



Human Pacemakers and Experiential Reading

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This paper applies an embodied perspective to the study of reading and has a two-fold aim: (i) to discuss how reading is best understood in terms of cultural-cognitive performance that involves living bodies who actively engage with reading materials, and (ii) to spark a dialogue with neighboring disciplines, such as multimodality studies and movement studies, which likewise pivot on how practices and performances involve moving bodies: life is something we *do*. An embodied cognitive perspective considers how performance is constrained by and draws on expertise such as lived experience as well as the material affordances available in the situation. Such a perspective is crucial for reading research as this domain has been, and largely still is, dominated by the view that reading is a silent, disembodied activity that takes place in the reader's brain by means of neural mechanisms. However, recent studies of reading practices are starting to develop new explanations emphasizing the multimodal engagement in reading as crucial for managing the activity. While this perspective is still empirically underexplored, we seek to highlight how reading is managed by readers' dynamic, embodied engagement with the material. We call this engagement *cognitive pacemaking*, an action-perception phenomenon we argue should be considered as the key mechanism for controlling attention. We present here a framework to understand reading in terms of pacemaking by emphasizing attentional shifts constituted by embodied modulations of lived temporality. Methodologically, we combine a close reading of a classic literary text, with the focus on attentional modulation with a qualitative study of university students reading different short texts. We highlight how meaning emerges not primarily from linguistic decoding and comprehension, but also from cognitive-cultural, multimodal engagement with the text. Finally, we conclude that empirical reading research should focus on how embodied reading differs across contexts, genres, media and personalities to better scaffold and design reading settings in accordance with those aspects.

Keywords: reading, embodied cognition, cognitive pacemaking, attention, reading education

INTRODUCTION: READING IS ACTIONAL AND PUNCTUATED

A recent report by OECD, *Future of Education and Skills 2030* (OECD, 2018), highlights two essential and desirable cognitive and socio-emotional skills in modern society: creativity and empathy. In short, the dominant currency in the modern knowledge society is *critical thinking* and its related cousins: imagination, sincerity, and openness to great ideas on which to build

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resilient societies. In education, they are often associated with literary reading (e.g., Nussbaum, 1995; Schrijvers et al., 2019) allowing for the creation of fanciful universes, bold thinking, and exploration of various scenarios by engaging in affective-emotional as well as cognitive processes (Mar and Oatley, 2008; Kukkonen, 2016; Wolf, 2016; Mumper and Gerrig, 2017; Dodell-Feder and Tamir, 2018; Trasmundi and Cowley, 2020; Baron, 2021). Importantly, such processes go beyond a simple notion of conjuring (primarily visual) mental images (e.g., Kuzmičová, 2014). However, knowledge about how such cognitive processes are enabled, is scarce. While there is a dawning realization that reading is embodied and interesting work emerges within this field (see for instance; Mangen, 2008; Pirini, 2014; Mangen and Van der Weel, 2016; Norris, 2019; Hillesund et al., 2022), a disembodied view on reading continues to dominate in research as well as in pedagogical practice.

A disembodied view treats reading as a primarily mental operation of meaning-making. On such a view, there is little room to consider the function of the living, encultured body, that is, the person who *does* the reading. Still largely theoretical, work on embodied reading might seem a radical conceptualization; hence, empirical, qualitative work on what the body does and functions during reading is needed to further our understanding of the scientific and educational implications of the embodied turn in reading. Interestingly, modern neuroscience opens questions about the function of the body and culture and claims that cultural life indeed has increased capacities of the human primate brain. Dehaene (2009) argues that neuroscience should be integrated with cultural knowledge about how humans engage in social practices: “The new science of reading is so young and fast-moving that it is still relatively unknown outside the scientific community” (Dehaene, 2009:2). In a similar vein other reading researchers (e.g., Trasmundi et al., 2021) argue that little is communicated across disciplines, and that education is strongly biased by a mental understanding of reading, giving no room for teaching, and assessing reading as an embodied phenomenon in a systematic and scientific manner. In sum, reading is not primarily a silent, mental activity; it is an active, meaningful multimodal performance involving a living, moving, experiential, and encultured body.

As mentioned, only recently—approximately in the last two decades—there has been an increasing interest in the various ways in which reading is embodied (see, e.g., Mangen and Van der Weel, 2016; McLaughlin, 2016; Caracciolo and Kukkonen, 2021; Trasmundi et al., 2021; Hillesund et al., 2022) and multimodal (Pirini, 2014; Norris, 2019). While movement is key in human performances, the questions that remain are how this movement *changes* over time, and how it is enabled. By that we mean how the flow is ruptured, how breaks emerge and how performances are constantly punctuated, slowed down, or speeded up by the pacemaker (that is, the reader).

Despite acknowledged contributions from multimodal studies (e.g., Norris and Pirini, 2016), the role and nature of empirical breaks during reading performances is poorly understood. Typically, these breaks are discussed in negative terms, and conceived as distractive, interruptive, and economically inefficient by reference to, for instance, how digital reading

environments cue inattentiveness (Delgado and Salmerón, 2021), constrain attention span (Wolf, 2018), or how a reader struggles to get into what Csikszentmihalyi (1975, 1990) coined as “flow.” This critique might be true in terms of external disturbances when, e.g., a reader is distracted by a notification of an incoming e-mail. However, punctuations can also be self-enacted, as when the reader’s attention is prompted by curiosity which enables her to scrutinize a phenomenon further. Thus, different from ruptures imposed externally, breaks in the reading flow enacted by the reader are not necessarily disrupting or detrimental to reading.

In this paper, we emphasize the nature of the pacemaking and punctuations, the shifts in flow and breaks for reading experience. We hypothesize that these pacemaking processes in reading *amount to* imaginative and critical reading. In the next sections we will elaborate on what pacemaking is, what embodied processes it comprises, and what we understand by imaginative and critical reading. However, we can advance already that if our proposal is correct, it will be possible to find empirical support showing that imaginative and critical reading is accompanied by complex pacemaking processes enacted by the reader while reading and, correlatively, that cases in which the reader’s pacemaking is partially inhibited—by her own reading habits or by the situation—there will be a diminished level of imaginative and critical reading. We suggest that this focus will generate insights about how readers engage with texts by use of very different embodied engagement patterns.

Adequately accounting for reading thus requires (1) applying embodied frameworks to cases of reading and (2) expanding the boundaries of movement studies to include neighboring disciplines that due to its more subtle interaction dynamics will showcase the value of embodied approaches to higher cognition practices, such as reading. Our focus is modulation of attention in reading through an embodied cultural-cognitive framework. We suggest combining movement and multimodality studies to cognitive-oriented views to demolish the internal-external boundaries between communication and cognition (Trasmundi, 2016) to foreground skilled, experiential bodies (Trasmundi and Harvey, 2018).

Imaginative Reading: Pacemaking and Timescales

Consider the simple question: What is reading? To answer that question, you will need to consider an array of activities that go on as you engage with written material. For instance, imagine every rapid embodied adjustment and gesture your body makes: how often you vocalize, re-read syllables, words or passages; how you speed up or slow down; imagine the rapid saccading that goes on, or how you look up and away from the page, how you impose rhythmicity, stop, continue, go back, make connections and free associations, how you leaf through passages, point to the material, put it down or move it closer to you, how you underline, sigh, laugh, and generally experience emotional responses such as frustration, joy, and confusion. Consider the ongoing imagery, the ineffable aesthetic experiences—which consist of much more than the “linguistic

meaning” of the words you read. You constantly make *embodied-affective judgements*. Those judgements are the human mortar of *imagining*.¹ That is, your reading is much more multi-actional, punctuated, dynamic, and non-linear than commonly described in the reading research literature.

