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Metacontrol of Spontaneous Thought and Action

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in

Cognitive and Information Sciences

by

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The Dissertation of Alex Dayer is approved, and it is acceptable in quality and form for publication on microfilm and electronically:

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Abstract

Metacontrol of Spontaneous Thought and Action

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Doctor of Philosophy in Cognitive and Information Sciences

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Spontaneity is a pervasive feature of our mental lives. Many of our thoughts and actions seem to unfold in the absence of explicit, cognitive control. This has led some to argue that spontaneous cognitive processes are always experienced passively: spontaneous cognition is the sort of thinking that seems to just *happen* to us. That is, it doesn't usually appear as if we are in control of the dreams we have at night, the drifting of our attention as our minds wander, the ruminations we have about our concerns, or the flashes of creative insight we might have as we go about our life projects. When we experience these sorts of cognitive processes, they often seem to happen to us in the absence of any deliberation or effort. Instead of willfully generating the thoughts that inhabit our minds in such cases, these thoughts seem to spontaneously strike us.

This dissertation argues that spontaneity in cognition and action *does not* necessarily imply passivity. Although spontaneous thoughts and actions may be experienced passively in many cases, I think there is also a sense in which we can *let* spontaneous thoughts and actions unfold. For example, one can intentionally let one's mind wander during an inherently boring situation such as sitting in standstill traffic. Similarly, one may intentionally engage in an episode of reflective rumination, repetitively engaging the same ideas to solve a problem. In the realm of spontaneous skillful action, expert improvisers often claim they perform best when they intentionally let the actions flow through them. And in habitual behavior, such as habitual smartphone use, one might intentionally let their absent-minded scrolling behavior continue. In all cases, I think intentionally letting spontaneous processes unfold qualifies as a sort of mental action, in contrast to those who think that spontaneity implies passivity.

At first glance, this may seem like a contradiction: intentional spontaneity seems oxymoronic. This dissertation will argue that this is not the case. I think one can intentionally engage in spontaneous thinking and acting via *metacontrol*, a form of metacognition that is directed at other control processes. In this dissertation, I will argue metacontrol underlies individuals' ability to intentionally engage in spontaneous cognition and action. In particular, I characterize metacontrol in the context of intentional mind-wandering, rumination, lucid dreaming, improvisation, and doomscrolling to illustrate how metacontrol influences a range of both adaptative and maladaptive patterns of thinking and behavior.

Chapter 1: Introduction

Spontaneity permeates our mental lives. Much of our life is spent dreaming, mind-wandering, or ruminating about our concerns. Similarly, we often have to improvise as we go about our life projects, often acting without a plan. In such cases, we may feel as though we are not in direct cognitive control of our thinking or acting.

This has led some to argue that we experience spontaneous cognitive processes passively (Metzinger 2015). Arango-Muñoz & Bermudez (2021) have called this the "passivity assumption." After all, spontaneous cognition is the sort of thinking that seems to just *happen* to us. While we are dreaming, mind-wandering, or ruminating, our thoughts often seem to arise without any explicit deliberation or effort. Dreams and mind-wandering episodes often occur unintentionally and do not seem to require any careful cognitive control. Spontaneous action is similar: these are actions we perform that seem to happen effortlessly and without prior preparation. For example, in the context of improvisation, experts sometimes perform best without a plan, allowing actions to unfold automatically and effortlessly, often generating unexpected surprises. In the context of habitual behavior, such as habitual smartphone use, individuals find themselves spontaneously reaching for their digital device, without any explicit prior intention to do so.

Despite this initial description, this dissertation argues that spontaneity in cognition and action *does not* necessarily imply passivity. Although spontaneous thoughts and actions seem to just happen in many cases, I think there is also a sense in which we can *let* spontaneous thoughts and actions unfold. For example, one can intentionally let one's mind wander during an inherently boring situation such as sitting in standstill traffic. Similarly, one may intentionally engage in an episode of reflective rumination, repetitively engaging the same ideas to solve a problem. In the realm of spontaneous skillful action, expert improvisers often claim they perform best when they let the actions flow through them. And in habitual behavior, such as habitual smartphone use, one might intentionally let their absent-minded scrolling behavior continue. A primary aim of this dissertation is to argue that intentionally letting spontaneous cognition unfold qualifies as a sort of mental action[1], in contrast to those who think that spontaneity implies passivity.

Although spontaneous cognition makes up a great deal of our mental lives, it is relatively neglected compared to other areas of research in philosophy of mind, such as attention, memory, perception, etc. Why is spontaneous cognition rarely discussed in philosophy compared to other mental processes? I think there are two related possibilities. First, philosophers discussing mental processes often draw on findings from cognitive science, which tend to have a bias toward *tasks*. Researchers set up experimental tasks in the lab in order to investigate some aspect of attention, memory, perception, etc. However, spontaneous cognition often occurs in a way that is unrelated to ongoing tasks. Perhaps philosophers discuss spontaneous cognition less frequently than other mental processes because of a task-bias in cognitive science. This leads to the

[1] This dissertation will not be making any metaphysical claims about the nature of free will and is primarily concerned with the phenomenology associated with feelings of control or lack thereof during spontaneous cognition and action.

second, but related possibility: it is possible that spontaneous cognitive processes such as mind-wandering and rumination are harder to study precisely because they often occur in a task-unrelated way. Another aim of this dissertation is to contribute to a growing recognition that spontaneous cognitive processes deserve more attention, despite cognthe fact that it is often a difficult endeavor.

When individuals do study spontaneous cognition, the majority of research tends to focus on the negative outcomes associated with spontaneous thinking. For example, mind-wandering is often described as a failure of attention, especially when studied in the context of reading comprehension or dangerous driving. Similarly, rumination is often studied in the context of maladaptive thinking patterns as they relate to negative mental health outcomes. Yet, spontaneous cognition also seems to play a role in creative idea generation and cognitive flexibility. Similarly, rumination has also been associated with problem solving, self-understanding, and personal growth. In the realm of spontaneous action, habitual behavior may occur spontaneously yet so may the actions of experts during peak performances. Spontaneous cognition and action seems beneficial at times, yet detrimental at others. What makes spontaneous cognition adaptive or maladaptive? Another primary aim of this dissertation is to attempt to shed light on what sorts of processes lead spontaneous cognition to be adaptive or maladaptive.

Throughout the dissertation, I argue that metacontrol, a form of metacognitive regulation and monitoring directed at other control processes, underlies individuals' ability to intentionally engage in spontaneous cognition and action. Further, I argue that metacontrol can help explain why some instances of spontaneous cognition and action are beneficial whereas others are detrimental. To do so, I incorporate findings from disparate research programs across cognitive science. Another contribution of this dissertation is to highlight similarities and differences in characterizations of metacontrol across the cognitive sciences and offer my own account.

The dissertation consists of five chapters: an introduction, three main chapters, and a conclusion. Chapter 2 is titled "Metacontrol of Spontaneous Cognition," and I will argue that metacontrol affords *intentional spontaneity* across a range of spontaneous cognitive processes, including mind-wandering, rumination, and dreaming. Chapter 3 is titled "Metacontrol and Improvisation". In this chapter, I argue that skilled behavior, and in particular creative skilled behaviors such as improvisation, crucially depends on metacontrol. Chapter 4 is titled "Doomscrolling as Extended Rumination" and describes a case in which metacontrol fails; I will argue that doomscrolling is a form of smartphone-mediated rumination. In the final chapter, I will suggest directions for future research.

Chapter 2, "Metacontrol of Spontaneous Cognition", is focused on metacognitive control of spontaneous cognitive processes, such as dreaming, mind-wandering, and rumination. First, I review evidence in favor of and against the idea that spontaneous cognition can be intentional, primarily in the context of intentional mind-wandering, and argue that the experimental evidence suggests some episodes of spontaneous cognition are intentional. In the rest of the chapter, I argue that *metacontrol* is the sort of cognitive control that underlies intentional spontaneity. I survey existing literature on metacontrol across philosophy of mind, experimental psychology, cognitive neuroscience, and computational modeling, and find that characterizing metacontrol as a form of *metacognition* is preferable to alternative characterizations. Specifically, I contrast the

metacognitive characterization of metacontrol with Bernard Hommel's "Metacontrol State Model," and similar models from action theory which tend to leave the role of awareness unspecified. Is there something it is like to experience metacontrol or is this a process which largely unfolds outside of our awareness? I argue that awareness does play a role in metacontrol, and that metacontrol processes can act on thought as well as action. I then focus on three cases of metacontrol of spontaneous cognition: intentional mind-wandering, reflective rumination, and lucid dreaming.

Chapter 3, "Metacontrol and Improvisation," makes a similar argument; however, in the context of spontaneous *action*, not spontaneous cognition. This chapter builds on a previous paper, "Attention in Skilled Behavior: An Argument for Pluralism," that I co-authored with my advisor, Dr. Carolyn Dicey Jennings. In our original paper, we argued for pluralism in skilled behavior: the view that skilled behavior involves both automaticity and cognitive control. This contrasts with *habitualism* (or *automatism*), which characterizes skilled behavior as a largely automatic process, and *intellectualism* (or *cognitivism*), which characterizes skilled behavior as necessitating some form of cognitive control throughout skilled behavior. Our original paper investigated pluralism through the lens of attention and explicitly argued against the idea that metacognitive control might underlie fluctuations of attentional control during skilled behavior. Although this chapter maintains a commitment to pluralism, I present a modified account of pluralism. I will focus on cases of creative skilled behavior, in particular improvisation, to argue that metacontrol is often crucial for skillfully switching between more automatic and more controlled modes of responding. I still agree with our original assertion that explicit metacognition (thinking about how one is thinking) is unlikely to be responsible for skillfully oscillating between automatic and controlled processing (especially in the case of improvisation). However, I think non-propositional forms of metacognitive control may play this role. In sum, in this chapter, I argue that metacontrol during improvisation is best characterized as a non-propositional form of metacognition that can be developed as one acquires expertise, and further, that this may help explain fluctuations of control and spontaneity during improvised action.

At this point, I should also note that I have a pluralist perspective about cognitive science in general (Dale et al. 2009; Abney et al. 2014; Yoshimi 2023) and that this perspective is reflected throughout the dissertation. Rather than relying on a single framework to account for the complexity and variety of cognitive processes (computationalism, connectionism, dynamical systems theory, predictive processing, etc.), I opt for a more convergent approach. I think we should consider how various theories and methods work together to explain a given cognitive phenomenon. Throughout the dissertation, I take an approach similar to Flanagan (1995)'s "natural method." I will take the phenomenology of experts seriously, yet also see how well they mesh with existing theories and findings in cognitive science, psychology, and neuroscience.

In Chapter 4, "Doomscrolling as Extended Rumination," I present a case in which metacontrol fails, leading one to engage in maladaptive behavior that puts one at risk for increasing the severity of a range of mental health issues such as depression, anxiety, and PTSD. This paper aims to be the first detailed philosophical account of *doomscrolling*, drawing on work from philosophy of mind, experimental and clinical psychology, as well

as communications studies. I make two major claims about doomscrolling. First, I argue doomscrolling is a kind of *rumination*, "a form of perseverative cognition that focuses on negative content, generally past and present, and results in emotional distress" (Sansone & Sansone 2012, p.29). Second, I argue that doomscrolling is a form of extended cognition. Extended cognition refers to cognitive processes that incorporate entities external to an agent: in this case, a smartphone (or similar digital computing device). To be clear, while I do not think that anyone's smartphone is *brooding*; instead, I think it can change the way we experience ruminative thinking. In this chapter, I provide an overview debates around extended cognition and cognitive integration, focusing, the criterion for what ought to count as an instance of genuinely extended cognition. I opt for a family resemblance approach that treats the level of integration between an agent and an artifact as dependent on several dimensions. I focus on the dimensions of reliability and trust, procedural transparency, information flow, and transformation to argue that doomscrolling ought to count as a case of genuinely extended cognition, and, further, that it is a form of extended rumination. While presenting my characterization of doomscrolling as extended rumination, I will also contrast it with other proposed forms of habitual and diversionary smartphone use, such as absent-minded smartphone use (i.e., extended mind-wandering). Therefore, another contribution of my dissertation will be to distinguish between often conflated forms of problematic smartphone use. I will conclude the chapter by suggesting that doomscrolling ought to be characterized as a metacontrol failure. By integrating the smartphone into dysphoric information-seeking habits, one has a sense that they may find solutions, explanations, or answers to the source of their distress, yet they are rarely satisfied. I will suggest that metacontrol processes are involved in both action and cognition during doomscrolling and that they result in the agent getting "stuck" dwelling on distressing information received from their digital devices.

Throughout the dissertation I argue that skillful metacontrol of spontaneous cognition underlies a wide range of adaptive cognitive processes, from reflective rumination to skillful improvisation, and the failures of metacontrol may be implicated in harmful online habits such as doomscrolling. In short, although spontaneity is pervasive in our mental lives, I do not think it is pervasively passive because metacontrol often underlies our ability to intentionally engage in spontaneous thinking and acting.

