Toward a Somaesthetic Participatory Cognitive Science of ADHD: From Feelings of Restlessness to the Somatic Noise Hypothesis

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Abstract: *This paper explores a style of inquiry that might be called a somaesthetic participatory cognitive science of ADHD. As a concrete demonstration, it focuses on feelings of restlessness in ADHD and interprets them as bodily feelings that can disturb the aesthetic quality of everyday experience. It then develops this interpretation into the somatic noise hypothesis, a hypothesis that can be examined within cognitive science: feelings of restlessness may function as noise that interferes with interoceptive bodily signals involved in prospective memory (PM) and thereby contribute to PM-related inattentive symptoms of ADHD.*

Keywords: *ADHD; somaesthetics; participatory cognitive science; somatic noise; interoception; prospective memory; Feldenkrais Method*

1. ADHD as a Diagnostic Category

Attention-deficit/hyperactivity disorder (ADHD) is a widely recognized psychiatric diagnostic category classified as a neurodevelopmental disorder in the DSM-5-TR, the latest edition of the *Diagnostic and Statistical Manual of Mental Disorders* (American Psychiatric Association 2022). According to the DSM-5-TR, ADHD is diagnosed on the basis of symptoms of inattention and/or hyperactivity-impulsivity that have persisted for at least six months and meet additional diagnostic conditions (American Psychiatric Association 2022).

ADHD is now generally understood as a condition marked by causal heterogeneity (Sonuga-Barke et al. 2010). Various neuropsychological hypotheses have also been proposed to explain ADHD, including Sonuga-Barke's triple-pathway model (Sonuga-Barke et al. 2010), the state regulation deficit hypothesis (van der Meere 2005), and the mind wandering hypothesis (Bozhilova et al. 2018). Nevertheless, many aspects of the causal factors underlying ADHD remain unclear.

Evidence-based interventions include pharmacological approaches, such as methylphenidate, and non-pharmacological approaches, such as cognitive behavioral interventions (Maniadaki and Kakouros 2017; National Institute for Health and Care Excellence 2018). These interventions may be effective in managing symptoms, but their effects are not permanent; in medical terms, they are generally considered non-curative (Subcommittee on Children and Adolescents with Attention-Deficit/Hyperactive Disorder 2019). Since these interventions do not always resolve the difficulties faced by people with ADHD, continued scientific research on ADHD remains necessary for developing additional intervention options.

2. Recent Developments in ADHD Research and the Aim of This Paper

In recent scientific research on neurodevelopmental disorders, including ADHD, increasing emphasis has been placed on involving neurodivergent people in the research process and incorporating their insights into their own experience. This shift has emerged in response, at least in part, to the rise of the neurodiversity movement. Sonuga-Barke and colleagues, who occupy a central position in mainstream ADHD research, describe this recent development as follows:

> […] involvement of people with ADHD in the ADHD research process is increasingly seen as vital—allowing them to give advice and help shape the research process and order its priorities by providing essential insights into their experience of the condition.
>
> (Sonuga-Barke et al. 2023, 513)

More recently, in their research program "Regulating Emotions—Strengthening Adolescent Resilience" (RE-STAR), Sonuga-Barke and colleagues have sought to integrate a Young Researcher Panel (Y-RP), consisting of ten young people diagnosed with ADHD and/or autism, into the core of the translational research process as members of the research team. The panel participates across the scientific cycle, from theory formation, experimental hypothesis generation, and methodological development to contributing to new interpretations of research findings and disseminating results (Sonuga-Barke et al. 2024).

RE-STAR is innovative as a model case of participatory cognitive science: it brings neurodivergent people's experiential insights into the research process as a whole. At the same time, however, Sonuga-Barke and colleagues have not yet addressed the question of what kind of philosophical framework might help neurodivergent people interpret their own experience.

What I mean by this is that experiential insight does not arise in a conceptual vacuum. Human beings always interpret their own experience through some framework, often an implicit one. For example, whether feelings of restlessness, distractibility, impulsivity, or fatigue experienced by people with ADHD are understood as merely internal mental phenomena or as embodied experiences can significantly alter both how people with ADHD make sense of themselves and what scientific questions researchers come to ask. For this reason, participatory cognitive scientific research on ADHD requires explicit reflection on what kind of framework can productively guide the interpretation of their experience.

The aim of this paper is to introduce *somaesthetics* as one promising philosophical framework for interpreting ADHD experience. More specifically, I use somaesthetics to offer a new interpretation of the experience of feelings of restlessness in ADHD and to formulate a scientific hypothesis, which I call the somatic noise hypothesis. Through this demonstration, the paper shows how somaesthetics may help people with ADHD interpret their own experience within participatory cognitive scientific research on ADHD.