Punctuations play an important but hitherto neglected role in reading experience and performance (Trasmundi et al., 2022). Specifically, such ruptures and breaks may be fuelling the development of higher cognitive processes such as imagining as it requires the reader to make judgements during the reading, hence, to control the reading pace very dynamically. In what follows, we suggest viewing imagining as grounded in a particular reading practice which is bounded by how flexibly a reader adapts to and exploits emotional responses. The degree of a reader’s executive freedom depends on how well the reader improvises *in situ*; a result of both experiential backgrounds and social norms for curious behavior (Montani, 2019; Loaiza et al., 2020). Within an embodied approach, imagining is thus treated as a depicting; that is, a creation rather than a representation (Asma, 2017; Trasmundi, 2020). This view has been characterized as the embodied cognitive turn in imagination research and a steppingstone toward the development of an anti-representational model of imagining in reading (Van Dijk and Rietveld, 2020). However, studies of embodied imagining remain anchored in goal-oriented and highly performative contexts (sports, arts, music, design, etc.) where the coordination of the body and body-tool relation is the locus of interest (Malafouris, 2014). Embodied imagination researchers have been reluctant to enter territories that are saturated by language—such as alphabetic reading. Rather than approaching imagining as an operation of structuring semantics based on grammatical constructions on a page or screen, an embodied approach turns to the reader’s rapid, observable judgements *during* reading. Thus, breaks are assumed to function as a “construction resource” that enables the reader to exceed control over imagining, because temporal delays can be exploited for sculpturing and strengthening a reader’s stance. However, to our knowledge, no one has studied reading as a performance that changes over time. Embedded in reading, imagining becomes a complex process where the words on the page or screen play only a part (Duncker, 2021), and where the reader engages with her own engagement to read what is *not* in the text. While it is commonly agreed that reading involves more than decoding (Duncker, 2021; Kravchenko, 2021; Trybulec, 2021), the “more” is nevertheless a mysterious field. Often “the more” is ignored, or, alternatively it is treated as an epiphenomenon secondary to and depending on other underlying cognitive functions. Who you are, what you know, and your current mood constrain what you do with the text, and vice versa. Nevertheless, dimensions such as these are rarely considered part of reading proper, by reading researchers across disciplines.

To fill this gap, we propose a framework that models reading (regardless of its specific cultural manifestation) as an embodied and distributed performance (Benne, 2021; Trasmundi

¹In our parlance, *imagination* relates to the outcome of a process, whereas *imagining* is the creative, constitutive process of sensational impressions.

and Copley, 2021; Trasmundi et al., 2021) emerging from the integration of different timescales (see **Figure 1**).

The model provides an analytical focus on how embodied reading is enabled by a reader’s ability to manage the pace—a process that we will coin “pacemaking”—and how the reading can thus be observed as unfolding on a pico-micro-macro continuum. When the analyst zooms in on the rapid movements of the reader [the pico-scale²], the reader’s modulations of attention and the attentional shifts can be tracked empirically as saccading, rapid zooming in or out, etc.

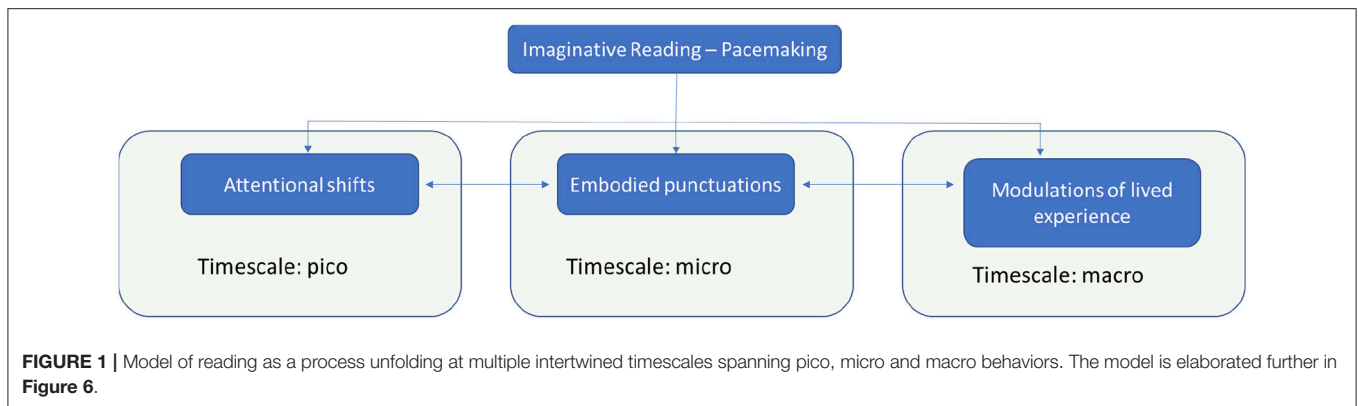
When focusing on the ecological, micro-conversational scale of interaction³ (this scale is concerned with situations/interactions unfolding in seconds and minutes), the embodied strategies that constitute the modulations of attention enacted by the reader during reading will surface, and can be identified as strategies or tricks to manage the task such as note-taking, highlighting, pointing, etc. Finally, when the analyst considers slower timescales pertaining to the reader’s lived experience (the macro scale), affective-cognitive judgements can be identified as the reader’s habitual forms of engagement, such as motivation, values, norms, interests, etc. Empirically, this socio-personal style is often interpreted in the emerging pattern of selective judgements; e.g., fixation on aspects, skipping others, emotional stances such as frustration, curiosity, etc.

The model we propose of imaginative reading consisting of processes unfolding at different timescales bears an interesting resemblance with, and can be enriched through, the analytical tools provided by multimodal interaction analysis (MIA) as developed by scholars like S. Norris and J. Pirini (see Norris and Pirini, 2016). Indeed, MIA provides a framework to perform detailed analysis of mediated actions (social actions) which comprise higher and lower level actions. Lower level actions, according to Norris and Pirini, include embodied processes like gestures and postural shifts, which seem to correlate with what we have called here embodied punctuations at the micro-timescale. In the same line, what we have called here modulations of lived temporality, at the macro-scale, could be interpreted within the MIA framework as higher level actions, which are defined within MIA as a chain of lower level actions. In sum, we conjecture that including insights from the MIA framework to the present enquiry would shed light on the issues here addressed. We leave open this line of enquiry for future research.

Crucially, as reading happens in the here-and-now, it is enabled by and draws on this temporal meshwork. The bi-directional focus of pico-micro-macro allows the analyst to interpret how the slower timescales are inherent in the rapid and how the rapid coordination movements sculpture the slower habitual forms of engagement.

²Pico-scale refers to Thibault’s (2011) notion of the rapid flow of minuscule, fast inter-bodily movements that enable humans to self-organize—often these processes happen below 200 ms.

³Gibson, referred to the ‘human perception timescale’ as ecological: “Human observers cannot perceive the erosion of a mountain, but they can detect the fall of a rock. They can notice the displacement of a chair in a room but not the shift of an electron in an atom. [...] [E]mphasis will be placed on events, cycles and changes at the terrestrial level of the physical world. The changes we shall study are those that occur in the environment.” (Gibson, 1979:12).



By approaching reading from this multi-temporal and embodied perspective, we develop an account of reading that considers it as a much more complex and richer phenomenon than the act of decoding and interpreting symbols on a page or a screen.⁴ We thus argue that readers are cognitive pacemakers, who—due to their experiential, embodied agency—are able to mesh multiple timescales for situational purposes. Imaginative reading, we will see, is centrally involved in the reader’s capacity to modulate attention, modulate embodied processes, and modulate lived temporality in reading.

METHODOLOGY: THEORETICAL FRAMEWORK AND DATA

Our point of departure is an embodied and distributed understanding of reading that takes seriously the neuroscientific evidence suggesting that different readers experience texts differently (Hruby and Goswami, 2011; Trasmundi and Cowley, 2020; Trasmundi et al., 2021). This fact entails the deceptively simple questions: *what does the reader attend to while reading, and how is that attention enabled and managed?* Answering these questions requires investigations of situated reading practices to explore how readers control attention. However, we also need to inquire into essential aspects beyond the reading that constrain how attentional processes unfold; like the role of the reader’s previous knowledge of the text, her personal memories, and the argument or story being developed by the author in the text, among many other elements. We thus designed an empirical study that allowed investigations of such questions. Specifically, our qualitative analysis of embodied reading is informed by empirical data that we have gathered through a semi-experimental setup in which university students read an academic article and a short story on paper. In this study 8 university students were asked to read a literary short story and

an academic article. The reading set-up was semi-experimental: the project team decided the time, place, and texts, however, there were no specific task beyond the instruction to read as they used to read both genres. We video-recorded their readings of both texts. After each reading, they filled in a questionnaire about their immersion and absorption processes, and they were interviewed and asked to elaborate on their reading experiences. The dataset gives a broad indication of how students engage with texts and how attention relates to embodied affective-cognitive experiences.