Chapter 2: Metacontrol and Spontaneous Cognition

1. Introduction

Spontaneous cognition is the sort of thinking that seems to just *happen* to us. That is, it doesn't usually appear as if we are in control of the dreams we have at night, the drifting of our attention as our minds wander, the ruminations we have about our concerns, or the flashes of creative insight we might have as we go about our life projects. When we experience these sorts of cognitive processes, they often seem to happen to us in the absence of any deliberation or effort. Instead of willfully generating the thoughts that inhabit our minds in such cases, these thoughts seem to spontaneously strike us.

In other words, it seems that spontaneous cognition is characterized by mental passivity. Rather than actively controlling the generation of thought contents, we passively experience them as they are spontaneously generated. In the context of mind-wandering, Arango-Muñoz & Bermudez (2021) has labeled this the "passivity assumption," the view that mind-wandering can neither be active nor intentional. For example, Metzinger (2013) argues that mind-wandering, a prototypical spontaneously generated mental state, is "the opposite of mental autonomy" and "that for roughly two-thirds of our conscious lives we are not mentally autonomous subjects" (p.14). Relatedly, Kane et al. (2017) used experience sampling methods to track the frequency of mind-wandering throughout the day and found that participants spent up to 50% of their waking mental lives mind-wandering. If these rates of mind-wandering are accurate[2] and Metzinger is correct to suggest we lack mental autonomy during spontaneously generated mental states, this entails that we spend most of our waking mental lives in a state of mental passivity.

In my view, we ought to resist the passivity assumption, not only in the context of mind-wandering but across all forms of spontaneous cognition, including rumination and dreaming[3]. This is because I think it possible to engage in episodes of spontaneous cognition *actively* and *intentionally*. The purpose of this chapter is to argue this is possible across a range of spontaneous cognitive processes, not just mind-wandering.

A mind-wandering example should help illustrate what sorts of mentals states I'll be discussing. Imagine you are riding a bike through a park with the intention to relax after a stressful day. At times you may need to focus your attention on shifting the gears or avoiding irregular surfaces on the path, but at other moments you find your attention drifting away from the demands of the bike ride, off towards other matters entirely. Your mind starts to wander, and suddenly you are thinking about the birds, and then what you might have for dinner, and then of your friends. None of these thoughts seem particularly

[2] Seli et al. (2018) is skeptical about these rates of mind-wandering. When participants are given a range of options to make judgements and report task engagement, rates fluctuate between 10% and 60% of the day. Seli et al. suggest that researchers' assumptions about what it means to be on-task or off-task influence the reported rates of mind-wandering.

[3] Creative cognition will not be covered in this chapter, as it is discussed in more detail in the following chapter on improvisation.

connected (you weren't planning on feeding those birds to your friend for dinner), but the fact that the thoughts aren't connected is in no way surprising or alarming to you. This is because you intended to relax on the bike ride, and drifting thoughts are a predictable consequence of such a relaxing state. You're aware of the meandering nature of your thoughts and this acts as a signal that you are relaxed, that there is nothing pressing you must focus on. Sweet relief! You had a sense of control as you initiated the relaxing mind-wandering state and when you allowed the mind-wandering state to *persist*. However, you weren't exactly in control of the specific contents of your thoughts or order in which they were presented to you. In short, you *let* the spontaneously generated thoughts occur to you, your mind taking twists and turns while your body does the same along the bike path.

It is precisely the fact that we can *let* spontaneously generated cognitive processes unfold that leads me to believe that the passivity assumption ought to be abandoned. In short, the overarching aim of this chapter is to convince the reader that although you may not be able to control the specific mental *contents* of spontaneously generated cognition, it is possible to exhibit a form of cognitive control such that you initiate or maintain a mental state in which your mind continues to generate mental contents spontaneously (as the example of intentional mind-wandering illustrates above). More specifically, I think that a form of metacognitive regulation and monitoring, *metacontrol*, enables individuals to intentionally engage in spontaneous cognition. My argument is as follows:

> **P1.** The passivity assumption entails that spontaneous cognition can neither be active nor intentional (i.e., it does not involve cognitive control).
>
> **P2.** If spontaneous cognition can involve cognitive control, the passivity assumption ought to be rejected.
>
> **P3.** Spontaneous cognition can involve metacontrol, a form of cognitive control.
>
> **Conclusion.** The passivity assumption ought to be rejected.

In addition to arguing that the passivity assumption ought to be rejected across all forms of spontaneous cognition, I will also offer a novel definition of spontaneous cognition. In the next section, I will provide some conceptual clarification on spontaneous cognition, ultimately arguing that existing accounts are either overly restrictive or overly inclusive with respect to what sorts of mental phenomena count as spontaneous. After presenting my own definition of spontaneous cognition, the next section reviews work on metacontrol, which has historically been conducted in the context of action control. I will argue that metacontrol is not restricted to action control and that cognition can also be the target of metacontrol processes. To do so, I will primarily focus on the case of intentional mind-wandering. In the remaining sections, I will argue that one can also intentionally engage in episodes of rumination (e.g., reflective rumination) and dreaming (e.g., lucid dreaming).

2. Spontaneous Cognition

Spontaneous cognition refers to a collection of cognitive processes including dreaming, mind-wandering, rumination, and creative thinking. Because it is an umbrella term that covers a wide range of cognitive processes, some researchers have raised definitional concerns. Some researchers worry that existing definitions of spontaneous cognition are either overly specified or not specified enough (Christoff et al. 2018; Seli et al. 2018a; Seli et al. 2018b). Whereas some researchers would like spontaneous cognition to have a clear, unambiguous definition, other researchers are happy to treat spontaneous cognition as an umbrella term for a set of loosely related cognitive processes (Seli et al. 2018). Here, I will outline their disagreements.

One attempt to clearly define spontaneous cognition has been in terms of a lack of constraint. Christoff et al. (2016) define spontaneous thought as "a mental state, or a sequence of mental states, that arises relatively freely due to an absence of strong constraints on the contents of each state and on the transitions from one mental state to another" (p.719). The notion of "constraint" in this definition refers to *attentional* constraint. Broadly, there are two ways in which attention can constrain ongoing mental activity. One is a more deliberate, effortful mode of attention, often referred to as top-down attention, and the other route is more automatic, often referred to as bottom-up attention (Baluch & Itti 2011; Itti 2005; Katsuki & Constantinidis 2014). Whereas top-down attention constrains mental activity via inhibition and cognitive control, bottom-up attention constrains mental activity by directing our attention to salient affective or sensory information (Connor et al. 2004; Melloni et al. 2012). Christoff et al. propose that it is the lack of attentional constraint that explains why thoughts during spontaneous cognition flow freely from one to the other. Mind-wandering is said to occur because reduced bottom-up and top-down attentional constraint cause our thoughts to meander from one subject to the next. Further, they claim that their "dynamic framework" of spontaneous cognition is preferable to existing definitions of spontaneous cognition because it is the only one that directly accounts for the *dynamics* of spontaneous cognition, i.e., how thoughts unfold over time. In sum, the dynamic framework claims that spontaneous cognition is thinking that occurs in the absence of both bottom-up *and* top-down attentional constraint.

Others take a looser approach when defining spontaneous cognition. For example, in the context of mind-wandering, rather than providing a strict definition, the "family resemblances" approach treats mind-wandering as a "graded, heterogenous concept" that refers to a broad range of mental phenomena, some of which share overlapping characteristics (Seli et al. 2018, p.479). Whereas the dynamic framework seeks to define spontaneous cognition solely in terms of attentional constraint, others take a more inclusive approach that treats spontaneous cognition as "a cluster concept with a probabilistic rather than a definitional structure, where membership is graded along multiple dimensions and some exemplars are more prototypical than others" (Seli et al. 2018, p. 959). For both the dynamic framework and the family-resemblance approach to spontaneous cognition, there is a worry that, as Seli et al. (2018) note, "researchers may be lumping fundamentally different experiences in the same category" (p. 483). Yet the

two theoretical approaches have different solutions to this problem. Whereas the dynamic framework seeks to solve this problem by providing a rigid, definitional structure in terms of attentional constraint, the family-resemblance approach recommends being very precise about what dimensions of spontaneous cognition one is studying, while still treating spontaneous cognition as a cluster concept.

For the present chapter, I define spontaneous cognition as a class of cognitive processes during which one's mental contents arise endogenously (i.e., not in direct response to an external stimulus) and non-deliberately (i.e., free from explicit forms of top-down attentional constraint). Here is a chart depicting how my view differs from the other accounts:

S = Spontaneous NS = Not Spontaneous	**Dynamic Framework**	**Family Resemblance Model**	**My view**
Ruminating about a bad experience	NS	S	S
Deliberately planning a vacation during a resting-state brain scan	NS	S	NS
Allowing one's mind to wander while taking a bike ride.	S	S	S

Table 1: *The dynamic framework is overly restrictive because it excludes highly affective spontaneous cognitive processes such as rumination, and the family resemblance model is overly inclusive as it may classify off-task, yet deliberate thinking as a form of spontaneous cognition. My view includes rumination, but excludes off-task, deliberate thinking.*

I'm using my own definition because I think the dynamic framework is overly restrictive and the family resemblance model is overly inclusive. For example, according to the dynamic framework, spontaneous cognition occurs in conditions of absent or significantly reduced attentional constraint. According to their view, rumination does not count as a form of spontaneous cognition because it is constrained by bottom-up attention. This is even though rumination shares important characteristics with other forms of spontaneous cognition (e.g., lack of control over the specific mental contents generated during the ruminative state). For example, *brooding* rumination occurs when individuals repetitively and unintentionally dwell on the sources of their distress, often in a manner that is difficult to stop (Burwell & Shirk 2007; Watkins & Nolen-Hoeksema 2014). Although one's cognition in these cases is highly constrained by affective

processes, I still think we ought to include brooding rumination as a form of spontaneous cognition because the thinking occurs unintentionally and often outside of the agent's top-down attentional cognitive control. From the individual's perspective, the mental contents of one's thoughts are still experienced as occurring spontaneously. The thinking is still perceived to occur spontaneously, despite one's thoughts being repetitive and affect laden.

Whereas the dynamic model is overly restrictive by excluding rumination, the family resemblance model runs the risk of being overly inclusive. Christoff et al. (2018) point out that the family resemblance model may lead one to researchers to overgeneralize and categorize fundamentally different types of thinking into the same category. For example, researchers may focus on stimulus-independence or task-unrelatedness, but just because a research subject is thinking about something other than the present stimulus or task at hand, this does not necessarily mean that their thinking was spontaneous. Deliberately planning a vacation during a resting state brain scan ought not to count as an instance of spontaneous cognition (see Table 1). One can deliberately think about things unrelated to one's sensory environment or present task. The worry is that this approach is underspecified to the degree that some studies of spontaneous cognition are not exploring spontaneous cognition at all.

Because my definition only references *top-down* attentional constraint, it is simultaneously more precise and more inclusive than the dynamic framework. That is, it does not exclude rumination as a spontaneous cognitive process. Also, because my definition is somewhat rigid, it is not overly inclusive like the family resemblances approach; task-unrelated or stimulus-independent thought cannot be spontaneous if the mental contents were deliberately generated by the individual.

Although my definition emphasizes that *mental contents* are not deliberately generated during spontaneous cognition, I think individuals can deploy a form of cognitive control such that one initiates or maintains episodes of spontaneous cognition. That is, I think one can intentionally bring about or maintain a state of spontaneous cognition; however, the specific contents that are generated in such a state are not under one's immediate control. For example, a lucid dreamer may maintain a dream state (Wolpin et al. 1992; Lemyre et al. 2020), a mind-wanderer may intentionally prolong the meandering of their thoughts (Seli et al. 2016; Robison & Unsworth 2018), and someone experiencing depression might prolong a perseverative bout of rumination (Treynor et al. 2003; Whitmer & Gotlib 2011). As the cases above suggest, individuals are capable of intentionally engaging in episodes of spontaneous cognition. As mentioned previously, I think a form of metacognitive regulation and monitoring *metacontrol* enables individuals to intentionally give rise to such states. In the following section, I will provide more conceptual background on metacontrol to clarify how I think individuals can intentionally engage in spontaneous cognition.

3. Metacontrol

Metacontrol is often described as a process that is responsible for the "control of cognitive control" and has its roots in theories of action control (Goschke 2013; Hommel 2015). Although there are different accounts and models of metacontrol, most describe

metacontrol as a control process that operates on antagonistic control states (Eppinger et al. 2021). Antagonistic control states refer to control states that are in competition with one another as an agent attempts to actualize some goal or intention. We often need to make trade-offs when responding to different situations. For example, we may be more stable in our responding if we get a consistent reward, but we may need to shift to more flexible responding if the reward becomes less consistent (Fröber & Dreisbach 2021). In some situations, it may be best to rely on automaticity (e.g., playing a well-rehearsed part of a song) whereas other situations may call for carefully controlled actions (e.g., scaling a dangerously steep mountain) (Hommel & Wiers 2017). Sometimes it is necessary to exploit existing strategies, whereas other situations demand that we explore new strategies (Marković et al. 2021). In sum, metacontrol is typically characterized as the way agents adjust their cognitive control state between antagonistic modes of responding (e.g., automaticity vs. control, exploitation vs. exploitation, stability vs. flexibility).