3. Why Somaesthetics? A Candidate Framework for Participatory Cognitive Science

This section first offers a brief overview of somaesthetics and then explains why it can serve as a useful interpretive framework for ADHD research.

Somaesthetics originally emerged as a field within aesthetics. In its early phase, it developed as a critique of mainstream aesthetics, which had long neglected embodiment. Today, however,

somaesthetics has become a broader philosophical arena in which various academic and practical fields intersect. Its founder, Richard Shusterman, describes somaesthetics as an attempt to return aesthetics to its etymological meaning: aesthesis, or "perception, consciousness, and feeling," through the philosophical and practical study of embodied experience. He also describes it as "an exploratory orientation for new research in philosophy of mind" (Shusterman 2012, 3). In line with this orientation, the present paper explores a possible new development in philosophy of cognitive science with the aim of advancing participatory cognitive science research on ADHD.

The first reason for adopting a philosophy that emphasizes embodiment in this research is that it accords with a recent trend in psychological and cognitive scientific research: the increasing emphasis on interoception. Although there are only three studies on interoceptive sensitivity in people with ADHD (Wiersema and Godefroid 2018; Kutscheidt et al. 2019; Tebrizcik et al. 2025), the number of publications on interoception has been increasing in the sciences of mind more broadly (Khalsa et al. 2018, 502), and embodiment is increasingly discussed in mental health research in interoceptive terms (Khalsa and Verdonk 2024). This makes it important to prepare a framework through which people with ADHD can interpret their own experience as embodied.

Somaesthetics is one promising candidate for such a framework. It draws on two important philosophical sources: Merleau-Ponty's phenomenology of embodiment and the pragmatist tradition of William James and John Dewey. From the former, somaesthetics inherits the idea that the body should not be regarded merely as a physical object, nor conscious experience as a mental phenomenon detached from the body. Rather, body and consciousness are understood as two aspects of a unified experience, which Shusterman calls the *soma*, or *somatic consciousness* (Shusterman 2012, 5). According to Shusterman, our conscious experience is always lived in an embodied way, and somatic consciousness is "an indispensable medium for all perception" (Shusterman 2012, 3).

From pragmatism, by contrast, somaesthetics inherits its practical orientation. Somaesthetics is concerned not only with interpreting embodied experience theoretically, but also with enriching it and enhancing its quality through somatic practice. In this spirit, it encourages philosophers themselves to refine the quality of their own experience through somatic practices and to deepen their thinking on that basis. Shusterman, for example, developed his philosophy while training in Zen meditation and the Feldenkrais Method of Somatic Education, usually referred to simply as the Feldenkrais Method (Shusterman 2012, 15, 22).

This practical orientation raises the question of why the present paper adopts somaesthetics rather than another contemporary philosophy of embodiment. After all, enactive approaches influenced by phenomenological accounts of embodiment have already been developed in ways directly relevant to ADHD and psychiatry more broadly. In the case of ADHD, Maiese's affective framing deficit hypothesis offers an enactive account of ADHD (Maiese 2012), and de Haan's enactive psychiatry provides a broader enactive framework for understanding psychiatric disorders and neurodiversity (de Haan 2020).

I treat such enactive work as an important ally of somaesthetics. Nevertheless, I do not place it at the center of the present argument. This is because the aim of this paper is not only to interpret ADHD experience as embodied, but also to show how such interpretation can be connected to the transformation and enrichment of everyday experience for people with ADHD. Since participatory scientific research on ADHD is carried out collaboratively with people with ADHD, its results should ideally be useful to them and contribute to improving their everyday experience. In light of this aim, somaesthetics is especially suitable because it offers an explicitly

pragmatic and practice-oriented philosophy of embodiment, whereas this practical orientation is less central to Merleau-Ponty's phenomenology and many enactive approaches.

In the next section, I introduce the somaesthetic idea of "the body as background" and "the body as figure" by drawing on "The Body as Background," chapter 2 of Shusterman's *Thinking through the Body* (Shusterman 2012).

4. The Body as Background and Figure

This section introduces the somaesthetic idea of the body as background and the body as figure (Shusterman 2012, 47–67). The idea of regarding the body as background, however, did not originate with somaesthetics. One of the most important twentieth-century philosophers to have developed this view of the body is the French phenomenologist Maurice Merleau-Ponty. In *Phenomenology of Perception*, he writes:

> One's own body is the always implied third term of the figure-ground structure, and each figure appears perspectivally against the double horizon of external space and bodily space.
>
> (Merleau-Ponty 2012, 103)

Let us consider a concrete example. Suppose that I am writing a paper on my laptop. My attention is directed toward the manuscript, while the glass of water on the desk, the desk itself, and the chair on which I am sitting remain in the background of my experience. This does not mean that I do not feel the chair at all, or that the glass of water is absent from my visual field. Rather, they are simply less likely to become the focus of consciousness. When one thing in the external world becomes foregrounded as figure, other things recede into the background as ground. According to Merleau-Ponty, this figure-ground structure is fundamental to our conscious experience (Merleau-Ponty 2012, 4).