In the following analytical section, we use interview data from this study to shed light on how reading processes are experienced and constrained in practice. With this dual theoretical-empirical perspective we intend to show (1) the value of an embodied and multiscale approach to reading, and (2) how the categories in the proposed model translate to empirical observations of readers’ embodied engagements with texts. The outcome of such a deductive-inductive analytical procedure will be an innovative and interdisciplinary theoretical framework for understanding experiential reading, particularly focused on explicating the temporal complexity in actual reading performances. This complexity, we claim, is observed in how the readers *perform* reading through different embodied strategies.

The main objective of this article is to develop the aforementioned framework, which renders a more comprehensive and nuanced, embodied model of reading that treats it as multi-scalar, and which opens up for its punctuated nature in relation to attentional shifts. To do this, we have adapted and further developed a theory of the structure of consciousness initially proposed by the phenomenological philosopher Gurwitsch (2010). Our framework is based on theoretical and analytical considerations about the processes we have identified as crucial in reading (see Figure 1 above). The real value of this framework, we argue, depends on its applicability to generate, interpret, and integrate empirical reading data.

To illustrate the central notions of our embodied framework of imaginative reading, we combine in section Analysis: From Reading to Readers a close reading of the well-known novel *Don Quixote* with findings from a semi-experimental study of university students’ reading performances. We introduce a close reading of excerpts of chapter 22 of Cervantes’ *Don Quixote* with the sole purpose of illustrating the notion of

⁴Empirical evidence indicates that it may make a difference for higher-order reading processes such as comprehension whether the symbols are displayed on paper pages in a book or on a screen display (for meta-analyses, see Delgado et al., 2018; Clinton, 2019). Word limit prevents a more thorough exploration of the role of the substrate on which the text is displayed, but see Mangen (2006, 2008) for a phenomenologically inspired approach to the distinction between reading on paper vs. on screens.

attentional sphere and the attentional shifts that we consider central to a description of reading in terms of attentional processes. The formulations of the attentional transformations proposed by Gurwitsch can be very abstract, so we consider that applying them to a concrete case—a Don Quixote's adventure—will make them easier to comprehend. In addition, applying the attentional transformations to a concrete case of reading helps clarify how attentional processes unfolds during the act of reading.

On the other hand, the role of the experiential reports in the general argument of this article, although illustrative too, is to provide actual experiences of readers as reported by them briefly after reading. Through these experiential reports we aim at highlighting how the attentional shifts are associated with embodied processes in real life cases, and how some attentional shifts can be identified in the reports offered by the participants.

Therefore, the general aim of combining experiential reports and a close reading of Don Quixote is to highlight and explain the key components in the framework and to showcase the framework's relevance more generally by using it as an analytical tool for analyzing empirical data of how students engage with different kinds of texts.

We now turn to the analytical section in which we develop the theoretical framework of attention modulation during reading. In addition, we show how that abstract model can be applied to interpret and integrate various types of empirical data.

ANALYSIS: FROM READING TO READERS

The attentional processes underlying reading at the pico-timescale are much more varied and complex than previous theories of reading and of attention portray (see, e.g., LaBerge and Samuels, 1974; LaBerge, 2002). In addition, identifying some of the crucial mechanisms underlying attentional processes in reading can shed light on how imagination, creative and critical thinking are constrained by and developed through different reading strategies.

We claim that these attentional processes underlying reading do not unfold in a disembodied abstract mind: readers are always reading in a socio-material context. Following the principles of embodied cognitive science, we conceive the reader as an embodied and situated agent. This perspective means (a) that a study of reading must, in turn, involve a study of the reader, and (b) that we treat the reader's attentional processes as fundamentally embodied, yet also shaped by previous embodied experiences. We apply these insights in our analytical framework, which we will develop throughout the article, by emphasizing how embodied strategies of pacemaking in the range from pico- to macro-timescales co-determine the attentional shifts unfolding during reading. Altogether, this multi-scalar perspective reveals how readers rely on basic cognitive pacemaking skills to constitute the pace of reading at every moment of the process: slowing down here, accelerating there, and stopping altogether over there. This pacemaking trajectory is dynamic and thus changes during reading as the reader's attention is prompted. The model is further elaborated

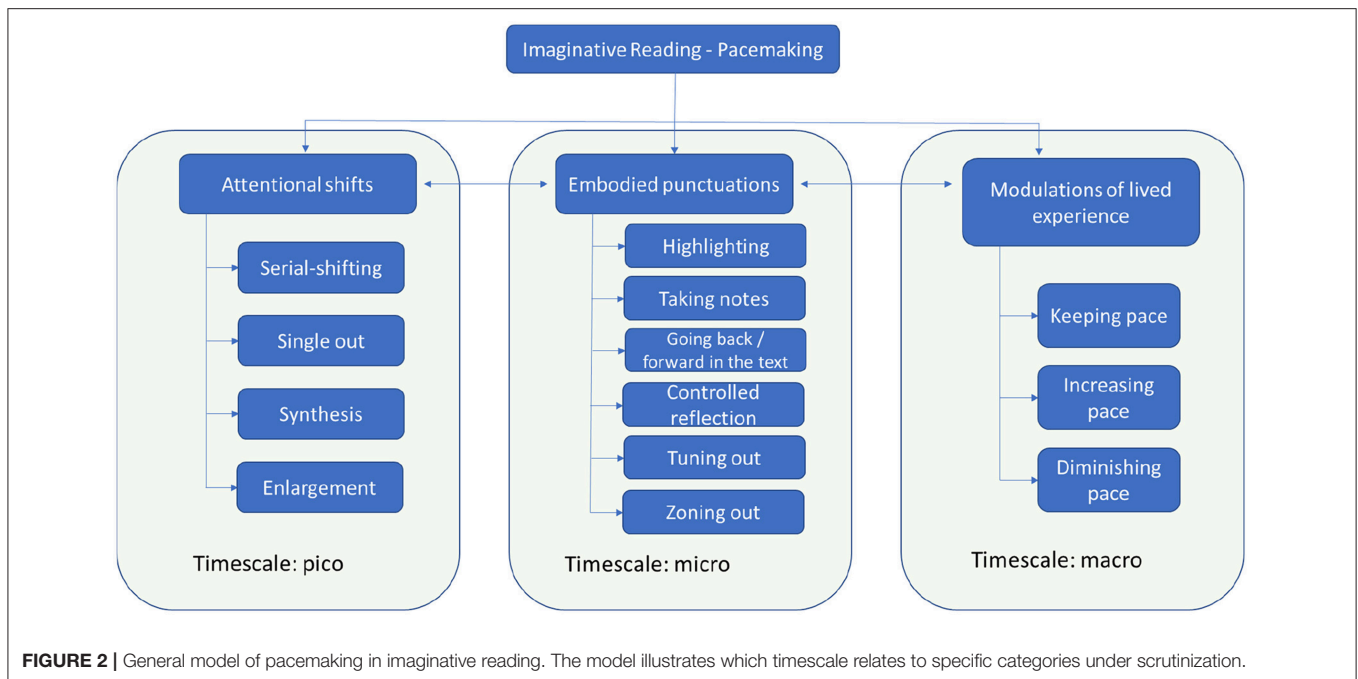
and introduces a heuristic of categories unfolding on each temporal scale that the analyst can attend to (see below).

Below follows a step-by-step description of the framework which, illustrated with empirical case examples throughout. The description covers the categories and their relation to different temporal scales as depicted in the model above. First, we introduce the notion of attention, conceived as a multi-scalar and embodied modulation of reading behavior (section The Role of Attention for Imaginative Reading). We argue that this basic notion of embodied attention is necessary to understand how imaginative processes emerge in reading (section Setting the Scene: Imaginative Pacemaking in a Close Reading of Don Quixote). In section Attentional Shifts and Transformations by Pacemaking Readers, we describe four kinds of attentional shifts (serial shifting, singling out, synthesis, and enlargement) at the reading pico-timescale (cf. the left box in **Figure 2**). We integrate the concomitant embodied punctuations at the micro-timescale (cf. the middle box) and the modulations of lived experience at the macro- timescale (cf. the right box) in each attentional shift to underline the multi-scalar and embodied nature of reading performance. Together, this framework provides a conceptual frame for investigating imaginative reading as cognitive pacemaking instantiated in the underlying processes enacted by the reader that unfold at different timescales. In the concluding section (section Concluding Remarks and Educational Implications), we flesh out the implications of our model for educational practices around reading. Finally, we underline the untapped potential entailed in an interdisciplinary endeavor such as ours, by encouraging reading research and multimodality and performance studies to engage in fruitful dialogue about the role of embodied cognition.