Here, I would like to raise three issues with current conceptions of metacontrol. First, it is unclear from existing accounts what role, if any, awareness and one's phenomenology plays in metacontrol. Is there something it is like to experience metacontrol or is this a process that largely unfolds outside of our awareness? Many accounts are agnostic about this issue. Second, should metacontrol be considered a form of metacognition? Some accounts are explicitly metacognitive, whereas others are not. Finally, it is unclear if metacontrol is restricted to action control or if it extends to control of one's cognition (i.e., mental control). Can metacontrol influence thinking or is it just restricted to action control? For the remainder of this section, I will argue that metacontrol is experiential, metacognitive, and applies to both action *and* cognition.

3.1 Non-Experiential Accounts of Metacontrol

As mentioned above, it is unclear if metacontrol is something that individuals can experience or if it is largely a subpersonal process unfolding outside of awareness. Descriptions of metacontrol that are generated in the domains of experimental psychology, cognitive neuroscience, and computational modeling tend to be either silent or agnostic about this issue. However, descriptions of metacontrol within philosophy of mind and philosophy of action tend to either implicitly or explicitly assume that metacontrol has an experiential component. This is likely due to different disciplines having different aims. Whereas experimental psychologists, cognitive neuroscientists, and computational modelers are primarily focused on describing the computational and neural mechanisms underlying metacontrol, those working on metacontrol within philosophy of mind and philosophy of action are utilizing the concept of metacontrol to explain the occurrence of specific kinds of experiences (e.g., intentional mind-wandering). Here, I will compare existing accounts of metacontrol and argue that awareness plays a role during metacontrol, i.e., metacontrol is something that can be experienced and awareness can impact ongoing metacontrol processes.

One of the earliest models of metacontrol is the Metacontrol State Model (Hommel 2015). According to this account, metacontrol is the interaction of two different systems, one of which promotes persistent responding during action implementation and another which promotes more flexible responding. He draws on research from Cools

(2006; 2008), which provides evidence that the nigrostriatal and mesofrontal dopaminergic pathways are particularly important for promoting persistence and flexibility, respectively. For Hommel, a "metacontrol state" is the level of either flexibility or persistence within an agent, or the current balance between the two antagonistic control states. Metacontrol states are said to come in degrees, on a gradient from more persistent to more flexible responding. This is determined by the level of top-down bias from goal states as well as the level of inhibition between response alternatives. A persistent metacontrol state is the result of "increasing the top-down bias from the goal representation and/or the degree of competition between the alternatives" (117). A flexible metacontrol state is the result of reduced top-down bias from the goal representation and reduced competition between response alternatives, which allows one to flexibly shift between response alternatives.

Is there something it is like to be in a metacontrol state, or to shift between metacontrol states? Hommel explicitly states that his model is not concerned with the phenomenology of metacontrol: "note that this concept is agnostic with respect to the degree of consciousness, awareness, or phenomenal experience that may or may not go with particular metacontrol states… but only considers the functional and neural characteristics of metacontrol" (p.118). There are other accounts that are like Hommel's metacontrol state model. Boureau, Sokol-Hessner, and Daw (2015) built a computational model of metacontrol that describes the process as an ongoing cost-benefit analysis weighing the cost of exerting or relinquishing control vs. the average reward. Eppinger (2021) describes metacontrol as a collection of computational mechanisms that both "monitor the progress of controlled processing and regulate the underlying control parameters in the service of current task goals and in response to internal or external constraints" (p.447). None of these accounts indicate whether awareness plays a role in metacontrol: they are either explicitly agnostic or avoid the issue entirely.

If awareness does play a role in metacontrol, this could be an issue for existing accounts. The issue is that researchers may be describing processes as "metacontrol processes" even though there is no sense in which the process ought to be considered "controlled" at all, at least not in any meaningful sense from the perspective of the individual. For example, Hommel & Colzato (2017) suggest that one's degree of flexibility and persistence (i.e., their metacontrol state) can become sedimented based on one's genetics (Markett et al. 2011) or cultural background (Masuda & Nisbett 2001). I accept that one's genetics and cultural background may influence individuals to be more flexible or persistent; however, it seems mistaken to identify such processes as metacontrol processes because they do not involve mental control on the part of the agent. In contrast, I think metacontrol processes are those in which an agent has some role in either monitoring or regulating the balance of antagonistic control states such as flexibility vs stability or automatic vs. controlled processing.

In sum, several accounts of metacontrol within experimental psychology and computational modeling are agnostic with respect to the experience of metacontrol. This is an issue because some of the processes characterized as metacontrol processes seem to occur completely subpersonally. It is unclear in what sense metacontrol is genuinely the "control of cognitive control" or if metacontrol just refers to any processes that modulate one's current cognitive control state, outside of awareness. In the next section, I will

argue that metacontrol is best construed as a form of metacognition, and as a result, it is a sort of control that can be experienced.

3.2 Metacontrol is Metacognitive

Whereas metacontrol is often described as the "control of cognitive control," metacognition is often described as "thinking about thinking" (e.g., Fisher 1998; Lai 2011; Vaccaro & Fleming 2018). However, the standard portrayal of metacognition as "thinking about thinking" seems to presuppose a particular characterization of metacognition, that is, one that necessarily involves a metarepresentational capacity or the ability to re-represent an existing mental representation (Proust 2007; Carruthers 2008). I accept that metacognition can take the form of explicitly re-representing existing mental representations, but also that there are non-propositional, procedural forms of metacognition as well (Proust 2012). Here, I am assuming a two-factor view of metacognition in which there are two major components to metacognition: metacognitive knowledge and metacognitive regulation (Flavel 1979; Schraw & Dennison 1994). Metacognitive knowledge generally refers to explicit, propositional awareness about one's ongoing cognition, whereas metacognitive regulation involves monitoring, evaluating, and regulating one's own cognition (which can unfold either implicitly or explicitly). Mylopoulos et al. (2023) refers to these two kinds of metacognition as low-level and high-level metacognition. I think metacontrol is best described as a kind of metacognitive regulation that operates on antagonistic control states, which can take either explicit or implicit forms. So, while I think metacontrol *can be* experienced, it is not the case I think that it must *always* unfold in a manner we are explicitly aware of.

In contrast to accounts of metacontrol in experimental psychology and computational modeling, characterizations of metacontrol within philosophy of mind and philosophy of action are explicitly experiential and often metacognitive. These accounts assume that not only is there something that it is like to experience metacontrol, but awareness also seems to play a critical role in the ongoing control of cognitive control. In particular, awareness affords the *monitoring and evaluation* of ongoing cognitive activity for the purpose of regulation. For example, Mylopoulos & Pacherie (2021) describe metacontrol as a form of metacognition responsible for shifting between more automatic and more controlled forms of responding during action. Awareness is a crucial component of metacontrol according to their account. They say:

> "…we observe that such control requires knowledge or awareness of what is working and what isn't as an action is unfolding. If an agent has no access to information about the success of their control processes, then they will have no input on the basis of which to guide their metacontrol processes and balance the interplay between cognitive and automatic control." (21)

This contrasts sharply with the account of metacontrol offered by Hommel (2015/2017), in which the role of awareness is left unspecified and shifts in metacontrol states are largely determined by genetic, cultural, or situational factors. For Pacherie & Mylopoulos, awareness or knowledge of the success or failure of one's actions is

necessary for the agent: otherwise, they would not have information available to guide shifts between modes of responding (i.e., antagonistic control states). They think the active monitoring and evaluation of the success of one's current control state can be used in the service of regulating ongoing control. It is unclear if metacognitive monitoring and regulation can play this role in Hommel's Metacontrol State Model or other computational models that leave the role of awareness unspecified. Therefore, it is an open question whether the Metacontrol State Model and models that incorporate metacognition are in conflict. However, if metacognitive monitoring and regulation does turn out to be essential for navigating shifts between antagonistic control states, this would most likely entail that models of metacontrol ought to be updated to account for the influence of metacognitive processing, abandoning a phenomenologically neutral stance. Because I take metacontrol to be something that can be experienced by an agent, I define it as follows:

> **Metacontrol**: metacognitive monitoring and regulation directed at antagonistic control processes (e.g., flexibility and stability, control vs. automaticity, exploration vs. exploitation).

The "meta" in metacontrol refers to the fact that these processes are *about* underlying control processes, the "control" in metacontrol refers to the fact that the agent is consciously aware of the ongoing monitoring and regulation. As mentioned above, I think metacontrol can unfold explicitly or implicitly, that is, with or without explicit knowledge of one's current control state. So, while one may have explicit, propositional knowledge that one is in a particular control state and use that information as the basis of which to switch between control states, I think it is also possible for one to monitor one's control state implicitly and non-propositionally. In particular, I think lower-level metacognitive processes allow for this. For example, one may have metacognitive feelings on the basis of which one may make shifts between control states. Metacognitive feelings refer to feelings such as fluency, certainty, and confidence, that can be used to inform agents about their ongoing cognition (Efklides 2006/2016). In these cases, individuals experience a kind of "fringe" consciousness, "a kind of summary representation of information that is in itself inaccessible to consciousness" (Norman 2017, p.96). For example, in the context of action, one may be responding in a very consistent and stable manner yet experience a feeling of low confidence as the stable responding does not yield the desired effects. This feeling of low confidence serves an epistemic function by alerting the agent that they may need to shift control strategies. Because metacognitive feelings provide information about underlying one's cognitive processes, they have also been characterized as "epistemic emotions" (Arango-Muñoz & Michaelian 2014; Vogl et al. 2021). In the next section, I will propose that Irving (2016)'s notion of attentional guidance may be considered a metacognitive feeling, and further, that this is what allows for the metacontrol of intentional mind-wandering.

To wrap up this section, according to metacognitive accounts of metacontrol, awareness and knowledge about one's own mental processing is essential for navigating between different modes of responding during action implementation. This can occur in the form of explicit, propositional metacognitive knowledge or in the form of implicit,

non-propositional metacognitive feelings. I will review more evidence for metacognitive accounts of metacontrol for action in Chapter 3 by focusing on intentionally spontaneous action: i.e., improvisation. However, this chapter focuses on intentional spontaneous cognition. In the next section, I will make the case that metacontrol is not only experiential and metacognitive but also applies to mental control as well as action control. To do so, I will focus on three kinds of cognition that can occur spontaneously, yet also intentionally: mind-wandering, rumination, and dreaming.

4. Metacontrol in Spontaneous Cognition

As mentioned in Section 2, I define spontaneous cognition as a class of cognitive processes during which one's *mental contents* arise endogenously (i.e., not in direct response to an external stimulus) and non-deliberately (i.e., free from top-down attentional constraint). During spontaneous cognition, one's mental contents seem to be generated outside of one's immediate attentional control. So, how can one *intentionally* engage in spontaneous cognition if the generation of one's specific mental contents is outside of their immediate attentional control? In the context of intentional mind-wandering, Murray & Krasich (2022) have suggested that intentional mind-wandering may be an incoherent category. The worry is that intentional mind-wandering is logically incoherent: if one intends to mind-wander, then mind-wandering becomes the task, so it is no longer task-unrelated cognition. In this section, I will argue that it is not an incoherent category and suggest that metacontrol processes may be responsible for intentional mind-wandering. Further, I will argue that metacontrol processes can help explain intentional spontaneous cognition in rumination and dreaming as well: in particular, reflective rumination and lucid dreaming. I think metacontrol processes can help explain how individuals who are intentionally mind-wandering or lucid dreaming let a state of spontaneous *cognitive flexibility* to persist, and ,in the context of reflective rumination, how individuals allow a state of spontaneous *cognitive stability* to persist.

4.1 Metacontrol and Intentional Mind-wandering

Seli et al. (2016) define intentional mind-wandering as mind-wandering in which "there is a conscious intention to initiate (or continue) an episode of mind-wandering" which "likely includes metacognitive awareness of its occurrence (at least some point during the episode" and as a result is not associated with "the feeling of a lack of control" (p.606). The metacognitive awareness that Seli refers to is often referred to as "meta-awareness" in the mind-wandering literature. Schooler et al. (2011) define meta-awareness as the "explicit knowledge of the current contents of one's thoughts" (321). Episodes of mind-wandering that involve meta-awareness of their occurrence are referred to as "tune outs," as they involve an agent intentionally tuning out their surroundings (Schooler & Schreiber 2004). In contrast, episodes of mind-wandering that lack meta-awareness are referred to as "zone outs" as they involve an agent experiencing an episode of mind-wandering without awareness. So, intentional mind-wandering is a kind of mind-wandering that involves an agent intentionally tuning out their surroundings in a manner that is not experienced as a loss of control.

In contrast to Seli, Metzinger (2015) argues that it is impossible for agents to have control over mind-wandering episodes. Recall from the introduction that he thinks mind-wandering is "the opposite of mental autonomy" and "that for roughly two-thirds of our conscious lives we are not mentally autonomous subjects" (Metzinger 2013, p.14). For Metzinger, when someone's mind is wandering they lack meta-awareness of their meandering thoughts. Because they lack meta-awareness of their thinking during mind-wandering, they also lack *veto control*, or the ability to terminate or suspend the ongoing cognitive process. For Metzinger, it is incoherent to say that a mental process is associated with mental control if the agent cannot be aware of or terminate that ongoing process.