The point of Merleau-Ponty's claim in the passage quoted above is that this two-term relation between one thing and other things surrounding it in external space is always implicitly shaped by a third term: one's own body. To see how this third term operates, suppose that thirst gradually arises. My attention then becomes more likely to turn from the manuscript to the glass of water. The water becomes figure, while the manuscript recedes into the background. Once I drink and my thirst is satisfied, the manuscript again returns to the foreground. This shift within the figure-ground relation in external space is mediated by a change in bodily feeling: the arising and disappearance of thirst. In this sense, bodily feeling functions as the ground against which things in external space become salient as figure.

Merleau-Ponty himself held that the body cannot, in the strict sense, become figure, but is in principle always background:

> Now, the permanence of one's own body is of an entirely different type: it is not to be found as the result of an indefinite exploration. […] Its permanence is not a permanence in the world, but a permanence on my side. To say that my body is always near to me or always there for me is to say that it is never truly in front of me, that I cannot spread it out under my gaze, that it remains on the margins of all of my perceptions, and that it is with me.
>
> (Merleau-Ponty 2012, 93)

Leaving aside the question of principle, it is certainly true, from a practical point of view, that if the body constantly came to the foreground of conscious experience, smooth and spontaneous action would often be disrupted. If I were intensely thirsty, or if I were suffering from severe lower back pain, such bodily discomfort would be clearly foregrounded, the manuscript would recede entirely into the background, and I would have to stop writing. For spontaneous action to be possible, it is often desirable for the body to remain in the background of conscious experience. It should not always come to the foreground; rather, it should function transparently as the hidden third term—the background of the background, so to speak.

Shusterman partly agrees with this view, but from a pragmatist perspective inherited from John Dewey, he writes:

> In other words, I am not urging the impossible task that the somatic background always be brought to the foreground and that all spontaneity be eschewed. Full transparency of our actions and feelings is not only unachievable but not worth achieving in practice; on most occasions, our focus is best directed elsewhere, to the world in which we must act. […] But for pragmatism, these distinctions are functional and flexible, not absolute. This means that some elements of the background can be brought into the foreground and that in certain practical contexts such foregrounding is valuable.
>
> (Shusterman 2012, 65)

From the standpoint of somaesthetics, which emphasizes not only describing or interpreting bodily experience but also pragmatically transforming and enriching it, foregrounding bodily feeling has advantages when done at the right time and in the right way. One such advantage is the improvement of habits (Shusterman 2012, 63).

Consider severe lower back pain that makes it difficult to concentrate while sitting and writing. One possible short-term strategy is to push the pain into the background, whether through mental effort or with the help of painkillers, and continue writing. Sometimes this may be the best available short-term solution. Yet it may be more sustainable to foreground one's habitual way of using the body and attempt to improve it. If such improvement succeeds, the pain may decrease, the somatic quality of sitting and writing may improve, and this may contribute to a better quality of life.

As we have seen, the body, as the hidden third term in the figure-ground structure of conscious experience, profoundly shapes the way we experience the world. This is precisely what Merleau-Ponty shows. Yet somaesthetics, as a form of pragmatist philosophy, is distinctive in that it seeks to bring this hidden third term—the body—into the foreground of conscious experience when necessary, to improve it by some practical means, and thereby to enhance the quality of our everyday experience.

In the next section, I use this concept of figure-ground structure to analyze the experiential organization of feelings of restlessness, which appear to be common among people with ADHD, by drawing on the narratives of interlocutors in Nielsen's (2020) anthropological study.

5. A Somaesthetic Interpretation of Feelings of Restlessness in ADHD

This section focuses on feelings of restlessness in ADHD and offers a new philosophical interpretation of them from a somaesthetic perspective. There are two reasons for focusing on feelings of restlessness. First, even if they are not specific to people with ADHD, they are

sufficiently common among people with ADHD to have long been included in the DSM diagnostic criteria. Second, my own experience as a qualified teacher of Awareness Through Movement lessons in the Feldenkrais Method of Somatic Education has suggested that these feelings may be worth examining from a somaesthetic perspective.

From the standpoint of somaesthetics, which emphasizes the philosophical significance of experience, it is somewhat regrettable that the DSM-5-TR diagnostic criteria for ADHD focus primarily on behavior and say very little about subjective experience. There is, however, a noteworthy exception among the criteria for hyperactivity and impulsivity. In criterion c, the DSM-5-TR states: "Often runs about or climbs in situations where it is inappropriate. (Note: In adolescents or adults, may be limited to feeling restless)" (American Psychiatric Association 2022, 69). Earlier versions of the DSM emphasized the subjective character of this experience even more clearly, using the phrase "subjective feelings of restlessness" in the corresponding criterion (American Psychiatric Association 1994, 84; 2000, 92).