The Role of Attention for Imaginative Reading

While imaginative processes require attention of some sort, we are here interested in defining the dynamic nature of attention and its enabling conditions. Within an embodied framework a model of attention must consider how attention is enabled, managed, and modulated through performance. The phenomenon of attention has been studied systematically since, at least, James' (1983) seminal work *The principles of psychology* (originally published in 1890). James' proposal reduces attention to two co-existing processes: (i) the accommodation or adjustment of the sensory organs, and (ii) the anticipatory preparation from within the ideational centers concerned with the object to which attention is paid (James, 1983:411). Importantly, James' conception of attention shows the concomitance of two kinds of processes: the embodied acts of adjustment to the object of attention, and the imagination or anticipation of it (see also Mole, 2021).

Despite James' influential contribution to the conception of attention as whole-bodied agency, its embodied aspect has been overlooked in most of the research on attention in the last 100+ years. In the 1950's, the cognitivist conception of the mind treated it is mental, and brain-bound. Attention, thus, was explained in terms of computational information processing



(see Thompson, 2007). This view of attention gained ground through the work of Broadbent (1958) who treated attention as *a bottleneck* in information processing. Broadbent's idea is simple and compelling: we need to filter out the noise from the overflow of information, which, he argues, becomes a job for the attention (see Mole, 2021).⁵

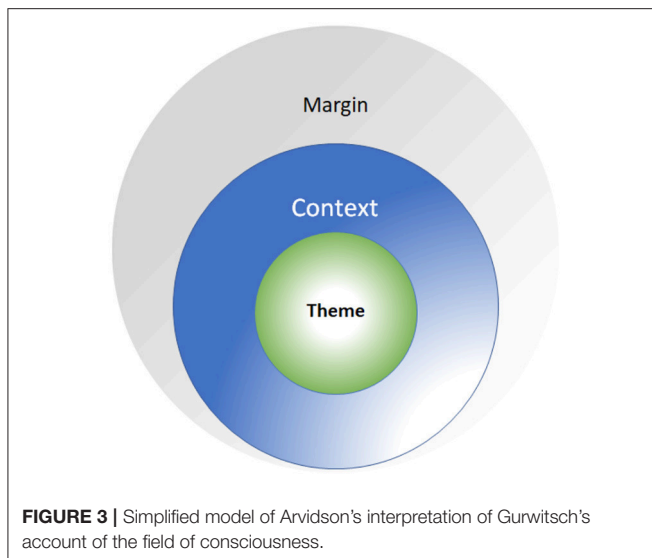
Within this cognitivist framework, LaBerge and Samuels (1974) proposed a seminal account of reading in terms of prevalent theories of attention. According to their proposal, two attentional processes are involved in reading: an automatic letter-word decoding process, and a controlled

translation/comprehension of entire sentences. Simply put; it is the brain that reads. The logic underlying this idea is that due to the limited information-processing capacity of our brains, it is important to automatize some of those processes through statistical learning. By automatizing such processes, the system liberates capacity to perform the more demanding information processing tasks. This is how LaBerge (2002:223) describes the process:

Upon first exposure, letters and words require attention in order to be perceived as units, but with repeated exposures they can be perceived without attention, i.e., automatically. Attention also is required at first to associate perceived words with their meanings, but with practice, a word can evoke its meaning without attention, i.e., automatically. Thus, when visual words are perceived and their meanings accessed automatically, attention can be dedicated entirely to the goal of reading, which is the comprehension of the combined word meanings in sentences.

In this model, reading is “flat” and denotative, in the sense that nothing emerges beyond the meaning “already there.” Despite the problems of LaBerge and Samuel's (1974) proposal, its theoretical value is undeniable, especially if considered together with later developments (e.g., LaBerge, 2002). Specifically, LaBerge and Samuel showed how some of the attentional processes gradually become less conscious and more automatic. The most important shortcomings of their account derive from some of its core cognitivist assumptions. First, in line with the cognitivist paradigm, LaBerge and Samuel assumed that reading happened in the brain, and they thus disregarded the living body, the reader. Second, even though in some respects the theory can be interpreted as a description of the reading experience, it is mostly concerned with the sub-personal mechanisms underlying

⁵Another highly influential account of attention, developed in the 1980s by Anne Treisman, is that according to which attention is a process that binds together the different properties (color, shape, smell, motion, etc.) into a unitary object of perception. Attention solves what is known as the binding problem, derived from the claim that the properties of the object perceived are processed by different detection centers in the brain (one for color, another for shape and so on). In very general terms, the Feature Integration Theory claims that by delimiting spatially the “window” of attention (i.e., by focusing on the space in which the object is located) all the features perceived at one location are merged into one and the same object (see Treisman and Gelade, 1980; Treisman, 2003). Probably the contemporary theory of attention that has moved more decidedly toward an embodied account has been the selection-for-action theory proposed by Neumann and Allport independently of each other in 1987 (see Allport, 1987; Neumann, 1987), and later taken up by Wu (2014) and other theorists. Wu formulates it as a conditional: “If subject S selects X for some action A, then S attends to X” (Wu, 2014, 83). If, for instance, I select out of a set of many objects a football to kick it with my left foot, I have selectively attended the football for my action of kicking. This is not the place to analyze in detail this theory of attention, however, we would like to emphasize two aspects of it that are relevant for our present purpose: it proposes an account of attention that gives pride of place to bodily action, and it describes attention at the personal level of explanation. Despite these two important features of the selection for action theory, it still doesn't take us very far when it comes to describing the highly complex attentional processes occurring in the act of reading.



reading, such as neuronal structures. For this reason, the description of the experience of being attentive to the content of the text, and to the symbols displayed on the paper (or screen) is superficial. And third, the conception of reading is narrow and reductionist as it conceives reading as the act through which the reader grasps some fixed meaning encoded in a text (i.e., reading defined as information processing).

To address the above-mentioned shortcomings, we adapt Gurwitsch's (2010) schema of attention to a recent embodied cognition framework. In Gurwitsch's theory, the structure of attention can be likened to a sphere constituted by three dimensions: *the theme* (at the core) *the context* (surrounding the theme), and *the margin*, as the outer shell. This idea has been visualized in Arvidson's (2006) reinterpretation of Gurwitsch's theory (see **Figure 3**).

Setting the Scene: Imaginative Pacemaking in a Close Reading of *Don Quixote*

To illustrate how the content of a specific experience is distributed in the dimensions of the attentional sphere, imagine you're reading the novel *Don Quixote* in the 1008-page paperback version published in the Oxford UP World's Classics series. *The theme* corresponds to the focus of attention, in which the object of attention appears as a well-formed, unified, and coherent whole. You are for the moment focused on the event in which Don Quixote liberates 12 prisoners who are being taken to the galleys by the King's orders (Cervantes, 2008:Ch. 22). That event is the theme of your attention. Don Quixote's encounter with the prisoners emerges, as the object of your attention, from *a context*, and the encounter between Don Quixote and the prisoners gets its meaning from it. Here the context is constituted by many elements: what you've read so far about the adventures of Don Quixote (you already know about his madness), your personal memories about similar or related events, the knowledge you have about literature, about history, etcetera. There is, then, a relation of relevance and co-dependency between the context and

the theme, and both constitute a gestalt unity of foreground and background. Some parts of the context might be more relevant for the theme than others, but all of them hold a relation of coherence insofar as they serve as the context for the theme. Since attention is a dynamic process, whenever there are changes in the theme, there are necessarily corresponding changes in the context. You could, for instance, focus for a moment only on one word and its meaning in a specific sentence. In that case, the encounter of Don Quixote and the prisoners ceases to be in the theme and becomes part of the context of your attention (this is one of the many possible attentional transformations).