The foundation for Metzinger's argument is a specific conception of mind-wandering: one that only allows for zoning out, but not tuning out. He supports his argument by citing work that suggests that most of our mind-wandering episodes are "zone-outs," that is, they unfold without meta-awareness (Schooler et al. 2011). However, Metzinger seems to ignore instances of "tune-outs," or mind-wandering episodes that are associated with meta-awareness of their occurrence. I agree with Metzinger that we do not appear to have any appreciable sense of control in cases of zone outs or mind-wandering without meta-awareness; however, when agents have metacognitive awareness of a mind-wandering episode, I think agents can metacognitively regulate their mind-wandering either by a.) initiating the mind-wandering episode, b.) maintaining the mind-wandering episode, or c.) terminating the mind-wandering episode (i.e., "veto control" for Metzinger). Before explaining how I think this is possible, I will briefly review some evidence from intentional mind-wandering that suggest we do have a sense of control over at least some mind-wandering episodes.

Seli's work on intentional mind-wandering seems to directly contradict Metzinger's characterization of mind-wandering. For example, in a series of studies that aimed to distinguish between intentional and unintentional mind-wandering, Seli et al. (2016) and Seli (2018) provide evidence that individuals can initiate and maintain mind-wandering episodes. Given a Sustained Attention to Response Task (SART), participants were probed intermittently about their mental state and asked to indicate if their mind was wandering and, if so, if they were doing it intentionally or not. For nearly 25% of responses, individuals reported that they were intentionally tuning out the experiment to allow their minds wander. According to Seli, the fact that people can and frequently do report intentional mind-wandering is sufficient reason to suspect intentional mind-wandering is a legitimate phenomenon. If Metzinger is correct, it would entail that individuals who report that they are intentionally mind-wandering are simply mistaken. Either the participants in these studies claimed they were aware when they were in fact not aware of their minds wandering or, alternatively, they were simply just deliberately and explicitly thinking about something other than the experiment and misclassified this as an instance of mind-wandering. I think the first alternative explanation is implausible: that is, I think that the reports of participants in the studies ought to be taken as a reflection of what they experienced. The second alternative explanation is more plausible, but participants reported that their minds were wandering when caught by the thought probe, not that they were deliberately thinking about something else. Distinguishing

between intentional mind-wandering and deliberate off-task thinking is important methodologically, as only the former but not the latter ought to qualify as an instance of mind-wandering. Although it would make experiments more cumbersome, it may be beneficial to ask participants if their thoughts were experienced as unfolding deliberately or spontaneously. However, the existing work on intentional mind-wandering suggests that participants are indeed mind-wandering intentionally.

The research on intentional mind-wandering presents further trouble for Metzinger's view. Not only were participants in Seli et al.'s experiments initiating intentional mind-wandering episodes, but they were also maintaining and terminating them. This should not be possible according to Metzinger's view, as he characterizes mind-wandering as lacking veto control (the ability to terminate the mind-wandering episode). For example, in the SART task mentioned above, participants were asked to look at an analog clock and press a button when the clock struck 12:00. Interestingly, rates of intentional mind-wandering decreased as the clock approached 12:00, which indicates that participants were able to strategically maintain or terminate mind-wandering episodes in response to shifting task demands. Relatedly, rates of mind-wandering decrease in response to situational demands such as increasing the stakes or reward associated with a specific task (Dreisbach & Fröber 2019) This is precisely the sort of strategic shifting that is the hallmark of metacontrol: as task demands change, agents seem able to shift between a state of spontaneity to a state of controlled processing.

In short, I think Metzinger's account applies to cases of "zoning out," or mind-wandering without meta-awareness. However, I do not think this view is appropriate when considering other instances of intentional mind-wandering in which meta-awareness is present, especially given Schooler's work on "tune outs" and Seli's work on intentional mind-wandering. When meta-awareness is present, I think this allows one to monitor and evaluate an ongoing cognitive process so as to actively regulate and control that process as it unfolds. Meta-awareness is a source of information for the agent, and they can use this information to regulate the mind-wandering episode. In the context of intentional mind-wandering, when one is "tuning out" this seems like a case of consciously experienced metacontrol in which one is shifting the balance of antagonistic control states: in this case, towards flexible, spontaneous cognition and away from more stable, deliberate cognition.

Irving (2021) is the first to suggest that metacontrol may be responsible for intentional mind-wandering. Irving's description of metacontrol departs from other accounts of metacontrol. His account of metacontrol is based on his notion of "attentional guidance," rather than shifting the balance of antagonistic control states. Irving describes metacontrol as instances in which "one actively initiates or maintains an unguided mode of thought, while exerting no control over *where* your attention is directed" (p.627). What does it mean for one's attention to be guided or unguided? Irving (2016) states "attentional guidance is conscious and involves the agent: the guided agent experiences distractions as (in some sense) calling for correction" (p.548). According to Irving, when our minds wander, our attention is "unguided" because our attention is not reliably pulling back to any particular information, nor do we feel the need to correct the meandering of our attention.

I do not think Irving's account of metacontrol is necessarily inconsistent with existing accounts. Rather, I think Irving's description of metacontrol refers to a specific kind of metacontrol: metacontrol that biases an agent towards cognitive flexibility and away from cognitive stability or persistence. I think Irving's account can be improved by explicitly acknowledging that metacontrol is a form of metacognition, as this is unclear in Irving's account. Irving claims that mind-wandering is incompatible with "guidance that operates on the focus of attention" yet compatible with "mechanisms that guide the attention," such that one can "actively suppress the guidance of attentional focus" (14). Arango-Muñoz & Bermudez (2021) have a similar account to Irving's in which they characterize intentional mind-wandering as "an intentional omission to control our thoughts" (7736). Yet neither of the accounts specify what sorts of cognitive processes are responsible for initiating or maintaining states of "unguided attention" or "intentional omission." Irving implicates metacontrol but does not specify exactly *how* it can influence the mechanisms that guide attention, and Arango-Muñoz & Bermudez are primarily concerned with how intentional omission may be utilized for creative endeavors (in particular, the surrealist method for art).

In short, I think low-level, implicit metacontrol is responsible for achieving such states. I think agents can use metacognitive feelings to regulate episodes of intentional mind-wandering. Recall that metacognitive feelings refer to feelings of fluency, certainty, confidence, etc. that can be used to inform agents about their ongoing cognitive processes. Because these lower-level metacognitive processes may occur implicitly, i.e., without explicit, propositional awareness, one may rely on such epistemic feelings to maintain a meandering, flexible mental state without exerting explicit cognitive control. I think Irving's account can be improved by characterizing his notion of "guidance" as a kind of metacognitive feeling. That is, there is something that it feels like to be attentionally unguided: it is possible to sense that one's thoughts are flexibly drifting from one topic to the next, without explicitly thinking "my thoughts are drifting from one topic to the next."

Contrasting mind-wandering with *brooding* rumination can help further illustrate how attentional guidance might be best construed as a kind of metacognitive feeling. According to Treynor & Nolen-Hoeksema (2003), brooding rumination is subtype of rumination that is unintentional, repetitive, maladaptive and involves "a passive comparison to one's current situation with some unachieved standard" (p.256). When experiencing brooding, individuals are painfully aware of the fact that their attention is being guided back to thinking about the sources of their distress. There is a strong sense that one is being pulled back to a stable, repetitive form of thinking. Mind-wandering is the opposite: our thoughts meander and we do not feel particularly drawn to any of them. I think we can use the metacognitive feeling of guidance as a source of information to regulate ongoing mind-wandering episodes. Having intended to initiate mind-wandering or having realized one's mind is wandering and intending to maintain that episode, an individual can rely on non-propositional, implicit feelings of guidance as a signal that their current thinking matches their intentions. This may explain why individuals who are intentionally mind-wandering are not surprised or caught off guard by the contents: they have reliable metacognitive information that signals their current mental state is line with their expectations. Yet, because it unfolds implicitly and is non-propositionally, it is not a

form of explicit, metacognitive awareness or control (which would be incompatible with a mind-wandering state).

In sum, I think intentional mind-wandering is possible because of low-level, non-propositional metacontrol, which allows an agent to utilize metacognitive feelings of guidance to initiate, maintain, or terminate spontaneous, flexible thinking. In the next section, I will make a similar case for reflective rumination, a spontaneous cognitive process that is a spontaneous yet simultaneously intentional, stable, and repetitive form of thinking.

4.2 Metacontrol and Rumination

Rumination refers to a class of spontaneously generated thought characterized by high levels of bottom-up attentional constraint (Christoff et al. 2016) in which one's cognition involves "thinking perseveratively about one's feelings and problems rather than in terms of the specific contents of thoughts" (Nolen-Hoeksema et al. 2008, p. 400). Not all instances of entertaining negative thoughts count as rumination. The distinctive feature of ruminative thinking is its repetitive nature: one recurses upon the same negative thoughts and feelings over and over. Ruminative thinking is described as *perseverative* because individuals often report being "stuck" in a repetitive pattern of thinking, often claiming the episodes are often difficult to stop. Rumination is like other forms of spontaneous cognition because the specific contents of one's mental state are perceived to be generated non-deliberately, yet in a stable and repetitive nature. It is typically restricted to a single distressing, highly affectively salient topic, in contrast to mind-wandering in which one meanders from one topic to the next, none of which are particularly affectively salient. So, in contrast to mind-wandering, which is marked by cognitive flexibility, rumination is characterized by highly stable patterns of thinking.

Rumination is typically sub-divided into two categories: brooding and reflective rumination. According to Treynor and Nolen-Hoeksema (2003), brooding rumination is characterized as "a passive comparison of one's current situation with an unachieved standard," and reflective rumination is characterized as "a purposeful turning inward to engage in problem-solving to alleviate one's depressive symptom" (p.256). Whereas brooding rumination is thought to be unintentional and passive, reflective rumination is typically described as intentional (Uleman 1989; Matthew & Wells 2004). In this section, I will suggest that metacontrol can be responsible for initiating and maintaining both types of rumination. If this is the case, then this would provide further reason to abandon the passivity assumption about spontaneous cognition, as this would be another example of one intentionally engaging in spontaneous thinking.

The idea that metacognition plays a role in rumination has been around for some time. However, most researchers typically study the relationship between metacognitive knowledge and rumination. For example, Papageorgiou and Wells (2003) found that both negative and positive metacognitive beliefs contributing to the prevalence of rumination. Negative metacognitive beliefs refer to beliefs that have to do with "uncontrollability and harm of rumination" as well as "the interpersonal and social consequences of rumination," whereas positive metacognitive beliefs refer to the beliefs involving the benefits and utility of rumination as a coping style (p.262). An example of a negative

metacognitive belief would be: "I can't control my ruminating thoughts, I'm not sure anyone would want to be around me like this." An example of a positive metacognitive belief might be "I need to dwell on this problem otherwise it won't go away." Both positive and negative metacognitive beliefs can contribute to the severity ruminative episodes, in addition to the onset of major depression disorder (Ruijten et al. 2010).

As mentioned above, positive and negative metacognitive beliefs are a form of metacognitive knowledge; however, the relationship between metacognitive *regulation* and rumination is less explored. One may change their metacognitive beliefs about rumination in order to reduce the prevalence of rumination; however, I also think it is possible for individuals to actively regulate one's thinking during episodes of rumination. I think metacontrol of ongoing episodes of rumination may help explain differences between brooding rumination and reflective rumination, and further, why brooding, yet not reflective rumination, is associated with negative long-term consequences. According to Uleman (1989) and Matthew and Wells (2004), rumination may involve both controlled and automatic processes. They claim that rumination can be initiated and maintained by executive systems that spur self-focused, emotion-focused processing, which in turn bias lower-level, automatic processing to generate thoughts spontaneously. Thus, it appears that reflective rumination is a metacontrol process, as it involves the metacognitive regulation of antagonistic control processes: in this case, automatic and controlled thinking.

Because rumination is often directed at highly emotionally salient content, many individuals who find themselves in such a state seek to actively manipulate the ruminative thought patterns. These attempts to control the ruminative state have been referred to as "thought control" strategies (Watkins and Moulds 2009). I think such strategies amount to learning how to employ metacontrol to skillfully cope with episodes of rumination, the goal being to avoid brooding rumination and to shift towards more reflective rumination, which is more likely to yield concrete solutions (as opposed to dwelling in negative emotions and abstract concerns, as in brooding). Not all such strategies are effective though. For example, some individuals seek to punish themselves for their unpleasant thoughts by initiating a ruminative episode marked by the spontaneous generation of distressing thoughts and emotions, a coping strategy which typically further prolongs the ruminative state (Wells & Davies 1994). Thus, it appears individuals are also capable of intentionally engaging in the brooding form of rumination, which is associated with negative outcomes (i.e., increases in severity of depression, anxiety, PTSD) (Burwell & Shirk 2006).