As shown above, feelings of restlessness have long appeared in the DSM diagnostic criteria for ADHD. Yet, to my knowledge, they have rarely been examined by ADHD researchers, with the exception of Nielsen (2020). Nor does the DSM itself explain what such feelings are like. This is one reason why they deserve further philosophical and empirical attention.

The second reason for focusing on feelings of restlessness is more directly connected to somaesthetic practice. I am a qualified teacher of Awareness Through Movement lessons in the Feldenkrais Method of Somatic Education, usually referred to simply as the Feldenkrais Method. The Feldenkrais Method is a somaesthetic method developed by Moshe Feldenkrais. In practice, it has often been regarded as helpful for reducing excessive muscular tension in action. In my own teaching, several people diagnosed with ADHD have reported that their feelings of restlessness improved after a single Awareness Through Movement lesson. Of course, empirical research is necessary to determine whether the Feldenkrais Method actually has such an effect on feelings of restlessness in people with ADHD. Nevertheless, my experience as a Feldenkrais Method teacher suggests that feelings of restlessness in ADHD may be a form of somatic feeling that deserves systematic academic investigation.

In what follows, I draw on Nielsen's (2020) qualitative data in order to better understand the character of these feelings, their embodiment, and especially their role within the figure-ground structure of conscious experience discussed in the previous section.

Nielsen's study is based on anthropological interview data interpreted through Thomas Fuchs's phenomenological account of temporality. I cannot present the full scope of her analysis, which understands ADHD as a problem of temporality rooted in embodiment. Instead, I focus only on the interview passages concerning feelings of restlessness. These materials are valuable for deepening a somaesthetic understanding of these feelings in ADHD. Drawing on them, Nielsen characterizes feelings of restlessness as "being unable to find inner calmness" (Nielsen 2020, 114). The following passage is part of the narrative of John, one of Nielsen's interlocutors with ADHD:

> I could get all sick from that inner restlessness that just wanted to get out or something. I had to act on it, I had to do something. It was like if you have to do something, but you do not know what. And it slowly builds up all the time, and gets worse and worse, and you do not know what you are supposed to do.
>
> (Nielsen 2020, 114)

As John's narrative shows, when feelings of restlessness are thematized as figure within experience, they appear as unpleasant feelings. These feelings seem to drive one from within, producing a sense that one must act or do something. Kenny, another interlocutor, describes his own experience of feelings of restlessness even more explicitly as a bodily experience:

> KENNY: Mostly, I can feel the tensions here [he points at his head] and it is like ... it is like trembling electricity through the brain "bizzzz." Those are the physical symptoms. And then I realize that I start shaking my legs [he is moving one of his legs restlessly up and down].
>
> AUTHOR: What is up with that leg?
>
> KENNY: Well, it is nothing now. But it is because the energy accumulates. And it has to come out somehow. When I go to a meeting, for example, where we have to sit on our butts and are being taught from the black board – then my legs start moving. I fiddle with something. It is like carbonic acid all over and that energy needs to be released. So, I will sit and jump a bit.
>
> AUTHOR: So that is the valve?
>
> KENNY: Yes, it is. It brings calmness.
>
> (Nielsen 2020, 119)

The first point that is worth noting from a somaesthetic perspective is that Kenny experiences feelings of restlessness as tension within the body. In other words, they are not merely mental experiences, but experiences lived through the body. This passage also describes the relation between feelings of restlessness and symptoms of hyperactivity, such as shaking one's legs or bouncing while seated. For Kenny, these hyperactive movements seem not to be mere symptoms. Rather, they appear to function as strategies for at least temporarily drowning out feelings of restlessness and gaining calmness.

Further, Susan, another of Nielsen's interlocutors, describes in an interview how her experience of feelings of restlessness changed before and after taking ADHD medication:

> I get an inner calmness. I guess that's the best way to describe it. For example, when reading bedtime stories to my kids, […] I did it, but it was not the nice experience that I wanted it to be — before I got the medication. Because my head was speeding 180 [km/h] while I was reading. I did not have the calmness to do what I was doing. […] I also tended to be really short-tempered and everything just shot out of my mouth and maybe sometimes inappropriately. The medication helps with that as well. It is a kind of general calmness in the body. I have so much more calmness in my body.
>
> (Nielsen 2020, 115)

One important point in Susan's narrative is that ADHD medication—presumably methylphenidate[1] —appears, at least in her case, not only to have reduced behavioral symptoms

1 Nielsen (2020, 115) does not specify which ADHD medication this "medication" refers to. Elsewhere, however, she writes, "Susan […] has difficulties controlling her temper, and, especially before she started taking Ritalin, […]" (Nielsen 2020, 94). I therefore infer that the medication mentioned on page 115 is likely also Ritalin, that is, methylphenidate.

related to impulsivity but also to have alleviated feelings of restlessness.