Finally, *the margin of attention* presents the socio-material situation more generally, which is not directly related to the theme and the context but is nevertheless co-present with them. While you are reading, focused on Don Quixote's adventures, there might be the noise from someone mowing the grass outside. This not necessarily disturb your experience of reading, but it is still noticed as unimportant. At the same time, you may be aware that the light is dim, and that the room is warm, and that in general there is a whole environment around you, but none of this appears as part of your focus on Don Quixote. You are also aware of the time passing by while you read, but you are not focusing on that either. Your progress through the thick paperback is indicated by the tactile feedback of the substrate (volume) of the book, indicating roughly how much you have read of the text, and how much remains. By comparison, if you read this novel as an e-book, such information is rendered only visually. Whereas, you may not be aware of it, empirical evidence suggests that the differences in sensorimotor contingencies between a print book and a digital display may affect aspects of the reading experience (Mangen and Kuiken, 2014; Mangen et al., 2019). And, finally, you may also be aware that you are sitting on a sofa, with your legs crossed, and a bit tilted to the side, so you catch the light from the lamp beside you.

In this description the three orders of the margin identified by Gurwitsch are present: (1) a certain sector of our perceptual environment, (2) the stream of consciousness, and (3) our embodied existence (see Gurwitsch, 2010). The stream of consciousness refers to the lived time that is necessarily co-present with any experience, and the embodied existence concerns the pre-reflective awareness of being in a certain bodily posture and performing some specific bodily act—e.g., turning the page by swiping across a screen or turning over a sheet of paper in a print book. From a phenomenological point of view, the three orders of existence in the margin are far from being contingent or unimportant: they are, in Gurwitsch's words "*an a priori necessary condition of consciousness*" (2010:448; see also Merleau-Ponty, 2012).

This account of attention applied to the specific case of reading makes progress in important regards compared to previous accounts. It introduces the topic of embodiment as a necessary element in the theory of attention. Moreover, Gurwitsch's account calls attention to the lived temporality and its transcendental role in all attentional processes (which we will develop further below, in relation to pacemaking). And, finally, by conceiving attention as a struggle of inter- and intra-dimensional forces, we can develop an account of reading that goes beyond the act

of decoding letters and words, and grasping meanings encoded therein. Attention is thus not fixed, but a flow that changes throughout the course of reading, and finally it is a cultural practice that also impacts how habits and forms of attending proves useful within a certain sociocultural niche. We will now present how those specific attentional shifts are enabled and how they relate to imaginative reading including creative and critical thinking.

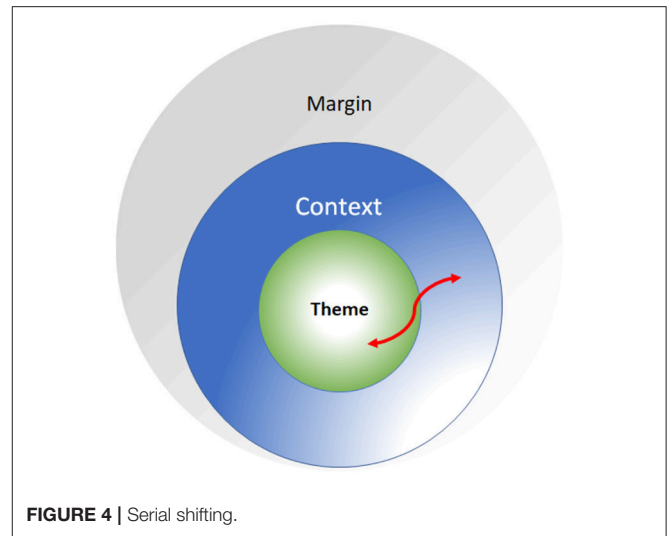
Attentional Shifts and Transformations by Pacemaking Readers

We have emphasized the dynamic and bodily character of attention. The fact that we frequently shift our focus during performances reveals an intrinsic feature of attention: it is a tension—a battlefield of forces, pulling us to attend to these forces at every moment. As fleeting as our attention might be, the transformations it undergoes hold a regularity that can be described in terms of the modifications of the theme, the context, and the margin. Some attentional shifts occur within one of these dimensions, others are more radical and modify all dimensions at once. In what follows, we describe some of the most relevant transformations of attention in principle (see Arvidson, 2006 and Gurwitsch, 2009:ch. 10), and propose how reading can be understood in terms of those transformations within an embodied framework. We elaborate on the embodied punctuations as pacemaking operations that are the empirical anchor points around these attentional transformations. We suggest a heuristic of four kinds of attentional transformations as visualized in **Figure 2**: serial shifting, singling out, synthesis, and enlargement. For the sake of simplicity, we continue to refer to the reading of the novel *Don Quixote* in the medium of a print book. The role of the medium (and substrate) for experiential aspects of reading is only beginning to be understood (see, e.g., Spence, 2020; Baron, 2021; Hillesund et al., 2022), and a more in-depth exploration of the ways in which the affordances of the substrate may affect embodied-affective reading is currently pursued in a follow-up paper.

Serial Shifting

Serial shifting emerges in a specific kind of exchange between the theme and the context: from the context emerges a content that becomes the new theme, and the former theme becomes then part of the new context (see **Figure 4** below). Gurwitsch describes it as a progress “*from one theme to another; however, to a theme which was materially related to the one ‘held in grasp’ before, both belonging to one and the same sphere of objects*” (Gurwitsch, 2009:255). Other examples of serial shifting are listening to a song, performing a step-by-step task, and listening to a story (see Arvidson, 2006).

We claim that the main attentional progression in reading corresponds to serial shifting. To continue with the example of reading *Don Quixote*, let’s suppose you are now reading about the encounter of Don Quixote with the prisoners. You keep reading about the reasons why the prisoners have been sent to the galleys by the king, and how Don Quixote ends up attacking the guards to release the prisoners. Here, the theme of attention goes from Don Quixote’s encounter to the reasons why they have been held



prisoners, then to Don Quixote’s deliberations about why they should be set free, and finally to his attack of the guards. At each progression, the former theme becomes part of the context, and the context frames the theme. While you read about the reasons the prisoners give for being held captive, the whole scene of the men tied with chains recedes to the context and now the focus (the theme) is the reason that one of the prisoners give: “I am going for making a little too free with two she-cousins-german of mine, and with two other cousins-german not mine: in short, I carried the jest so far with them all, that the result of it was the increasing of kindred so intricately, that no casuist can make it out” (Cervantes, 2008:167). Don Quixote keeps asking the prisoners, and he concludes that they should be set free. While you read his thought process, the stories of the prisoners become the context, thus informing Don Quixote’s argument to liberate them. And, finally, when you read that Don Quixote charges against the guards, the previous events you have read about constitute part of the context, which gives meaning to Don Quixote’s attack.

In reading, then, we see an attentional progression in which each part that has just been read becomes the context for the new theme, while, at the same time, an element that was in the context only vaguely or implicitly, is addressed and developed in the theme. Surely, there are many ways to read, beside the “orthodox” one: the reader might skim pages, go back to look for a specific paragraph, and so on. However, even in these cases, serial shifting is taking place, though possibly in a hybrid form, combined with other attentional transformations. This attentional progression at the temporal rapid scale is necessarily linked to embodied processes ranging from temporally pico- to micro scales that make the progression possible and regulate it. Trivially, the movements of the eyes over the letters and words are embodied processes associated with serial shifting. But, in addition, we find here the movements of the hands to hold the book at the right distance, the legs and torso to keep the posture adequate for concentrating on the text, the often the unconscious

movements of the mouth that accompany difficult parts of the text, etc.

If readers adapt to the social norms for reading in this scale, thus avoiding becoming reflectively self-aware, we can claim, following Gurwitsch, that the embodied processes remain at the margin of this attentional progression. While you are pre-reflectively aware of many bodily processes unfolding while you focus on Don Quixote's misadventures, you are aware of your (lack of) effort to maintain the flow: for instance, by keeping the right distance of the book to your eyes, and of the book to the lamp, among many other embodied acts. Nonetheless, even though all these processes are integral to your act of reading, they mostly remain outside of your focus on the story when absorbed, but rather they are supporting it, making it possible, and regulating it. Sartre describes similarly the consciousness of the body while reading: "The body is in no way grasped for itself, but it is a point of view and a point of departure: one after the other, the words slide before me; I *make them slide*" (...) (Sartre, 2018:443. Italics in the original). If the embodied processes forced their way into the theme, they would disturb the act of reading, and the body would cease to be a 'point of departure' to become the focus of the activity. This is how one of the participants in our semi-experimental study describes her experience of reading in bed: "[when I read] in bed I can't just stay in one position, so I have to change: I will lie down a little, now I'll turn around on my stomach, and there are all these things; whereas if I'm sitting at my desk the most I'll do is probably swing from side to side (in the chair), but I can still keep my eyes on the text even when I'm doing that (swinging in the chair)." And she added, in relation to reading an academic text, "I definitely think it is easier to concentrate on a text like this when you are sitting in a more formal setting, whereas if it's more cozy I would feel tempted to just fall into the coziness."