More successful strategies typically involve changing the way that one's thoughts are experienced during ruminative episodes. For example, one method for doing so is by engaging in "detached mindfulness," which is a technique that involves learning to not engage with thoughts, while maintaining awareness of them. According to Wells and Matthews (1994), the aim of "detached mindfulness" is "the development by the patient of a higher-order meta-cognitive awareness at which level the individual is encouraged to reside, rather than residing at the level of the negative appraisals themselves" (p.306). More recently, this has been supported by neuroimaging studies on brooding and reflective rumination. For example, research has shown that neural activity in the right supramarginal gyrus (rSMG) is associated with awareness of others emotional states as

well as an ability to refrain from projecting one's own emotional state onto others (Silani et al. 2013). When looking at the underlying neural correlates of brooding and reflective rumination, Satyshur et al. (2018) found increased functional connectivity between the anterior cingulate cortex (ACC) and the rSMG, which they suggest may be related to "a process of examining negative thoughts and emotions about the self from a more neutral or 'other' point of view" (896). Therefore, it seems that cultivating certain kinds of metacognitive awareness can help regulate episodes of rumination, and further, that this sort of metacognitive regulation is associated with better mental health outcomes over time.

4.3 Metacontrol and Lucid Dreaming

Dreaming seems to be the most prototypical form of spontaneous cognition. As ideas, emotions, images, and interactions happen in our dreams, they generally appear to just happen to us, without any deliberation or effort required on our part. At first glance, it might appear odd to suggest that one could intentionally engage in spontaneous cognition during dreaming, as these states seem to involve the least amount of control on our part. Yet, I do think it is possible to control aspects of spontaneous cognition during dreaming if we focus on a specific sub-type of dreaming: *lucid dreaming*. In this section, I will suggest that metacontrol can be responsible for initiating and maintaining episodes of lucid dreaming, and that this gives us further reason to abandon the passivity assumption about spontaneous cognition.

Lucid dreaming occurs when one has metacognitive insight (i.e., one becomes meta-aware) that one is dreaming, which is sometimes associated with the ability to control some aspect of that dream (Baird, 2019; Windt & Voss 2020). However, Windt and Voss (2020) note that because control is possible during lucid dreaming, that it may be problematic to consider lucid dreaming a form of spontaneous thinking. That is, it may be a sub-type of dreaming in which spontaneity is lost or greatly reduced. For example, Kahan & LaBerge (1994) have pointed out controlled processes such as metacognition may be involved during lucid dreaming. However, like Windt and Voss, I want to resist lines of argumentation that would suggest this renders lucid dreaming non-spontaneous. Whereas Windt and Voss argue that metacognitive insight (i.e., meta-awareness) and control are not opposed to one another but may coexist alongside one another, I will argue further that metacontrol may be how lucid dreamers may regulate spontaneous cognitive processes during dreaming. I will focus on two ways metacontrol may be involved in lucid dreaming: initiation and maintenance of the dream state.

There are several ways to initiate an episode of lucid dreaming. I will cover three techniques here: mnemonic induction of lucid dreams (MILD), waking induction of lucid dreams (WILD), and Wake up Back to Bed induction of lucid dreams (WBTB). MILD involves remembering a previous dream, vividly imagining that dream, and repeating sentences to oneself as one falls asleep such as "I will know that I am dreaming next time I sleep" (Levitan & LaBerge 1994). The WBTB method involves going to sleep for 6 hours, staying awake for 30 minutes to an hour, and then taking a nap in the early morning. This process increases the REM sleep duration and therefore increases the likelihood of becoming lucid. Further, the WBTB method can be combined with the

MILD method to further increase the likelihood of inducing a lucid dream state (Dyck et al. 2017). The WILD method involves directly entering a dream state lucidly from a waking state by maintaining meta-awareness throughout the transition (Neuhäusler et al. 2018). Windt and Voss (2020) point to Tibetan sleep yoga as an example of the WILD method, in which practitioners direct their attention at differently colored lights at locations on their body as they drift to sleep. So, not only is initiation of a lucid dream state possible, but there are also several means of doing so. Initiation of a lucid dream state seems like a prime example of metacontrol: a person *intentionally* maintains meta-awareness as they transition from a more stable, metacontrol state to a more flexible and spontaneous metacontrol state.

Metacontrol may be involved in initiating a state of lucid dreaming as well as maintaining or prolonging a lucid dream state. However, compared to initiating a lucid dream, which is itself not always an easy task, maintaining a lucid dream state appears to be quite difficult. Here is a report from a lucid dreamer articulating this phenomenon from Windt & Voss (2018):

> "For me, a lucid dream is always an exceptionally exciting experience... This condition feels like a brain battle between maintaining the dream scenery and waking up. In these short periods of clarity, the acting dream body and the real body that lies in bed exist simultaneously and it costs great effort and concentration to keep up the balance between the two." (p. 397)

So, while this report reflects the fact that lucid dream states can be maintained, it also suggests that this maintenance could also potentially terminate the dream. As Windt and Voss (2018) note, the voluntary maintenance of visual imagery within the lucid dream state often fails and leads to dream termination; therefore, they suggest that the higher-order maintenance involved in ludic dreaming involves more of a modulatory influence on the dream state, rather than being responsible for realizing all the mental contents of the dream. As evidence for this claim, they point to instances in which lucid dreamers frequently report that suppressing visual imagery leads to termination of the dream.

Why might it be the case that maintenance of lucid dreaming frequently fails? I would like to suggest that when lucid dreamers attempt to deploy top-down attention to suppress or control visual imagery in the dream state, this is incompatible with the relaxed attentional constraints characteristic of a dream. Deploying top-down attention terminates the dream because exerting top-down attentional control is incompatible with being in a state of spontaneous cognition: they are antagonistic control states. Rather than trying to control the specifics of the dream state, lucid dreamers find more success if they cultivate meta-awareness, yet do not exert top-down control. I think this counts as an instance of metacontrol, as cultivating this sort of metacognitive awareness appears to regulate the ongoing dream state. That is, it allows one to intentionally allow the lucid dream state to persist without actively generating the specific mental contents of the dream. Therefore, it seems as though, we are capable of metacognitively regulating even the most spontaneous of mental states, giving further evidence to abandon the passivity assumption about spontaneous cognition.

5. Conclusion

In this chapter, I have argued that spontaneous cognition is not a pervasively passive phenomenon. I introduced my own definition of spontaneous cognition, which I take to be an improvement on existing definitions as it is not overly restrictive nor overly permissive with respect to what sorts of mental states count as spontaneous. I have also proposed that metacontrol, a form of explicit or implicit metacognitive regulation of antagonistic control states, is responsible for instances in which individuals intentionally engage in spontaneous cognition. In contrast to other accounts of metacontrol, I argued it is best construed as experiential, metacognitive, and applicable to thought as well as action. As evidence, I reviewed research on intentional mind-wandering, reflective and brooding rumination, and lucid dreaming. Across all cases, it appears that individuals are capable of cultivating either explicit or implicit metacognitive awareness that can in turn be used as a means of regulating the ongoing spontaneous cognitive state. In sum, I have argued that we may have a sense of control during spontaneous cognition as we *let* our thinking be spontaneous.

Chapter 3: Metacontrol and Improvisation

1. Introduction

When asked where musical ideas and songs come from, Jack White tells Dan Rather:

> "You have to sit there and relinquish all control… I think that people think that when you write and you create you are the person in control and you're making all of this happen as if you're, you know, some sort of magician or something. But it's not really that. You sit there and you become an antenna and you just let things happen through you."

The idea that skilled behavior is *automatic* is pervasive. Experts frequently report feeling a lack of control when they are "in the zone." As the quote above demonstrates, many expert musicians (and dancers) report feelings of automaticity during psychological flow states (Pressing 1998; Araújo & Hein 2016). Similarly, when performing at peak levels, elite athletes frequently report that their action seem to unfold automatically, without the need for careful planning (Anderson et al. 2014). I certainly think there is some truth to this line of thinking: some aspects of skilled behavior seem to occur in the absence of explicit cognitive control. However, I do not think automaticity alone exhaustively characterizes skillful behavior. In this chapter, I focus on improvisation, a kind of spontaneous, creative mode of acting, to argue that automaticity cannot account for all instances of peak expert performance[4].

In Chapter 2, I discussed reasons we might doubt the "passivity assumption" about spontaneous cognition. This is the idea that spontaneous cognition cannot be active or intentional (Arango-Muñoz & Bermudez 2021). In this chapter, I will argue that we have good reasons to doubt what can be called the "automaticity assumption" about skilled behavior. This is the idea that all skilled action is characterized by automaticity, and further, that any sort of cognitive control only leads to disruption during performance. Here, I will argue that skilled behavior involves both automaticity *and* cognitive control. I will also argue that skilled behavior involves *metacognitive* control (i.e., metacontrol) in order to shift between automatic and controlled processing.

The account offered here is consistent with *pluralist* accounts of skilled behavior, in which automaticity and cognitive control are interwoven during skillful action (Dayer & Jennings 2021)[5]. Our initial account investigated skilled behavior through the lens of attention and characterized different ways in one might be a pluralist about skilled behavior. We argued that attention is present in different degrees at different levels of skill, different aspects of a task, and at different moments during the time course of skilled behavior. We labeled these types of pluralism as level pluralism, synchronic pluralism, and diachronic pluralism, respectively.

[4] I think improvisation is a counterexample to the claim that automaticity can explain all instances of peak performance, but allow that automaticity underlies other instances of peak performance

[5] Parts of this paper draw on material on the previously published pluralist account, in particular, the conceptual background in Sections 2 & 3.

Although I will discuss examples from different domains of expertise, the present paper will primarily focus on creative skilled endeavors, especially improvisation. I will characterize improvisation as a form of *strategic spontaneity*, through the framework of level pluralism and diachronic pluralism. Improvisation is a unique kind of expertise: it requires an expert to be flexible, spontaneous, and creative as they create something novel. Gallagher (2023) notes that:

> "…in the case of jazz and dance improvisation there is a skill-informed selective uncertainty, that is, you need to know a lot about your craft, about different traditions within your genre, and have skillful know-how, but you don't know what you are going to do or where the musical movement will take you." (p. 269)

For Gallagher, the aim of improvisation is to surprise oneself. Rather than sticking to a strict plan and executing it, experts improvising tend to create conditions where actions can flow spontaneously. However, I do not think actions unfolding *spontaneously* entails that they are unfolding *automatically*. Theories of skilled behavior that emphasize automaticity will likely paint improvisation as a kind of skilled behavior involving the complete absence of cognitive control. That is, when experts improvise, they suspend control entirely in order to let their actions unfold spontaneously, free from the constraints of careful planning or effortful attention. The account here does not share this perspective. While I do agree that some aspects of improvisation are automatic, as a pluralist, I think improvisation involves both automaticity *and* cognitive control. Further, I think improvisation crucially depends on *metacognitive control* (i.e., metacontrol) to navigate between more automatic and controlled responding during performance.

The account offered here departs from our previous pluralist account. In Dayer & Jennings (2021) we explicitly state that "we do not think it is necessary to suppose metacognitive support for skilled behavior" (p. 631). However, the present paper will push back against this position. Instead, I will argue that skilled behavior frequently, if not always, involves metacognitive support. Specifically, I think that skilled behavior, and especially improvisation, involves *metacontrol*: a form of metacognition involved in the maintenance and regulation of antagonistic control states. Antagonistic control states are those that are in competition with one another as an agent attempts to complete some task or actualize some goal. Examples include trade-offs between automaticity and control, flexibility and stability, as well as exploration and exploitation. In short, I think improvisation involves skillfully shifting between more automatic and more controlled ways of acting, and that these skillful shifts are enabled by metacognitive regulation. This account of improvisation is at odds with accounts of skilled behavior that assume peak expert performance is the result of purely automatic processes or the constant presence of careful cognitive control. My argument is as follows:

P1. Automatism assumes improvisation is exhaustively characterized by automaticity.

P2. Cognitivism assumes improvisation is requires the presence of constant cognitive control.

P3. Improvisation requires oscillations between automaticity and cognitive control.

Conclusion. Automatism and cognitivism ought to be rejected.

Before discussing in further detail why I think improvisation poses difficulties for the assumptions about automaticity and control in skilled behavior, I will first provide some conceptual background about skilled behavior in general. In the first section of the paper, I will briefly distinguish between overlapping debates on skill. In the second section, I will describe the current state of debates about skilled behavior. I will describe the two major theoretical camps: those who view skilled behavior as a purely automatic process (the "habitualists" or "automatists") and those who insist skill relies on higher-level cognitive control of some sort (the "intellectualists" or "cognitivists"). In the remainder of the paper, I will present a pluralist perspective that characterizes skilled behavior as a dynamic interplay between automaticity and cognitive control, enabled by metacognitive regulation. I will discuss metacognition and skilled behavior through two different kinds of pluralism: level pluralism and diachronic pluralism. The final section of the paper will focus on metacontrol during improvisation, characterizing it as a form of strategic spontaneity. In sum, I will argue the link between metacontrol and improvisation presents a particularly strong case against both automatism and cognitivism.