From a somaesthetic perspective, however, what is even more important is that before taking medication, Susan was able, on the surface, to read bedtime stories to her children, yet because she experienced feelings of restlessness and lacked sufficient calmness, this activity did not become the "nice experience" she wanted it to be.

Using the concept of figure-ground structure introduced in the previous section, we can interpret Susan's experience as follows. When she was reading stories, what she was reading was presumably foregrounded as figure in her conscious experience, since she was at least able to read it. Yet while she was reading, feelings of restlessness continued in the body as the ground of her experience. These feelings did not necessarily prevent her from completing the task of reading bedtime stories. Nevertheless, they seem to have interfered with the quality of her reading experience as a whole.

This is an especially important point from an aesthetic perspective. Reading bedtime stories to one's children is not simply a task to be completed. Its meaning lies, at least in part, in savoring a series of aesthetic qualities with one's whole body: the sparkling, expectant look in the children's eyes while they listen to the story; the stillness brought by the calm tone of the parent's reading voice; the soft warmth of the bedtime atmosphere; the gentle drowsiness that gradually fills the room as the story continues in a quiet voice; and the peaceful sleeping faces of the children who have fallen asleep before one knows it. Susan's remark that "it was not the nice experience that I wanted it to be" can therefore be interpreted as suggesting that feelings of restlessness prevented her from fully savoring the kinds of aesthetic qualities that might have been available in the here and now. In this sense, feelings of restlessness disturbed her embodied presence: her capacity to dwell bodily in the aesthetic qualities of the situation as it unfolded.

Taken together, these interpretations suggest that when feelings of restlessness appear as figure within experience, they are felt as a lack of calmness in the body. When they recede into the background while one is engaged in another activity, they may function as a kind of noise that interferes with one's embodied presence—that is, one's ability to savor the aesthetic qualities of everyday life in the here and now—and thereby diminish the quality of daily experience. This is my somaesthetic interpretation of Nielsen's qualitative data. In the next section, I show how this interpretation can be developed into a more specific hypothesis connected to mechanistic research in cognitive science.

6. The Somatic Noise Hypothesis: From Somaesthetic Interpretation to Participatory Cognitive Science

In the previous section, I interpreted feelings of restlessness in ADHD as bodily feelings that can alter the quality of one's embodied experience of the external world. When foregrounded, they are experienced as unpleasant bodily feelings; when they recede into the background of experience, they may still function as noise that interferes with one's ability to savor the aesthetic quality of an activity. In this section, I develop this somaesthetic interpretation into a specific scientific hypothesis: the somatic noise hypothesis.

This section does not aim to fully develop the hypothesis. Rather, it shows how interpreting the experiences of people with ADHD from the standpoint of somaesthetics can lead not only to the reinterpretation of experience, but also to hypotheses that can be empirically tested within cognitive science. In this sense, the following discussion should be understood less as a complete presentation of the somatic noise hypothesis than as a demonstration of a mode of inquiry that might be called *somaesthetic cognitive science*.

More specifically, the somatic noise hypothesis aims to explain a particular kind of inattentive symptom in ADHD, especially those that seem to be related to event-based prospective memory (PM). PM refers to the ability to remember and carry out an intended action at the appropriate moment in the future (Einstein and McDaniel 1990). PM is commonly divided into event-based and time-based forms. Event-based PM is the type of PM in which a particular event, or PM cue, triggers the retrieval of a previously formed intention.

For example, suppose that before leaving home, I form the intention to mail an envelope on my way to work. Yet while walking to the office, I become absorbed in other thoughts. Although the mailbox that should have served as the PM cue enters my visual field, I pass by it without mailing the envelope. Only after arriving at the office do I realize, "Oh, I forgot to mail it." This would be an example of event-based PM failure.

Among the inattentive symptoms listed in the DSM-5-TR, criterion i seems at least partly related to this kind of PM difficulty: "Is often forgetful in daily activities, e.g., doing chores, running errands; for older adolescents and adults, returning calls, paying bills, keeping appointments" (American Psychiatric Association 2022, 68–69). This reading is supported by previous research suggesting that people with ADHD tend to show difficulties in event-based prospective memory, especially under naturalistic or cognitively demanding conditions (Altgassen et al. (2019)).

One influential neuropsychological hypothesis that may help explain this kind of difficulty is the mind wandering hypothesis of ADHD (Bozhilova et al. 2018). According to Bozhilova and colleagues, mind wandering occurs when attention drifts away from the current primary task and toward task-unrelated internal thoughts or images. The basic idea of the hypothesis is that people with ADHD tend to experience spontaneous mind wandering more frequently, and that this tendency is related to inattentive symptoms.