However, becoming aware of these embodied processes while reading can sometimes be very helpful for the reader too. In our empirical data we observe how readers would read aloud to feel the words in the mouth, or repeat a word because it sounds strange, moving around and paraphrasing the text to simulate an author, yet at the cost of not remembering *what* it said, only *how* it felt saying it. In our account, it is worth paying attention to, rather than ignore, how those embodied breaks are often at odds with normative, serial shifting, because reading is not simply functional, it can be an aesthetic, playful activity too (Trasmundi and Cowley, 2020).

There are more than the embodied processes associated with serial shifting that lead the reader's way while reading. The reader is also pre-reflectively aware of lived time. We are less concerned with chronological time and emphasize how experienced time and the ability to make temporal regulations of action-perception is fundamental. For instance, the reader feels in control of time insofar as she can slow down in a part of the story that seems obscure or hard to understand, or she goes fast because she is eager to know what will happen next (see, e.g., Kukkonen, 2021 on how this may play out during the reading of various types of narratives). She is, as a reader, a cognitive pacemaker: she modulates time in relation to what she's reading, to how she makes sense of it. And, in modulating time, she adjusts her body accordingly, which should also accord with the attentional

progression going on. This modulation of lived time unfolds at the macroscale of temporality (see **Figure 1**).

This characterization of reading as embodied and temporal serial shifting provides elements to distinguish it from other cases of serial shifting, like listening to an audiobook or listening to a song. The differences do not pertain to the attentional progression itself, but on the embodied and temporal aspects that necessarily accompany each of them. The capacity of the reader to modulate the rhythm and pace of reading is unique, compared to listening to a story, where the flow and pace is constrained and fixed by a narrator. This difference has crucial implications regarding the sense-making of what is being read. The sole possibility of slowing down as the story gets complicated, intriguing, etc. is enough to show the cognitive relevance of modulating the lived time. It is when the reader engages and controls the pace, that she allows for her imagination to shoot ahead too. If needed, an embodied punctuation at the temporal micro-scale can be enacted, and this may in turn allow ideas to percolate. This modulation is what we define as "the glue of imagination," as it is always *there*, going on, and it requires an extreme degree of timing to develop and manifest. The import of the modulation of time, embodiment and attention while reading will be elaborated further as we present other attentional transformations that can be essential for experiential reading.

Singling Out

Singling out is one of the most researched attention transformations, also known as "selective attention" (Arvidson, 2006). In it, an element of the theme becomes the entire focus of the theme, in a process similar to "zooming in" (Gurwitsch, 2009:266–270). This attentional transformation modifies both the theme and the context: the theme is now entirely occupied by what previously was just a part of it, and the rest of the elements in the former theme become part of the new context (see **Figure 5**).

Imagine you keep reading about how Don Quixote liberated the king's prisoners, and you get to the part in which, in return of the favor, Don Quixote asks the prisoners to:

"laden with this chain, which I have taken from your necks, you immediately set out, and go to the city of Toboso, and there present yourselves before the lady Dulcinea del Toboso, and tell to her, that her Knight of the Sorrowful Figure sends you to present his service to her; and recount to her every tittle and circumstance of this memorable adventure, to the point of setting you at your wished-for liberty" (Cervantes, 2008:172).

This request seems extremely peculiar to you, so you might stop reading, and pay further attention to it. You go back and re-read the passage: what is Don Quixote really asking? Did you understand it well? Why would he ask something so unusual? What would he get out of it? In this case, the rest of the event of the prisoners recede to the background (i.e., to the context), and now your focus is exclusively on Don Quixote's eccentric request.

Singling out, at the micro timescale, is a central modulation of attention in quality reading. For a proficient reader, a text is always uneven in relation to what is relevant or interesting,

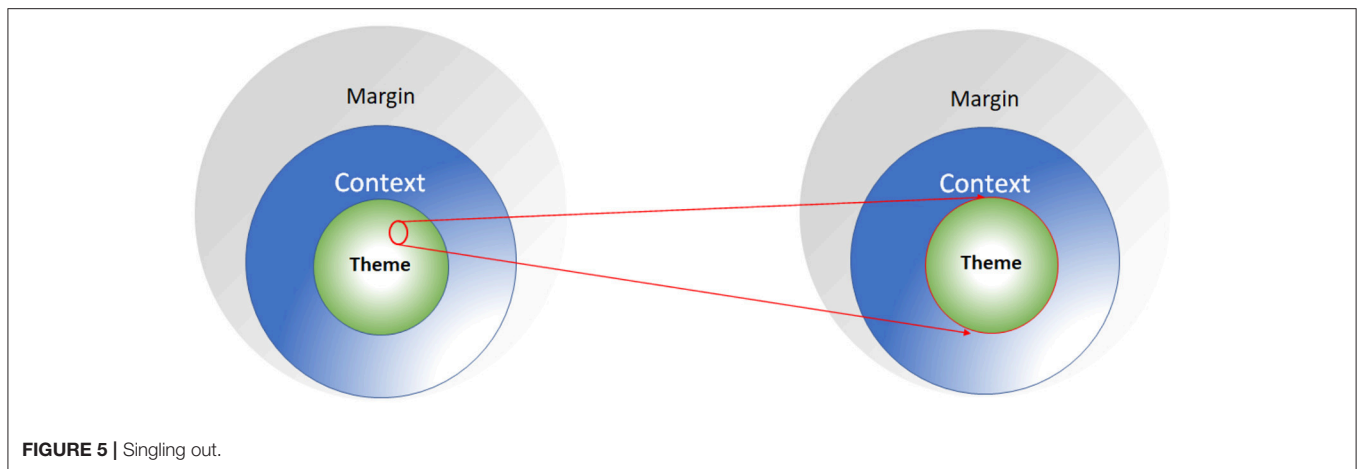


FIGURE 5 | Singling out.

some parts of the text immediately call for careful attention for the reader for many possible reasons (personal, normative, tactile/material). When a reader identifies a part of the text as relevant, several coordinated processes at different timescales start in association with the attentional transformation of singling-out: the reader might go back and re-read the relevant excerpt. This is a part of an experiential report of another participant in our study: *“Whenever I read any kind of sexual act or a physical act in a book, even if it’s not sexual, whenever an author tries to describe a physical thing, either be punching or whatever it is (gesturing bodily movements), I always kind of have a problem visualizing it, I kind of always need to re-read it.”*

Also, the reader might stop reading and take some notes in the margins of the text to develop further the ideas evoked by the relevant section. All these embodied processes are identified in multiple multimodal shifts: highlighting, taking notes, re-reading the sentences, and so on. All these embodied strategies are self-enacted modulations of attention. The act of highlighting, for instance, makes the reader attend on a specific part of the text because it seemed relevant for her, and it also demands a modulation of reading pace. In the same line, one participant in our sub-study explained why she usually takes notes: *“I stopped to write some notes because I can’t read and write at the same time (...), it [taking notes] does make me stop and have to think about what I actually just read.”*

An important but often unnoticed process of singling out in embodied reading is the reader’s vocalization of the relevant part of the text. As one of the readers in our study describes it: *“this text was relatively easy to understand but sometimes when I read some of the texts you have to read for class, with some of the longer and more complicated words, it helps for me to say it out loud ‘cause otherwise my brain makes like a word mambo-jumbo. Then, I have to say it out loud slowly because otherwise I will be like ‘what?’”*

In all the embodied processes mentioned here, there is a link between the modulation of attention and the embodied processes underlying such modulation. Concomitantly, we see at play the pace-making capacity of the reader. Reading a part of the text that awakens special attention does not leave untouched the