2. Conceptual Background

To avoid confusion going forward, it may be useful to provide some conceptual background. When using the term "intellectualism," I am not referring to debates about whether all forms of "know-how" are forms of "know-that" (e.g., Ryle 1949/2009) or whether concepts permeate our mental lives (Dreyfus 2007a; Dreyfus 2007b; McDowell 2007). Instead, I am interested in debates about whether skilled behavior necessarily involves some sort of higher-level cognition, broadly construed. The distinction is subtle but important. This is because "know-that" typically refers to propositional knowledge structures responsible for thinking, reflecting, and intending but I am using the term "higher-level cognition" to capture a wider range of cognitive capacities. For example, top-down attentional control and metacognitive regulation are also included in my sense of "higher-level cognition," both of which can unfold in the absence propositional content. My use of the term "higher-level cognition" is casting a wider net than the way it may be used in debates about know-how and know-that: I am not only concerned with different kinds of knowledge structures (i.e., procedural vs. declarative) but also forms of control, maintenance, and regulation as they relate to skilled behavior.

Schwartz and Drayson (2019) note that some debates about skilled behavior are within epistemology, others in cognitive science, and sometimes a mix of both. The shift to using findings from cognitive science has its roots in Stanley and Williamson (2001). There, they argue against Ryle's idea that know-that is grounded in know-how by using linguistic analysis to suggest that all know-how is ultimately a form of propositional knowledge. In addition to linguistic analysis, theorists who look to incorporate cognitive science into their accounts might also employ findings from anthropology, cognitive neuroscience, cognitive psychology, and computational modeling. So, rather than being restricted to one or two branches of philosophy, more recently the relationship between skilled behavior and higher-level cognition has become an interdisciplinary endeavor incorporating findings from several domains. Levy (2017) suggests that whether know-how can be subsumed by know-that is a matter that will be settled within the sciences. Mylopoulos et al. (2023) describes this embrace of cognitive science within philosophy of action as a shift in emphasis from the relationship between practical and theoretical knowledge to "the nature of control that underlies skilled action" (p.35). According to Mylopoulos et al., the conversation is transitioning away from debates about know-how and know-that to debates about "automaticity" and "cognitive control."

At this point, it is important to note that I do not mean for the term "automaticity" to imply mindless or unreflective activity. Here, I am referring to "automatic" processes as those that require prior learning yet do not involve top-down attention or explicit cognitive control. For example, Fridland (2017) point out that just because an action occurs in the absence of conscious control does not make it a reflex. I am thinking of "automaticity" as in tying one's shoes, not as in blinking or a knee-jerk reflex. That is, tying one's shoes is a skill one must learn, that can then later be proceduralized, whereas blinking or a knee-jerk reflex is automatic, yet does not involve learning or skill in any sense.

Similarly, when discussing spontaneity in improvisation, I do not mean for the term "spontaneous" to imply completely unprompted or unintentional activity. This is because some spontaneous processes can be intentional despite lacking top-down attentional control (see Chapter 2). For example, Seli (2016) has shown individuals are able to allow their minds to wander intentionally. In the final section, on strategic spontaneity, I will argue that experts regularly engage in intentional and strategic spontaneity to excel in creative skilled behavior, and further, that this is especially the case during instances of creative improvisation.

I should also note that my view of metacognition may depart from standard assumptions and usage as "thinking about thinking" (e.g., Fisher 1998). I do not think metacognition *necessarily* has to involve a metarepresentational capacity—that is, a second-order representation of first-order cognitive contents (Proust 2007). I think metacognition *can* take the form of representing one's states as mental states as such, but I also think there are non-propositional, procedural forms of metacognition (Proust 2012). Instead, I opt for a two-factor view in which there are two major components to metacognition: metacognitive knowledge and metacognitive regulation (Flavel 1979, 1989; Schraw & Dennison 1994). Metacognitive knowledge generally refers to explicit awareness about one's cognition (both declarative and procedural knowledge) as well as one's cognitive strategies. Metacognitive regulation involves monitoring, evaluating, and

regulating one's own cognitive operations, allowing agents to shift between different cognitive strategies. There are two important things to note. First, metacognitive knowledge and metacognitive regulation need not work together simultaneously: each can unfold in the absence of the other. Second, and perhaps most importantly, metacognitive regulation does not have to unfold explicitly. It can unfold implicitly as well (see Proust 2012), making it a strong candidate for a form of executive control that need not be mentally effortful or taxing, as the metacognitive monitoring involved need not be explicit.

3. Automaticity vs. Control

Before presenting a pluralist approach to skilled behavior, here I will provide a sense of the major theoretical perspectives within debates about skilled behavior. The main aim of this paper is to suggest that seemingly disparate theories of skill are more compatible than perhaps is assumed, and further, that they can fruitfully inform one another, especially in the context of metacognition and creative skilled behavior. But, first, it is important to understand why there is any disagreement at all.

Papineau (2015) identifies two major theoretical camps concerning the relationship between higher-level cognition, automaticity, and skilled behavior: habitualism and intellectualism. Habitualism is the idea that skilled behavior lacks higher-level cognition, and further, that its absence is a defining feature (see Dreyfus 2007a; Cappuccio 2023). In contrast, intellectualism (recall: not the epistemological kind) is the idea that skilled behavior involves higher-level cognitive processes such as reflection, deliberation, and planning. According to this view, experts are constantly thinking about and concentrating on what they are doing in order to reach peak levels of performance (see Montero 2010). It should be noted that, like many accounts of skilled behavior, Papineau's primary focus is sports psychology, not improvisation or creative endeavors. He says habitualist accounts claim that "thought is the enemy of sporting excellence" and "cognitive effort only interferes with skill" whereas intellectualist accounts claim that "sporting performance depends crucially on mental control" (295). I am assuming for the present paper that Dreyfus' and Montero's accounts are meant to apply to both creative and non-creative skilled behavior, although defenders of automatism typically focus on sports to defend habitualism whereas Montero draws on her experiences as a ballet dancer to defend intellectualism. It is a live possibility that the extent to which one needs automaticity or explicit cognitive control will vary between different domains of expertise, and it is possible that assumptions about skilled behavior in general may be informed by the specific constraints of whatever test case one is using. That is, automaticity may be beneficial for playing tennis, but less for ballet, and cognitive control may be more beneficial for ballet, but less so for an optimal tennis performance. This poses no problems for pluralist accounts; however, this may be an issue for habitualists and intellectualists who want to paint skilled behavior as either wholly automatic or necessarily involving higher-level cognition of some sort.

Mylopoulos et al. (2023) construe the debate a bit differently than Papineau (2015). She distinguishes between automatism and cognitivism, rather than habitualism and intellectualism, for two reasons. The first reason is that the term intellectualism is

often confused with debates in epistemology, as mentioned above, so "cognitivism" is preferable to "intellectualism." The second reason is that she thinks that *habit* and *skill* ought to be distinguished, so "automatism" is preferable to "habitualism." Whereas habitual behavior is highly routinized and does not require the agent be particularly flexible or adaptive (e.g., think of tying your shoes), Mylopoulos et al. point out that skilled behavior is marked by highly flexible and adaptive responding. Therefore, the term "habitualism" seems to imply that skilled behavior is inflexible and routinized in a way that does not do justice to the behavior of experts performing at peak levels. This is especially the case in creative domains of expertise, such as improvisation, in which the behavior is characterized by spontaneity and flexibility. Take musical improvisation as an example. According to this view, playing out of habit will likely be more stable, less dynamic, and more predictable compared to skillfully improvising, which will likely involve surprises and shifts between several musical motifs in a single session. In short, playing by habit will likely lead to a less novel and exciting improvisation. Because I share the sentiment that we ought to distinguish between skills and habits, I will use the terms "automatism" and "cognitivism" instead of "habitualism" and "intellectualism."

According to Mylopoulos et al. (2023), automatism is the idea that skilled action control is driven by automatic motor processes and cognitivism is the idea that skilled action control involves cognitive control. They outline four aspects in which automatism and cognitivism differ. Automatism entails that skilled action:

> "…under optimal conditions, lacks (i) conscious reflection about action, (ii) explicit intentions guiding behavior, (iii) monitoring and attention towards action, and (iv) deliberation and reasoning about action." (p.472)

In contrast, cognitivism is the theoretical position that skilled action, under optimal conditions, involves the presence of *at least* one or more of the cognitive control processes mentioned above. I think improvisation involves ongoing metacognitive monitoring towards action; however, before presenting the case for this, I will overview arguments for automatism that deny this.

3.1 Like an Antenna: Automatism

At this point, it may be helpful to return to the quote from above. When asked where musical ideas and songs come from, Jack White says:

> "You have to sit there and relinquish all control… I think that people think that when you write and you create you are the person in control and you're making all of this happen as if you're, you know, some sort of magician or something. But it's not really that. You sit there and you become an antenna and you just let things happen through you."

Many artists, athletes, and scientists endorse the automatist view of skilled behavior. The idea that skilled behavior is automatic comes not only from expert reports of their peak performances, like the quote above, but it is supported by standard models of skill

acquisition within experimental psychology (Anderson 1982; Dreyfus & Dreyfus 1980). This is based on observations about developing expertise. As a novice, one relies on rules and heuristics to guide action. These often take the form of declarative knowledge structures that can be used to constrain, guide, and scaffold action. For example, when teaching someone how to shoot a free throw for the first time, a teacher might instruct a student to "hold their follow through." Holding your arm out after making the shooting motion ensures you complete the whole action fluidly, without your action ceasing too soon or becoming too rigid. These rules and heuristics help learners develop more rapidly at first, providing constraints that reinforce successful actions. As one progresses from a novice to intermediate level, the behavior of skill learners becomes increasingly more automatic and learners rely less on declarative knowledge and rule-based heuristics, albeit still relying on these rules at times. However, at expert levels, one's actions are tightly associated with expected outcomes and skilled behavior can unfold without the assistance of higher-level monitoring or cognition. If this is the case, this would imply that the skilled behavior of experts is exactly as Jack White and the automatists describe it. According to automatists, masters of their craft perform best when they relinquish all control, without the assistance of higher-level cognition of any kind. According to this view, skill learning for improvisation is complete when one's actions are completely automatized, and one becomes "like an antenna" and just "lets things happen" through them.

As mentioned above, Dreyfus is a well-known defender of automatism. His account has roots in the debates about intellectualism in epistemology mentioned above. Specifically, his position is presented in what is known as the McDowell-Dreyfus debate. Dreyfus (2007a) argues that McDowell has fallen prey to the "myth of the mental" or the idea that conceptual mindedness is ubiquitous in our mental lives. Instead, he draws on phenomenologists and embodied cognitive science to argue that know-how (procedural knowledge about how to act in the world) is the basis from which know-that (declarative knowledge about matters of fact in the world) can arise, updating Ryle's original account by drawing on new insights from cognitive science. His argument relies on expert reports of what Dreyfus calls *absorbed bodily coping*. Others refer to this phenomenon as flow experience (Csikszentmihalyi 1997). During these mental states, Dreyfus claims experts perform best without any higher-level cognition, that is, without any form of thinking or mental control. I take this to mean that explicit metacognitive knowledge has no place in skilled behavior, in Dreyfus' view. Instead, Dreyfus claims experts possess a "kind of non-mental content that is non-conceptual, non-propositional, non-rational, and non-linguistic" (p.352). I do not take this to mean that *implicit* metacognitive regulation has no place in skilled behavior, but it is unknown what Dreyfus might say about non-propositional forms of metacognition. His ideas are primarily inspired by Gibsonian ecological psychology: experts are immediately and automatically solicited by affordances of the agent-environment relationship (Gibson 1979/2014). So, for Dreyfus, peak performance requires no intermediate mental representations or higher-level cognition. Arguing against Dreyfus, Montero (2013) refers to this as the "principle of automaticity." When everything is going well, expert performance "involves neither self-reflective thinking nor planning, nor predicting, nor deliberation, nor mental effort" (p.304).

Dreyfus' account is intuitive and pervasive. So much so, in fact, that Nike seems to have adopted a succinct version of the idea as their tagline: "Just do it," they say, don't think about it. Automatism clearly seems to resonate with those in the sporting world. It is also likely to resonate with anyone who has *choked under pressure*. Choking under pressure occurs when stressful or suboptimal situations lead skilled individuals to perform at intermediate or novice levels (Beilock & Carr 2001; Beilock et al. 2002). There are several accounts of choking under pressure, but a theory especially supportive of automatism is the *explicit monitoring hypothesis* (Beilock & Gray 2007). This theory of choking claims that stress and pressure can cause an expert to misallocate their attentional resources to the specifics of their actions, which disrupts more automatic, procedural processing which normally ensures that experts' actions unfold fluidly. In short, the idea behind the explicit monitoring is that experts choke when they are thinking about what they are doing, or paying attention to what they are doing, instead of just doing it.

If automatism is correct, peak performance during skilled behavior would be characterized by a lack of higher-level cognitive thought and control. Exerting cognitive control during skilled behavior only leads to choking and disruption, automatists might claim. However, just because higher-level cognitive control and thinking leads to choking in some circumstances[6], this does not entail it is *always* detrimental to skilled behavior. There may be other circumstances in which peak performance may require significant cognitive control, which is a point that cognitivists, those on the opposite end of the debate, are keen to emphasize.