This hypothesis is certainly important. However, it does not seem sufficient by itself to explain the kind of inattentive tendency described in DSM-5-TR criterion i, namely being "forgetful in daily activities," insofar as this tendency involves PM failure. This is because people without ADHD also presumably engage in mind wandering quite often in everyday life. Few people remain continuously focused only on the task of mailing an envelope from the time they form the intention to do so until they actually arrive at the mailbox (Umeda 2022). In such situations, many people, not only people with ADHD, are likely to fall into task-unrelated thoughts.

Nevertheless, people without ADHD seem more likely than people with ADHD to return to the task at the moment they see the mailbox and to realize, "Right, I was supposed to mail the envelope." The issue, then, is not simply how frequently mind wandering occurs. Even frequent mind wandering would not necessarily lead to PM failure if one could reliably return to the task when the relevant cue appears. The more important question is therefore how awareness arises that allows one to exit mind wandering and notice the PM cue at the appropriate moment—and why this awareness may be more easily disrupted in ADHD.

This question is crucial for considering PM from the standpoint of somaesthetic cognitive science. In psychology, the retrieval process in PM is usually formulated as a two-stage process in which *remember-that* is followed by *remember-what*. Meier and Zimmermann (2015) offer an especially clear account of this process:

> Upon recognition of a prospective memory target participants often move back in their chairs, sometimes accompanied by exclamations like "oops," "aha," "now I have to do something," "what I am supposed to do now?" […]. At this point, the prospective component (remember that) is fulfilled, but participants do not necessarily know yet what exactly they have to do,

that is, the retrospective component (remember what) still has to be remembered.

(Meier and Zimmermann 2015, 1)

As their account shows, the process of prospective memory is usually understood as unfolding in two stages. First, one remembers that there is something one has to do. Only afterward does one remember what that something is—for example, that one has to mail the envelope. Ordinary experience also supports this distinction. One may clearly remember that there was something one had to do, while still being unable to remember exactly what it was. In this sense, *remember-that* and *remember-what* are distinct processes. Yet if we examine these two processes more closely, it seems plausible that before the explicit and verbal sense that "there is something I have to do," there is often a more primitive and difficult-to-verbalize stage of awareness, which may correspond to the "oops" mentioned in Meier and Zimmermann's description.

This stage of awareness was investigated psychophysiologically by Umeda et al. (2016) in their study of prospective memory and interoception. Their research suggests that PM cue detection may not be completed solely by cognitive processes in the brain, but may also be supported by autonomic bodily signals, such as changes in heart rate, and by interoceptive sensitivity to those signals. It should be noted, however, that their study did not examine people with ADHD.

In Umeda et al.'s experiment, larger changes in heart rate at the moment when the PM cue was presented were associated with better PM performance. They also found that higher cardiac interoceptive sensitivity, measured by a heartbeat detection task, was associated with better PM task performance. Of course, this study alone does not allow us to conclude that larger heart-rate changes or higher interoceptive sensitivity cause successful PM performance. Nevertheless, it suggests that, in the early stage of PM, before one explicitly remembers that one has something to do, bodily signals may already be involved.

In somaesthetic terms, we might say that PM cue detection may involve a subtle felt sense arising from the body as the background of experience. By "felt sense," I mean the kind of bodily sensed meaning discussed by Eugene Gendlin in his theory of Focusing, a body-oriented psychotherapy: a subtle sense of meaning that is not yet clearly verbalized but is bodily felt in relation to a situation or concern (Gendlin 1996). For example, at the moment when the mailbox enters one's visual field, even before one can explicitly say to oneself, "I have to mail the envelope," a small bodily sense that something is not yet settled may arise. This felt sense may then lead to *remember-that*, the awareness that "there was something I had to do," and further to *remember-what*, the retrieval of the specific content: "Right, I had to mail the envelope."

The important point here is that this initial awareness may not be a purely cognitive process occurring only in the brain. Rather, it may be supported by somatic signals arising from the body.

Inspired by Umeda's findings, I came to consider the possibility that in people with ADHD, reduced interoceptive sensitivity may impair PM processing and thereby contribute to certain inattentive symptoms. At present, there are only three studies that focus on interoceptive sensitivity in people with ADHD. Although one of them reports a null result (Wiersema and Godefroid 2018), the other two conclude that interoceptive sensitivity is reduced in the ADHD group compared with the control group (Kutscheidt et al. 2019; Tebrizcik et al. 2025). If ADHD does indeed involve reduced PM performance due to reduced interoceptive sensitivity, the next question is by what mechanism this might occur.