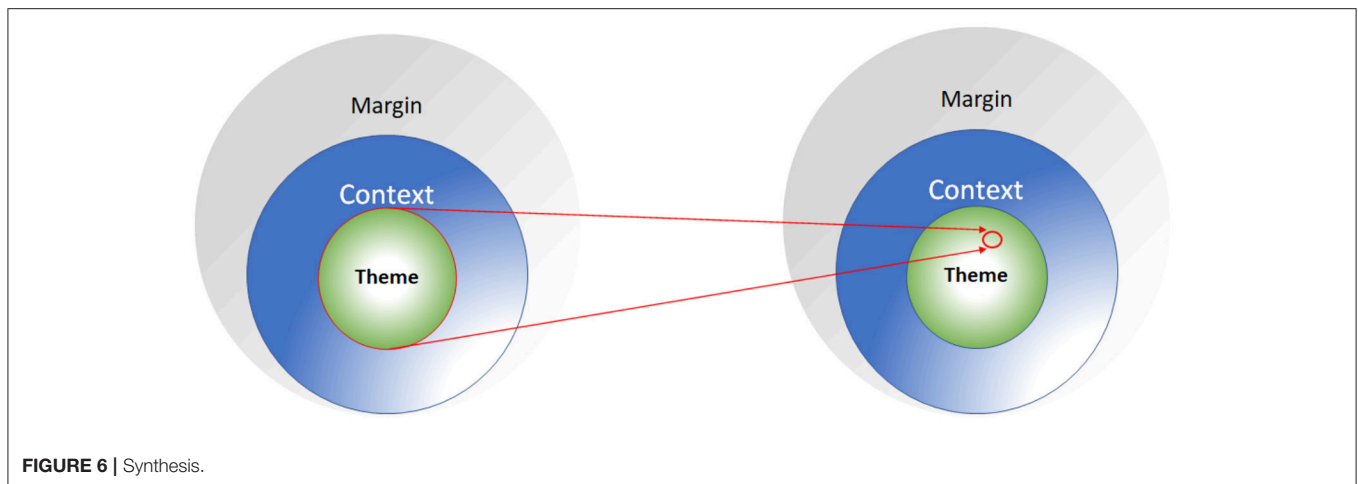
rhythm of reading. The reader initially might slow down when noticing that the point being developed there deserves a more careful consideration. Zooming in at the temporal microscale is also, necessarily, slowing down at the temporal macroscale, or even stopping altogether. Notice that if the reader, for any reason, would be unable to slow down, the very modulation of attention would also be impossible—or the cost would be missing what follows, which is often the case in audio-books, where the pace/speed of reading is set by the voice narrating the story. The challenges related to this externally determined reading pace/speed is a plausible reason why categories such as thrillers, mysteries and suspense stories top the lists of audiobook titles, as these do not consistently demand the listener’s full attention (Baron, 2021:ch. 7; see also Have and Pedersen, 2015). When thinking of something particular, the speaker continues the narrative of which it becomes impossible to attend at the same time. Pacemaking is here, as in the other attentional transformations, essential for the freedom to control the attention-modulation, something we take to be crucial for the quality of imaginative reading.

Synthesis

In synthesis, the attention undergoes a transformation that is the opposite to singling out: what previously constituted the whole theme becomes an element of the new theme, which now encompasses more elements, coming mostly or entirely from what formerly was the context. It is, accordingly, a sort of “zooming out” (see Figure 6).

To illustrate this attentional shift, now imagine you read the part in which the prisoners end up throwing stones at Don Quixote, for his insistence that they should be honorable and grateful and go to Dulcinea del Toboso to pay their respects. The chapter ends with a sad tone:

“The ass and Rosinante, Sancho and Don Quixote, remained by themselves; the ass hanging his head and pensive, and now and then shaking his ears, thinking that the storm of stones was not yet over, but still whizzing about his head; Rosinante stretched along close by his master, he also being knocked down with another



stone; Sancho in his doublet, and afraid of the Holy Brotherhood: and Don Quixote very much out of humor to find himself so ill treated by those very persons to whom he had done so much good” (Cervantes, 2008:173).

You might find that there is a strong similarity between the end of this adventure, and that of other previous adventures of Don Quixote, in which he and Sancho end up being beaten up by strangers, like those of chapters 15, 16 and 18 so far. You also wonder whether all these times it has been because of Don Quixote’s disturbed sense of reality. In these cases, the theme of your attention is much wider than the sole event of the king’s prisoners: now it also involves other elements provided by Cervantes in previous chapters of the book that were previously held in the contextual order of your attention sphere. You might keep zooming out and think about other stories you have read in which the main character suffers as much as Don Quixote, or for similar reasons.

The attentional transformation of synthesis is crucial for processes like voluntary reflection and mind-wandering, which, we claim, are in turn essential for quality reading. In voluntary reflection, the reader has a high degree of control of her cognitive processes. If, for instance, she is interested in the notion of justice, she might bring different ideas of justice to bear on a discussion about whether liberating the prisoners was an act of justice or not. Again, we claim that such inferences often go on *as* readers engage with the material, and not just after analyzing “the already read”—people do all sorts of imaginative detours during the act of reading, which is exactly enabled by the pacemaking capacities. If we had no control of regulating action-perception we would be prisoners of a fixed timescale in which only certain events could unfold. The ecological timescale in which we live (cf. Gibson, 1979) is not reduced to being able to perceive only seconds and events, we can actually manipulate action-perception to the extent that it allows us to live in a (life)world in which we can move ourselves, but to see micro and macro-scale life unfold.

Is mind-wandering also an essential process for quality reading? This idea goes against many theorists doing research on reading and mind-wandering, according to whom

mind-wandering is related to lower quality of reading, and it is even opposed to reading (see Smallwood et al., 2008; Varao Sousa et al., 2013; Broadway et al., 2015). However, as Fabri and Kukkonen (2019) rightly point out, these claims presuppose a narrow conception of reading (and the “task of reading”) as information retrieving from a text.

There are two ways to resist the idea that mind-wandering is necessarily detrimental for quality reading: (i) to broaden the conception of reading as a much more complex phenomenon than just the retrieval of information from a text, and (ii) to distinguish between different kinds of mind-wandering, as Smallwood et al. (2007) propose. The attempt to broaden the conception of reading is at the basis of this article. Let us now examine what kinds of mind-wandering are there.

Smallwood et al. (2007) identify two kinds of mind-wandering: *tuning out* and *zoning out*. In the former, the reader is aware of her mind-wandering and is to some degree capable of controlling her train of thought. In zoning out the reader is surprised to become aware of her mind-wandering and is therefore not in control of it (see also Metzinger, 2018). Adopting this conception of mind-wandering, we see that there is a spectrum in reflection that goes from almost total control of the train of thought (in voluntary reflection), to almost total absence of control in zoning out, and with tuning out somewhere in the middle of the spectrum.

Importantly, in all three of them the attentional transformation of synthesis is at play. In reflection this is clear: the person voluntarily takes a step back from the text and engages in a very complex embodied cognitive process of establishing conceptual connections between the topic just read and elements that were previously in the attentional context of reading. If reflection goes deep enough, it can even bring elements that were only in the attentional margin to become part of the theme. This operation can be very productive in enriching the content of the text just read, and it involves central skills like imagination and creative thinking. In other cases, reflection can be prompted by a feeling of fatigue or boredom with the text. This feeling can be seen in the description of the experience of reading given by another participant: “*the only astray thought I*

had reading this text was how long this text was. So I even stopped and checked (makes a gesture of revising how many pages were left).” Tuning out has a similar structure of voluntary reflection, but with a more marked role of marginal content in the train of thought. Many thoughts or ideas will be involuntarily introduced into the current theme coming from the marginal dimension of attention, allowing the person to establish connections that were unlikely to occur within voluntary reflection. For this reason, tuning out can have a primary role in an imaginative and creative engagement with the content of what is being read. And even zoning out, in which the current theme will be composed of elements from the former context and margin, can produce, involuntarily, relevant connections with the former theme (the story or argument just read). As an example of zoning out, consider the following report of another participant in our sub-study: “I think on page three, my mind kind of, uh, I kind of started wandering a bit. (...) Actually, it was because the topic was dating, my mind kind of wandered off to the last girl I... I had a girl that asked me out recently, who I said no to. I kind of very quickly thought about that girl for like a few minutes. Less than few minutes, but it felt like minutes.”