3.2. Don't Just Do It! Cognitivism

The idea that skilled behavior crucially depends on higher-level cognition and mental control is known as cognitivism. Montero is a well-known defender of the cognitivist account of skilled behavior[7], and she relies on her previous experience as a ballet dancer to argue against automatism and the principle of automaticity. During ballet, she recalls frequently thinking about what she was doing and exerting tremendous amounts of mental effort to reach peak levels of performance. She argues against automatism in several ways. She appeals to inconsistences between first-person reports (some experts claim thinking helps their performance, whereas other experts claim it tends to be a detriment). She is also skeptical that findings from sports psychology can be applied to all domains of skilled behavior (a skepticism I share), and frequently notes that experts have a desire to continually improve and push the boundaries of their expertise. I think the latter two argumentative strategies are the most persuasive and relevant to the present paper because they are particularly relevant to creative skilled behavior, so I will focus on them below.

According to Montero (2010), experts' constant desire for improvement shows that automaticity alone cannot explain how experts are able to reach peak levels of performance. To push the boundaries of their respective domains of expertise, she claims

[6] Another prominent theory of choking is the "distraction hypothesis" in which pressure leads to a decrease in available working memory (see Eysneck and Calvo 1992)

[7] She uses the term "intellectualism," but I'm using "cognitivism" here for consistency.

that experts must continually employ mental control and higher-level cognition. She uses Tiger Woods as an example. Although he was known as the best golfer in the world at one point in time, he deliberately altered his swinging style to improve his overall performance and continue to push the boundaries of his sport. To be completely transparent, his performance did dip during this re-training process; however, the temporary reduction in performance was necessary to reach new levels of expertise. Without higher-level cognition, planning, and the deliberate shifting of strategies, Montero argues we would never discover new, creative ways of acting skillfully nor would experts be able to continually improve.

This point is made more salient when comparing sporting performance and other domains of skilled behavior, such as creative skilled behavior, especially creative improvisation. Artists are constantly discovering new, creative ways of acting skillfully. Shooting a free throw is quite different than dance and jazz improvisation. As mentioned above, task constraints vary wildly across different domains of expertise. In sports, one's goals and criterion for success are often much more clearly defined than in creative endeavors, such as improvising for the sake of creating something novel. For example, the objective is to put the ball in the basket when shooting a free throw, but there are more routes to and different criteria for success when creating a song or making a painting. Further, even within creative domains of expertise, task environments and constraints vary tremendously. Performing a classical composition or executing a specific brushstroke is different than jazz or dance improvisation: the former involve sticking to a well-rehearsed plan, whereas the latter eschew plans for the sake of novelty. I agree with Montero that it seems unlikely that we can apply all the findings from sports psychology to other domains of expertise. In my pluralist view, I think it is likely that the contributions of automaticity, control, and metacognitive regulation vary between tasks and across domains of expertise.

So, at this point, it seems sometimes cognitive control can completely derail performance (e.g., choking under pressure) yet in other circumstances it can allow one to transcend the boundaries of one's area of expertise. I think this is a problem for both automatism and cognitivism but not pluralism. Should we, as Nike, Dreyfus, and Jack White urge us, "just do it"? Or does skilled behavior require more than automaticity, as Montero suggests? Automatists do cannot account for how experts use controlled processes to push the boundaries of one's expertise, and cognitivists do not have an account of how experts can also rely on unplanned, spontaneous acting to achieve peak levels of performance (as in improvisation). In the next section, I will overview pluralist and related "hybrid" accounts of skilled behavior, which attempt to reconcile the opposing views presented in this section by specifying the ways in which automaticity and higher-level cognition are in a dynamic interplay with one another during skilled behavior.

4. Pluralism

Hopefully at this point I have given the reader a sense of why one might adopt an automatist or cognitivist stance about skill. Both accounts emphasize important aspects of skilled behavior. Automatists are correct to highlight the role of automaticity in skilled

behavior (albeit at the expense of cognitive control) and cognitivists are right to call attention to circumstances in which cognitive control contributes to skilled behavior (although at the expense of automaticity). Even though they seem like incompatible theoretical positions, there are several aspects of skilled behavior in which the two theoretical camps seem to agree. For example, in his famous model of skill acquisition, Dreyfus argues that some aspects of skilled behavior will be automatized, whereas others will not be automatized up until the mastery stage (the penultimate stage before expert stage). This sounds like an admission that most of skilled behavior will involve contributions from both automatic and controlled processes. Similarly, when rejecting Dreyfus' more radical claims about *absorbed bodily coping* or flow states, Montero simultaneously agrees with Dreyfus that skilled behavior can include automatic components, at least in some cases. Thus, weaker versions of both automatism and intellectualism tend to have a pluralist spirit.

Pluralism about skilled behavior is the position that skilled behavior involves both automaticity and cognitive control. As mentioned previously, Dayer & Jennings (2021) argue for this position by looking at the role of attention during skilled behavior. We characterized three forms of pluralism: level pluralism, synchronic pluralism, and diachronic pluralism. Level pluralism is the idea that different levels of skill with different degrees of cognitive processing, and further that increases in automaticity allow experts to engage other executive functions, for example, like mind-wandering for the sake of imaginative idea generation (a capacity novices lack, as their working memory is otherwise occupied by task demands). Synchronic pluralism is the view that some aspects of a task may unfold automatically whereas other aspects may require careful cognitive control. This is consistent with the framework provided by Papineau (2015). In his account, he distinguishes between basic actions and the *components* of basic actions. According to Papineau, higher-level cognitive control only degrades performance if it is directed at the components of an action. However, higher-level cognition does not impair performance if it is directed at the basic action itself. For example, when shooting a free throw at an expert level, it is best to focus on the basic action of getting the ball through the hoop, not the specifics of your posture, the angle of your elbow, or the precise details of how to move your hand during a follow through. Attending to these low-level details only derails performance. Dayer & Jennings (2021) argued that the previous two forms of pluralism (level pluralism and synchronic pluralism) are consistent with standard models of skill acquisition and empirical findings on the topic of skilled behavior. The final form of pluralism we introduced, diachronic pluralism, is less consistent with standard accounts of skilled behavior. Diachronic pluralism is the idea that contributions of automatic and controlled processing will vary over the time course of skilled behavior. Like Dayer & Jennings (2021), I will focus more on this form of pluralism compared to the others (see section on strategic spontaneity). However, unlike Dayer & Jennings (2021), I will argue that metacognitive regulation is a crucial component of skilled behavior. But before continuing to elaborate on the pluralism offered in this paper, I will briefly describe perspectives that are similar, though not identical to my own.

Although not explicitly labeled as "pluralist" accounts, others have also argued for views that see skilled behavior as involving both automaticity and cognitive control. For example, Krakauer argues that skilled behavior is best viewed as a combination of

"intelligent reflexes" and deliberative processes. Levy (2017) has argued, against anti-intellectualists of the debates in epistemology, that know-how is composed of "a propositional element plus a motor element" (528). Defending a similar view, Buskell (2015) has argued for an account of skilled behavior that involves "the automatic and pre-reflective use of discursive, propositional cues in skill deployment" (1445). Others, such as Christensen et al. (2016) defend a "hybrid" account of skilled behavior in which "cognitive control reduces during skill learning as automatic control comes to play an increasing role, but cognitive control continues to make a substantial positive contribution at advanced levels of skill" (41). Elsewhere, there is work in phenomenology that closely resembles the pluralist and hybrid accounts overviewed above. Høffding (2014) criticizes what he refers to as "Dreyfus' dualism," according to which *skilled coping* (or "absorbed bodily coping") is incompatible with any sort of self-awareness or cognitive control. The thrust of his argument is that there is no single phenomenology associated with skilled behavior, but rather skilled behavior is *heterophenomenological*. A related view is presented in Dow (2017), in which a variety of forms of self-awareness are possible during the flow experience of experts. From a phenomenological perspective, this is the view endorsed here as well: experts most likely have a variety of experiences while behaving skillfully, sometimes involving automaticity, and at other times cognitive control.

If skilled behavior is characterized by a wide range of cognitive processes and forms of control, this leaves open the possibility for flickering or gradients between automaticity and control, an idea consistent with diachronic pluralism. In a more recent paper on dance and music improvisation, Ravn & Høffding (2022) describes these fluctuations as "oscillations of agency," a term based on extensive interviews of the experience of improvisers. A similar view is shared by Pacherie & Mylopoulos (2021), although about skilled behavior in general, although not improvisation, in particular. They argue that skilled behavior is characterized by the interplay of automatic and controlled cognitive processes. Further, Pacherie & Mylopoulos argue that skilled behavior involves *metacontrol*, a form of metacognition responsible for "the ability to successfully arbitrate between more cognitive and automatic modes of control with respect to both action selection and implementation" (650). I agree that it is important theories about skilled action move "beyond automaticity," as Mylopoulos urges. But once we acknowledge that both automaticity and cognitive control are involved in skilled behavior, it is also necessary to specify ways in which automatic processes and cognitive control interact, not only during optimal conditions but also *suboptimal* conditions. I will also describe how metacognition may be useful under *suboptimal* conditions and how metacognitive feelings may underly metacontrol processes that allow experts to navigate suboptimal situations skillfully.

In the following sections, I will begin to focus more on the role of metacognition in *creative* skilled behavior. I will use improvisation as a guiding example to illustrate how metacognitive regulation might influence the interplay between automaticity and control during skilled behavior. Specifically, I will argue, similar to Pacherie & Mylopoulos (2021), that skilled behavior involves *metacontrol*, and further that this is the best account of how experts are able to skillfully exert and relinquish cognitive control during improvisation (what I will refer to as "strategic spontaneity").

First, I will discuss improvisation in the context of level pluralism to specify how contributions automaticity and cognitive control change over the course of skill acquisition. Then I will discuss improvisation through the lens of diachronic pluralism to characterize the way expert improvisers are able to skillfully shift between more automatic and controlled modes of acting throughout the time course of improvisation.

5. Level Pluralism and Improvisation

According to Dayer & Jennings (2021), level pluralism is the "view that different levels of skill correspond with different degrees of cognitive processing" (p.623). As noted there and above, we take this to be consistent with most of the literature of skill acquisition. However, this general idea is usually interpreted to be more consistent with automatism than cognitivism because increasing skill levels are associated with increases in automaticity. I want to resist this temptation by, once again, suggesting that the increases in automaticity that come with increasing levels of skill do not imply that higher-order cognitive processing is absent from skilled behavior.

Dayer & Jennings (2021) argued for this point using the case of mind-wandering and attention. Mind-wandering is a form of spontaneously generated thought characterized by a relative lack of both bottom-up and top-down attentional constraint (Christoff et al. 2016). As skill level increases, one might be able to perform a task while experiencing an episode of mind-wandering without experiencing a decrease in performance. To support this idea, there is evidence that suggests that practice decreases one's dependence on working memory and executive control (Smallwood et al. 2003). Whereas mind-wandering might be detrimental to a novice learner, it can often occur without interrupting an expert. We took this to be evidence for level pluralism: there are different contributions of attention at different levels of skill. Here, I want to suggest the same for *metacognition*. That is, metacognition will have different contributions at different skill levels.

In our characterization of level pluralism (based on different levels attention at different skill levels), we used the example of a daydreaming knitter. An expert knitter, while knitting, experiences a daydream followed by an insight that they then incorporate into the creative skilled behavior. We used this example in part because there is research to suggest that mind-wandering can facilitate creativity via metacognitive insight (i.e., suddenly becoming aware of a solution). For example, Zedelius & Schooler (2015) found that increased rates of mind-wandering were positively associated with creative problem capability when participants approached the problems with insight (but not an analytical strategy). Similarly, Baird et al. (2012) found that mind-wandering aids the incubation of novel ideas.

Although the above suggests a link between mind-wandering and creativity, I think this work also suggests that metacognitive monitoring and evaluation may facilitate creative skilled behavior. This is because it is not sufficient to merely have a novel idea, but to also *evaluate* that idea in such a way that properly motivates shifting strategies. While discussing the role of serendipity in creative behavior, Ross (2024) notes that when participants made playful and unplanned movements while solving word-finding puzzles, this often yields unplanned and unexpected solutions. However, Ross also notes that an

unexpected finding of the study was that many participants would shuffle word tiles in such a way that they would nearly form a word, yet the participants remained completely unaware. Ross calls refers to these moments as "missed serendipity," and I think moments such as these demonstrate the importance of metacognitive insight. That is, spontaneous cognition and action may lead to new and improved ways of acting skillfully, but one needs to have an insight that this is the case. Returning to the daydreaming knitter, they not only had the mind-wandering episode, but they also *evaluated* the contents of the mind-wandering episode, which led to a metacognitive insight that led to the *regulation* of ongoing cognitive processing during the skilled behavior (i.e., it resulted in a strategy shift and presumably a redirection of attention back outwards to the task). This is consistent with a suggestion from Smallwood and Schooler (2015) that the metacognitive monitoring associated with mind-wandering may balance the negative effects of mind-wandering with positive outcomes as well. Metacognitive monitoring of action may play a similar role when improvisers act spontaneously: it is a means by which actions may unfold without a plan yet can still be evaluated and regulated such that the actions unfold skillfully.