The somatic noise hypothesis proposed in this paper answers this question as follows: in

ADHD, feelings of restlessness may function as noise that interferes with interoception. As a result, signals arising from the body in the earliest stage of PM processing may be more difficult to detect, PM performance may decline, and this decline may contribute to PM-related inattentive symptoms in ADHD.

In this sense, the somatic noise hypothesis should not be seen as detached from the aesthetic argument developed in the previous section. Rather, it extends that argument in the direction of cognitive science. Feelings of restlessness may interfere with the ability to remain attentive to the aesthetic qualities of the present situation; at the same time, they may also interfere with the bodily awareness needed for cognitive functions such as prospective memory to operate smoothly. In other words, somatic attentiveness to aesthetic quality and PM cue detection may both be affected by noise arising from the body as the background of experience.

This hypothesis can also be connected to Maiese's (2012) affective framing deficit hypothesis, an enactive account of ADHD. Maiese argues that ADHD involves a dysfunction in "affective framing," the embodied and affective process through which task-relevant information is filtered and made salient. The somatic noise hypothesis gives this philosophical account a more concrete formulation in the specific setting of PM: for an external cue to appear as relevant to action—as figure against the ground of many other things—subtle bodily signals may be needed. If feelings of restlessness function as somatic noise, they may mask such signals, so that one fails to notice the external cue and this failure may eventually be categorized as a symptom of "inattention."

The somatic noise hypothesis may also offer a partial account of hyperactivity and impulsivity in ADHD. In Kenny's narrative, discussed in the previous section, shaking his legs or moving his body was not described simply as an outward symptom of hyperactivity. Rather, it was described as a strategy for releasing the "energy" accumulated in the body and for gaining calmness, even if only fleetingly. If feelings of restlessness are experienced unpleasantly as somatic noise, bodily movement can be understood as a practical attempt to mask that noise, at least temporarily, with the kinesthetic sensations produced by hyperactive movement.

John's narrative likewise suggests a connection between feelings of restlessness and impulsivity. As we saw, feelings of restlessness can appear as an urge to act, a sense that one must do something without knowing what one is supposed to do. In this way, the somatic noise hypothesis may help explain some PM-related inattentive symptoms, as well as some aspects of hyperactivity and impulsivity, by starting from bodily experience.

At this point, another question emerges: in physiological terms, where do feelings of restlessness originate? Strictly speaking, the source of feelings of restlessness is unlikely to be reducible to a single bodily system. It may be more natural to understand them as a form of somatic experience arising from the complex interaction of various bodily systems—including the autonomic nervous system, the endocrine system, and the musculoskeletal system—and the environment.

Nevertheless, I would like to present one scientifically testable hypothesis: feelings of restlessness may be related to excessive muscular tension. Studies in rehabilitation science by Stray et al. (2009, 2013) suggest that people with ADHD may have difficulties inhibiting or releasing muscular tension during movement, independently of Developmental Coordination Disorder, which often co-occurs with ADHD. Stray and colleagues also report that methylphenidate has an immediate effect on such excessive muscular tension and the motor regulation problems associated with it, although this effect diminishes and disappears as methylphenidate is metabolized.

When these findings are considered together with Susan's narrative in Nielsen (2020), in which feelings of restlessness appear to be alleviated by medication, presumably methylphenidate,

and with Kenny's description of feelings of restlessness as a sense of tension in the body, a further hypothesis emerges: excessive muscular tension may be one source, among others, of feelings of restlessness. Of course, this hypothesis requires empirical testing. From a somaesthetic perspective, however, it becomes possible to consider excessive muscular tension, feelings of restlessness, interoceptive sensitivity, and PM failure and PM-related symptoms of inattention as part of a single hypothetical scientific relation.[2]

From the hypotheses developed so far, several testable predictions can be derived. If feelings of restlessness function as somatic noise that interferes with interoception, then stronger feelings of restlessness should be associated with weaker awareness of PM cues and lower PM performance. Conversely, when feelings of restlessness are alleviated, PM cues may become more salient and PM performance may improve. In addition, if excessive muscular tension is one source, among others, of feelings of restlessness, then somatic practices that reduce excessive muscular tension, such as the Feldenkrais Method,[3] may alleviate feelings of restlessness and, as a result, reduce some PM-related inattentive symptoms as well as some hyperactive and impulsive symptoms of ADHD.[4]

These remain hypotheses. Nevertheless, they have a form that can be tested through a combination of qualitative research, psychophysiological experiments, and intervention studies.

The argument developed so far shows that somaesthetics is not merely a philosophy for interpreting ADHD experience. By understanding feelings of restlessness as noise that interferes with bodily signals through which the body, as the background of experience, organizes action and perception, we can formulate PM-related inattentive symptoms, hyperactivity, impulsivity, and the diminished aesthetic quality of everyday experience as continuous problems open to empirical investigation, including intervention studies.