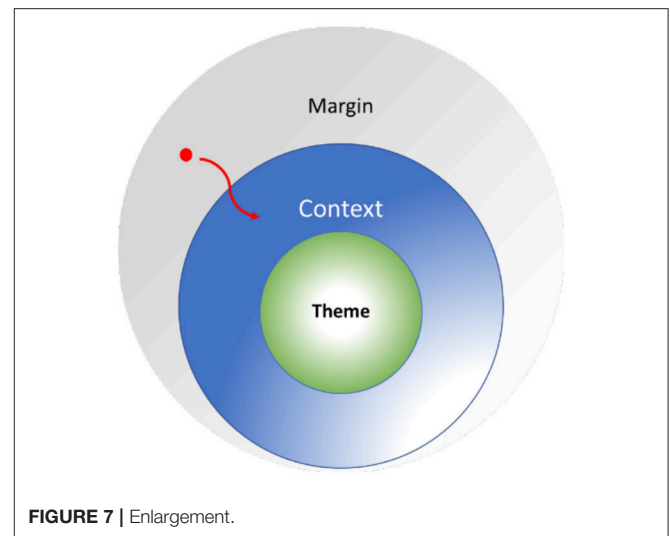
It is essential for imaginary reading to open the space for connections from the different dimensions of attention to interact more freely. Narrowing down reading to a process occurring only or mostly at the theme of attention closes creative and imaginative engagements of the reader with the text.

All instances of reflection and mind-wandering occur in strict co-dependency with embodied and pacemaking processes. In terms of embodied punctuations, attentional syntheses are usually related to a more introspective and less worldly engaged bodily attitude. The reader puts down the book and adopts a posture that embodies the “disengaged” attitude, i.e., the person takes some distance from the affordances in the room associated with practical engagements. Her gaze might be lost or focused on nothing. She might unconsciously play with her hair, or with a pen on the table, but with no specific aim. This embodied introspective attitude is strictly co-dependent with a delicate modulation of the lived time: the person has stopped reading, and now the lived temporality is at once fast and slow. The temporality of events in the environment has necessarily slowed down, to give space for the person’s thoughts and ideas to succeed one another at a quick pace.

Enlargement

In enlargement, the theme remains unchanged while the context grows in content, thus providing a new meaning to the theme. Some important sources of enlargement are personal memories and general knowledge on some matter that can be called upon by association or implication to the theme. Then, “the horizon of memories belonging to a certain thing broadens again, the same thing continues being given, but it has acquired new ‘meaning,’ a new significance for the whole of my life, it appears in a new light; I see it—the noematically same thing—in a different attitude” (Gurwitsch, 2009:248) (see **Figure 7**).

In this attentional shift, the enlargement of the context through a personal memory allows you to see the theme under a new light, even though the theme has not changed itself. One of



the participants in our study found the events of the story she was reading to be very similar to specific memories of her childhood: “It’s funny because as a child we had a summer house in Sweden and I always with my sister collected blueberries and I actually pictured them [the characters of the story] collecting blueberries somewhere in Sweden.” And she adds, “at some point of the story I stopped [reading] because I thought ‘this could be me.’”

Enlargement is the least radical of the attentional transformations considered so far. In the case of reading, it can occur in a hybrid combination with serial shifting. This means that the reader keeps reading (serial shifting) while, at the same time, the story or argument being read awakens in her personal memories/knowledge implicated in the theme. The embodied punctuations can be highlighting the part of the text that, because of the enlargement, gained a special significance for the reader. For the same reason, the reader can take notes making explicit the new meaning of the theme. The pace of reading is also necessarily modulated in enlargement. Depending on how much of the context is enriched, and how much that enrichment affects the meaning of the theme, the pace of reading will be slowed down accordingly. Keeping the pace or accelerating it might be attentionally too demanding for the reader.

CONCLUDING REMARKS AND EDUCATIONAL IMPLICATIONS

So far, we have presented some of the most relevant attentional shifts in reading and the co-dependent embodied punctuations and pace-making processes in which the reader necessarily engages, thus meshing processes at different timescales (see **Figure 2**). By doing so, we have aimed at providing a more nuanced picture of reading than those more commonly provided, by questioning the idea that an uninterrupted flow of reading (avoiding embodied punctuations) is the optimal reading strategy. Our account portrays a reader multimodally and multi-temporally engaged in the highly diverse and

complex sense-making reading processes where a reader is compelled to reflect, to revisit personal memories, to focus more closely on specific aspects of the text, to slow down or halt the pace of reading thus facilitating a richer grasp of the text, to take notes, highlight, etcetera. It should also be clear by now how the multimodal, embodied imagination, creative and critical thinking are necessarily related to every attentional transformation, every embodied punctuation, and every modulation of lived temporality through the reader's active engagement with the text.

Furthermore, the account of cognitive pacemaking and imaginative reading here developed is grounded on an empirically testable and falsifiable thesis. In section Introduction: Reading is Actional and Punctuated we proposed that if our proposal is right, it should be possible to observe a strong correlation between the reader's pacemaking while reading and the level of imaginative and critical reading. This means that modulations of attention, note taking, highlighting, mindwandering, modulation of reading pace, etcetera, should be accompanied by what we have characterized as imaginative and creative reading. This claim is in clear opposition to a still dominant picture of reading according to which interruptions to the reading flow are undesirable and are to be avoided (see subsection Synthesis).

In addition, our hypothesis opens paths of exploration that can be theoretically and practically relevant: consider, for instance, the effects of artificially disturbing pacemaking processes, like the modulation of lived temporality in the reader. The reader's modulation of temporality is an essential feature of reading processes, since it enables the reader to adjust the reading pace in tune with all the other processes occurring in parallel during reading. What would be the effects of fixing the reading pace for the reader—as it happens when listening to an audiobook?—Would it have a beneficial effect to artificially induce pauses in the reading? These and other considerations springing from our proposal may open up paths to explore and design optimally scaffolding and inspiring environments for reading across texts, technologies and purposes, in various educational practices.

The account of reading proposed here differs in many respects from common reading instruction and practice in educational contexts, regardless of grade level and subject. Reading in school is commonly geared toward speed and fluency, and cognitive outcomes such as comprehension, with or without an accompanying test. A potential exception here is individual (literary) reading programs, in which students read for extended (typically, 20–30 min) periods of time in their self-selected book without any explicit goal or purpose beyond that of, simply, reading for pleasure. Experiential aspects of reading related to affective-embodied and emotional facets of the experience, are less prevalent. Even in empirical research on reading, the focus is most commonly on cognitive outcomes, whereas studies focusing explicitly on emotional aspects of the process and experience,

are less common (Jacobs, 2015; Kaakinen et al., 2018). A large observational study of, specifically, literary reading in language arts classes in lower secondary schools in Norway (Gabrielsen et al., 2019) showed that the primary objectives of reading literary texts were related to analysis and interpretation of theme(s), labeling the text according to genre and/or epoch, and learning about stylistic devices (e.g., metaphors, contrasts), often for the purpose of employing them in students' own writing. As David Miall has pointed out, such rather reductionist and instrumental use of literary texts goes against the *raison d'être* of literary reading (Miall, 1996), according to which literary texts have the unique potential to prompt emotional and affective-embodied experiences not easily captured—nor nurtured—by a typical “schooled” approach to literary reading (see also Mangen et al., 2018).

One implication of the above-outlined view of reading is that a more experimentally rich and emotionally evocative reading can be nurtured by providing ample room, and time, for the readers' self-initiated breaks and ruptures during reading in the classroom (see also Trasmundi et al., 2022). Not restricted to the reading of literary texts specifically, the approach outlined above has the potential to turn reading into an experience of personal resonance, because of being better tuned to the readers' own trajectories of attention and pacemaking. This requires increased awareness of the ways in which reading is at once a deeply personal experience which is fundamentally affective-embodied, and always socio-materially situated. Reading research more generally, has a lot to learn from and offer to neighboring disciplines dealing with embodiment, movement and performances.

DATA AVAILABILITY STATEMENT

The original contributions presented in the study are included in the article/supplementary materials, further inquiries can be directed to the corresponding author.

ETHICS STATEMENT

Ethical review and approval was not required for the study on human participants in accordance with the local legislation and institutional requirements. The patients/participants provided their written informed consent to participate in this study.

AUTHOR CONTRIBUTIONS

ST and JT wrote a first draft. All authors discussed and contributed to the final version of the article.

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