropsychologia, 44*, 2836–2845.

Goethe, J. W. (2009[1790]). *The Metamorphosis of Plants*. Cambridge: MIT Press.

Heery, M. W. (1989). Inner voice experiences: An exploratory study of thirty cases. *The Journal of Transpersonal Psychology, 21*(1), 73–82.

Irving, Z. (2016). Mind-wandering is unguided attention: Accounting for the "purposeful" wanderer. *Philosophical Studies, 173*(2), 547–571.

Kam, J., & Handy, T. (2014). Differential recruitment of executive resources during mind wandering. *Consciousness and Cognition, 26*, 51–63.

Killingsworth, M. A., & Gilbert, D. T. (2010). A wandering mind is an unhappy mind. *Science, 330*, 932.

Kinsbourne, M. (2000). Inner speech and the inner life. *Brain and Language, 71*(1), 120–123.

Kopp, K., & D'Mello, S. (2016). The impact of modality on mind wandering during comprehension. *Applied Cognitive Psychology, 30*(1), 29–40.

Levinson, D. B., Smallwood, J., & Davidson, R. J. (2012). The persistence of thought evidence for a role of working memory in the maintenance of task-unrelated thinking. *Psychological Science, 23*, 375–380.

Maillet, D., Seli, P., & Schacter, D. (2017). Mind-wandering and task stimuli: Stimulus-dependent thoughts influence performance on memory tasks and are more often past- versus future-oriented. *Consciousness and Cognition, 52*, 55–67.

McVay, J., & Kane, M. (2010). *Adrift in the Stream of Thought: The Effects of Mind Wandering on Executive Control and Working Memory Capacity*. In A. Gruszka, G. Matthews, & B. Szymura (Eds.), *Handbook of Individual Differences in Cognition*. New York: Springer.

Mills, C., Raffaelli, Q., Irving, Z. C., Stan, D., & Christoff, K. (2018). Is an off-task mind a freely-moving mind? Examining the relationship between different dimensions of thought. *Consciousness and Cognition, 58*, 5820–5833. https://doi.org/10.1016/j.concog.2017.10.003.

Mittner, M., Hawkins, G. E., Boekel, W., & Forstmann, B. U. (2016). Opinion: A neural model of mind wandering. *Trends in Cognitive Sciences, 20*, 570–578.

Mooneyham, B., & Schooler, J. (2013). The costs and benefits of mind-wandering: A review. *Canadian Journal of Experimental Psychology, 67*(1), 11–18.

Ottaviani, C., & Couyoumdjian, A. (2013). Pros and cons of a wandering mind: A prospective study. *Frontiers in Psychology, 4*(524), 1–9.

Piaget, J. (1922). *The language and thought of the child*. USA: Routledge Classics.

Poerio, G., Totterdell, P., & Miles, E. (2013). Mind-wandering and negative mood: Does one thing really lead to another? *Consciousness and Cognition, 22*(4), 1412–1421.

Reddy, M. (1979). The conduit metaphor: A case of frame conflict in our language about language. In A. Ortony (Ed.), *Metaphor and thought* (pp. 284–324). Cambridge: Cambridge University Press.

Ridgway, A. J. (2009). The inner voice. *International Journal of English Studies, 9*(2), 45–58.

Roberts, J. (2008). Expressive free speech, the state and the public sphere: A Bakhtinian-Deleuzian analysis of 'public address' at Hyde Park. *Social Movement Studies, 7*(2), 101–119.

Rosenthal, V. (2012). La voix de l'intérieur. *Intellectica, 58*, 53–89.

Ruby, R., Smallwood J., Engen H. & Singer, T. (2013). How self-generated thought shapes mood— the relation between mind-wandering and mood depends on the socio-temporal content of thoughts. *PLOS ONE, 8*(10), e77554. https://doi.org/10.1371/journal.pone.0077554

Seli, P., Carriere, J. S., Thomson, D. R., Cheyne, J. A., Martens, K. A. E., & Smilek, D. (2014). Restless mind, restless body. *Journal of Experimental Psychology: Learning, Memory, and Cognition, 40*, 660–668.

Seli, P., Smallwood, J., Cheyne, J. A., & Smilek, D. (2015). On the relation of mind wandering and ADHD symptomatology. *Psychonomic Bulletin & Review, 22*(3), 629–636.

Seli, P., Risko, E., Purdon, C. & Smilek, D. (2017). Intrusive thoughts: linking spontaneous mind wandering and OCD symptomatology. *Psychol. Res*. Published online February 17, 2016. https://doi.org/10.1007/s00426-016-0756-3.

Shanon, B. (2008). *The representational and the presentational. An essay on cognition and the study of mind*. Charlottesville: Imprint Academic Center.

Silveira, A. C., & Gomes, W. B. (2012). Experiential perspective of inner speech in a problem-solving context. *Paideia, 22*(51), 43–52.

Smallwood, J., Brown, K., Baird, B. & Schooler. J. (2012). Cooperation between the default mode network and the frontal-parietal network in the production of an internal train of thought. *Brain Research., 1428*, 60–70.

Smallwood, J., & O'Connor, R. (2011). Imprisoned by the past: Unhappy moods lead to a retrospective bias to mind wandering. *Cognition and Emotion, 25*(8), 1481–1490.

Smallwood, J., & Schooler, J. (2006). The restless mind. *Psychological Bulletin, 132*(6), 946–958.

Smallwood, J., & Schooler, J. (2015). The science of mind wandering: Empirically navigating the stream of consciousness. *Annual Review of Psychology, 66*, 487–518.

Smallwood, J., Baracaia, S., Lowe, M., & Obonsawin, M. (2003). Task unrelated thought whilst encoding information. *Consciousness and Cognition, 12*(3), 452–484.

Thomson, D., Besner, D., & Smilek, D. (2015). A resource-control account of sustained attention: Evidence from mind-wandering and vigilance paradigms. *Perspectives on Psychological Science, 10*(1), 82–96.

Villagrán, M., Navarro, J., López, J., & Alcalde, C. (2002). Pensamiento formal y resolución de problemas matemáticos. *Psicothema, 14*(2), 382–386.
Vygotsky, L. S. (1934). *Pensamiento y Lenguaje*. Madrid: Paidos.
Werner, H., & Kaplan, B. (1963). *Symbol formation*. USA: Lawrence Erlbaum Associates Publishers.
Wertsch, J. V. (1991). *Voices of the mind: A sociocultural approach to mediated action*. Hemel Hempstead: Harvester Wheatsheaf.

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