7. Feelings of Restlessness as an Occasion for Creative Self-Stylization

In the previous section, I formulated feelings of restlessness as somatic noise in order to connect somaesthetic interpretation with cognitive scientific research. From the standpoint of somaesthetics, however, this is not the whole story. Feelings of restlessness need not be understood only as noise to be eliminated.

Lower back pain, for example, may indeed function as noise that interferes with the activity of sitting at a desk and writing. Yet for those who are willing to regard it not merely as something to be suppressed, but also as a sign that one's bodily habits may have room for further refinement, it can become an occasion for self-stylization: a creative opportunity to learn a new way of using the body that places less strain on the lower back. Similarly, if feelings of restlessness are understood as signals that some form of excessive somatic tension is present and that one may still learn new ways of acting with less tension, they can be regarded not merely as noise, but also as an occasion for creative self-stylization.

Through such self-stylization, people with ADHD may become better able to remain bodily present in the here and now, to savor its aesthetic qualities, and thereby to improve quality of life.

2 As a practitioner of the Feldenkrais Method, I have several times observed cases in which excessive muscular tension and feelings of restlessness in people with ADHD seemed to improve together after an Awareness Through Movement lesson. Since these observations were not made in controlled experiments, they of course do not count as scientific evidence. Still, I regard them as observations that could serve as a starting point for empirical research on the possible relation between excessive muscular tension and feelings of restlessness.

3 Moshe Feldenkrais, the founder of the method, writes that the exercises "will relieve both mental and muscular tension" (Feldenkrais 1980, 63). Readers interested in the experiential dimension of this claim may try the following freely available lesson from the Feldenkrais NYC YouTube channel and observe how their own mental and muscular tension, as well as their feelings of restlessness, change during and after the lesson: https://www.youtube.com/watch?v=3uYY2Wlq5GM

4 For a theoretical account of the relevance of mindful movement practices, including the Feldenkrais Method, to ADHD, see Clark et al. (2015).

8. Future Directions

Finally, I indicate future directions for the participatory somaesthetic cognitive science of ADHD proposed in this paper. Rather than presenting the somatic noise hypothesis as a completed theory, this paper has shown how a somaesthetic interpretation of feelings of restlessness can generate cognitive scientific hypotheses. Future research should develop this line of inquiry through qualitative research, quantitative assessment, and psychophysiological and intervention studies.

First, further qualitative research is needed on the lived bodily experience of feelings of restlessness in ADHD. As we have seen, feelings of restlessness have long appeared in the DSM diagnostic criteria, yet research on what these feelings are actually like remains extremely limited. Nielsen's (2020) study is a valuable exception. Future research should investigate more broadly, for example through interviews, how people with ADHD experience feelings of restlessness and how they understand these feelings in relation to particular body parts, urges to move, affective states, and environmental conditions. In doing so, it will be important to examine how feelings of restlessness relate to embodied presence, the aesthetic quality of daily experience, and the possibility of creative self-stylization.

Second, methods are needed for quantitatively assessing feelings of restlessness. In ADHD research, there has already been an attempt to develop a scale such as Weyandt et al.'s (2003) Internal Restlessness Scale. However, this scale appears to address "internal restlessness" primarily at a psychological or cognitive level. For the purposes of the present paper, it will be necessary to develop methods that can assess feelings of restlessness at a more bodily or somatic level. As a first step, it may be useful to develop a simple method for rating the intensity of feelings of restlessness at a given moment, similar to the numerical rating scales widely used in chronic pain research (Farrar et al. 2001).

Third, psychophysiological research is needed to examine the somatic noise hypothesis directly. Umeda et al. (2016) suggest that cue detection in event-based prospective memory may involve autonomic bodily signals, such as changes in heart rate, and interoceptive sensitivity to those signals. However, their study did not examine participants with ADHD. Future research should therefore measure event-based PM task performance, heart-rate changes, interoceptive sensitivity, and the intensity of feelings of restlessness simultaneously in people with ADHD. In designing such studies, it will be important to bear in mind the suggestion by Altgassen, Scheres, and Edel (2019) that, in event-based PM tasks, simple laboratory tasks may not sufficiently reveal differences between ADHD and control groups. It would therefore be desirable to design tasks that are more naturalistic, that involve a certain degree of cognitive demand, and that have an appropriate level of difficulty.

Fourth, these lines of research should be pursued in a participatory manner that incorporates people with ADHD themselves into the research process. Experiences such as feelings of restlessness cannot be adequately understood through external observation alone. They require an approach in which external observation is brought into dialogue with the narratives, practical knowledge, and self-interpretations of those who live through such experiences. This is why participatory research is especially important in this context.

I hope that the somaesthetic framework proposed in this paper will help people with ADHD connect their own experience both to participatory cognitive scientific inquiry and to practical transformation.

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