At this point, one might object that mind-wandering and metacognition are antithetical to the kind of engagement required skillful performance, especially improvisation. One might claim mind-wandering and metacognition involve an agent being too disengaged or detached from their own actions to truly reflect the experiences of experts. I will concede, that I think this is the case, *sometimes.* Høffding (2014) interviewed several expert musicians who described mind-wandering during musical performance as like "having two tracks running" (65). Of course, sometimes this will not be beneficial, and may lead to an uninspired performance. In Høffding (2019)'s interviews with a Danish string quartet, they described mind-wandering while performing as "going to Netto," a Danish supermarket chain. According to Høffding et al. (2024), the musicians described this experience as a state in which:

> "…attention to one's own playing is diminished to the point of some minimal keeping track that one plays in sync with the others, while most of the mental 'energy' is spent pondering items on the shopping list." (p.4)

For the string quartet, episodes involving mind-wandering like the experience described above are likely to occur when performers are bored. This is consistent with research on mind-wandering and creativity. Irving et al. (2022) suggests that mind-wandering facilitates creativity during moderately engaging activities yet not for boring activities. In Irving 2022 et al.'s study, they found that when individuals performed a boring activity (e.g., watching a video of men folding laundry), they tended to score poorly on an alternate uses task (AUT). However, those given a moderately engaging activity had significantly higher AUT scores. This does not suggest that mind-wandering is antithetical to skilled behavior, only that its usefulness is sensitive to one's level of task engagement: mind-wandering can provide boosts to creativity when a performer is engaged but tends to be detrimental when performers are bored (as one's ideas tend to be more semantically unrelated during boring tasks).

Similarly, one might argue that metacognition seems to involve a level of detachment that does not seem to reflect the experiences of experts. However, I think this stems from an overly restrictive view of metacognition, in which it only exists in an *explicit,* propositional form. I agree, especially when task demands are high and require an extraordinary level of engagement, explicit metacognitive monitoring and regulation may be detrimental. After all, when experts think too much about what they are doing while they are doing it, this often leads to choking under pressure (Beilock & Carr 2001). Yet it is still possible that *implicit,* non-propositional forms of metacognition may function to regulate and monitor ongoing action in a way that does not disrupt performance. In particular, I think metacognitive feelings might serve this function. Metacognitive feelings refer to feelings of fluency, certainty, confidence, etc. that can be used to inform agents about their ongoing cognitive processes (Efklides 2006/2016). Imagine an expert improviser who recently realizes that they are falling out of sync with their improvisational partner. A novice or intermediate level improviser may need to resort to explicit, propositional thinking in these cases: "oh no, looks like I'm playing in the same key, but they are shifting to another, I need to shift keys." However, an expert improviser may rely on metacognitive feelings of confidence or fluency to guide shifts in action. They do not need to explicitly re-represent the fact that they are out of sync; they *feel* out of sync and immediately shift their action to re-align with their improvisational partner, restoring feelings of confidence and fluency. Therefore, it is likely that explicit, propositional forms of metacognition may be disruptive, especially when task demands are high, because it leads to choking. However, experts may rely on automatic, implicit, non-propositional metacognition to guide action in such situations. Using metacognitive feelings as a guide, experts may monitor and regulate ongoing action *implicitly,* in such a way that does not misallocate attentional resources (as in *explicit* monitoring of one's actions).

At this point, automatists and cognitivists might object. Automatists might claim that these instances of mind-wandering and metacognition ought not be considered a part of skilled behavior but rather processes occurring alongside skilled behavior. Therefore, the evidence still points towards automatism. Similarly, cognitivists might conclude that the presence of metacognition during skilled behavior points to cognitivism about skill, not pluralism. However, I want to resist both lines of argumentation.

As mentioned, automatists might claim that metacognitive monitoring and evaluation involved during mind-wandering may not be relevant to skilled behavior because these processes either precede the skilled behavior or are somehow occurring "above" or "between" moments of skillfully performing. For example, Bergamin (2017) says "we slip from *moments* of smooth coping into reflective thought and back again at incredibly frequent intervals" (412). However, as before, I do not think that arbitrarily carving up of skilled behavior between moments of cognitive control and moments of automaticity is conducive to understanding the ways in which automaticity and control interact. In cases in which the content of the mind-wandering episode is task-relevant and the metacognitive evaluation and maintenance leads to novel and more rewarding action, higher-level cognition ought to be seen as making a substantial contribution to ongoing skilled behavior. Thus, a pluralist account in which automaticity and higher-level

cognition are interwoven is still preferable to an account which characterizes skilled behavior as exhaustively automatic.

Cognitivists might also argue against the idea that metacognitive monitoring, evaluation, and regulation points to pluralism. If metacognition is regularly involved in skilled behavior, then this points to cognitivism (Pacherie & Mylopoulos 2021; Mylopoulos et al. 2023). However, I would like to resist this line of thinking as well. This is because metacognitive monitoring and regulation can unfold *implicitly* as well as *explicitly* (Proust 2013). Let's return to the improvisation example above. When an expert improviser realizes they are out of sync with their partner, they *automatically* experience diminished metacognitive feelings of fluency and confidence. They do not expend effort to do this, rather they have spent countless hours developing their skills to be attuned to when things are going wrong. Conway-Smith et al. (2023) have argued that "metacognitive skill" can be acquired in a similar fashion to skilled actions. That is, with practice and repetition, metacognition can become proceduralized in such a way that it unfolds automatically. Thus, expert improvisers may not only be developing the requisite action capabilities but also a sort of metacognitive skill that can be deployed automatically to signal that things are either going well or poorly. In my view, if metacognitive monitoring and regulation can unfold automatically, this does not point to cognitivism but rather a pluralism.

In sum, level pluralism is the idea that as experts increase their skill level, they proceduralize aspects of the skilled behavior. Further, this proceduralization affords experts the ability to engage in higher-level cognition in adaptive ways, such as mind-wandering or metacognitive control[8]. For the above reasons, level pluralism does not clearly support an automatist view of skilled behavior, but rather a pluralist view in which automaticity and cognitive control processes interact. Level pluralism also does not clearly support cognitivism, at least in it its strongest forms, as automaticity also plays a role in regulating ongoing skilled behavior, as in the case of implicit, procedural metacognition.

7. Diachronic Pluralism

Diachronic pluralism is the idea that different periods within the time course of skilled behavior will be associated with different degrees of cognitive processing. Dayer & Jennings (2021) described diachronic pluralism through the lens of attention and mind-wandering. Mind-wandering and attention naturally ebb and flow because of the periodicity of attention, which suggests that even in skilled behavior there are likely to be moments in which attention is more present than in other moments.

Here, I likewise want to suggest that metacognition might be involved at different degrees in different moments of time during skilled behavior. If so, I think this would further support the idea of diachronic pluralism and hybrid accounts of skill more generally. To do so, I will suggest that metacognition is involved in different degrees at

[8] Because some aspects of skilled behavior unfold automatically while experts are otherwise engaged in higher-level cognition, this is also consistent with Dayer and Jennings (2021)'s *synchronic pluralism*: the idea that the degree of cognitive processing during skilled behavior will depend on the part or aspect of the skilled behavior in question.

different stages of creativity. So, in this section, I will describe those stages and suggest why metacognition might be useful in each stage.

There are several ways to carve up stages of creativity; however, for this paper I will focus on the four-stage model offered by Wallas (1926). The four stages he described were preparation, incubation, illumination, and verification. Preparation refers to the process of investigating a problem before approaching it. Incubation refers to the process of diverting attention away from the task at hand and letting creative ideas arise spontaneously or unconsciously. The daydreaming knitter example shows how metacognitive monitoring and evaluation of spontaneous cognitive processes might lead to the third proposed stage of creativity, illumination. Illumination refers to a flash of insight related to a given problem, which can then be incorporated into ongoing or future action. Implicit metacognitive evaluation and monitoring during the incubation period may be beneficial because the skilled agent can be open to novel ideas for future action. In this way, metacognition might be a link between the incubation and illumination stages. The final proposed stage is the verification stage in which insights are evaluated and criticized. For example, an expert improviser might explicitly question if an insight can be readily incorporated into action or if they should continue to perform as in a similar (i.e., not novel) manner to maintain stable performance. Importantly, this may unfold implicitly (via metacognitive feelings) or explicitly (via propositional forms of metacognition).

Although these proposed stages of creativity can occur at a variety of time scales, certain forms of creative skilled behavior incorporate many of these steps in rapid succession. For example, improvisation requires that skilled actors be able to act, evaluate, monitor, and adapt in constantly changing and unpredictable environments at a moment's notice. In such cases, I think experts employ metacontrol in order to shift between more and less controlled/automatic modes of acting in rapid succession. In short, I think expert improvisers are best described as being *strategically spontaneous*, incorporating both controlled and automatic modes of acting to achieve peak performance. I will describe this in more detail below.

7.1 Improvisation as Strategic Spontaneity

Improvisation is spontaneous yet skillful action that occurs without explicit preparation. But does spontaneity and a lack of planning render improvisation a purely automatic process? Recall Jack White saying: "You sit there, and you become an antenna and *you just let things happen through you*." At first glance, this might seem to endorse Dreyfus' principle of automaticity and automatism about skilled behavior in general. Elsewhere, Sheets-Johnstone (2017) has similarly described improvisation as "letting things happen."[9]

I do not think that these "letting happen" states involve automaticity alone. Instead, they involve metacontrol, a form of metacognition that monitors and regulates

[9] And in the realm of sports psychology, Swann et al. (2016) describe the flow states tennis players enter as the "letting it happen" state.

antagonistic control states (e.g., automaticity and control). Improvisers need to flexibly shift between more automatic and more controlled forms of processing in response to changing, uncertain, and unpredictable circumstances. Critiquing Sheets-Johnstone's emphasis on the spontaneous "letting go" aspect of improvisation, Ravn & Høffding (2022) describe improvisation as involving "oscillations of agency" between states involving mental control and states involving spontaneous "letting it happen" (p.515). Unlike Ravn & Høffding, however, I think these oscillations are guided by a form of metacognition: metacontrol.

Recall, I think metacognition involves the capacity to monitor and evaluate one's own cognitive processes for the purposes of regulation and control (Mylopoulos et al. 2023). And I think this can take both explicit and implicit forms. In the case of improvisation, given the time constraints improvisers confront, I think it is likely that low-level, implicit metacognition guide shifts between more automatic and controlled processing. Whereas explicit, propositional metacognition may take more time and mental effort, implicit metacognitive control can unfold in a less disruptive manner. For example, metacognitive feelings of confidence can influence how decision-making processes unfold (Desender et al. 2018); however, there is no need to presume that these are generated explicitly or in a manner that requires effort. Desender et al. (2018) found that when participants in a perceptual decision-making task rated themselves as having low confidence, they were more likely to sample more information before responding compared to those with high confidence. These lower-level forms of metacognition are functionally distinct from the higher-level and are available as sensory cues for higher-level cognition.

In my view, instances of "letting yourself go" involve a form of low-level, implicit kind of metacontrol or metacognitive regulation that biases action towards more spontaneous, flexible modes of action. This form of monitoring and regulation does not require top-down attention or explicit thinking be directed at specific movements, so it provides an improviser with the means to monitor and regulate ongoing actions without derailing performance by misallocating attention (as in choking under pressure). For example, an improvising dancer might experience a spontaneous behavior as unfolding fluently, indicating that the performance is going well. The metacognitive feeling of fluency can be used to monitor and evaluate ongoing performance, which can then be used to regulate ongoing behavior (e.g., by either persisting with the behavior or shifting to a new behavior). So, while the improvised dance may not involve explicit reflection or attention, it is far from automatic as it crucially involves implicit metacognitive monitoring, evaluation, and control of ongoing action.

This is consistent with Dayer & Jennings (2021) concept of diachronic pluralism. This is the idea that the contributions of automaticity and cognitive control will vary over the time course of skilled behavior. However, we explained this in terms of spontaneous fluctuations of neural activity and periodicity of attention, but I think metacognitive regulation can influence these fluctuations in some cases as well. We explicitly argued against metacognition influencing this fluctuation of attention; however, we had in mind an explicit, metarepresentational state that would dictate this, which is not necessary in a two-level view of metacognition. Further, it is possible to claim that metacognition can influence or modulate fluctuations of attention without simultaneously claiming that

metacognition is the sole source of maintenance or regulation of the fluctuation of attention. That is, it is possible that during skilled behavior, spontaneous fluctuations of attention occur as well as metacognitive monitoring and regulation; these are not mutually exclusive possibilities.

8. Conclusion

I have argued that both automatists and cognitivists cannot adequately account for the role of automaticity and cognitive control during improvisation. Automatists cannot explain how higher-level cognitive processes contribute to improvisation, and cognitivists cannot explain how automatic and higher-level cognitive processes interact during improvisation. In contrast, this paper presents a pluralist perspective that characterizes improvisation as involving automaticity, cognitive control, and metacognitive monitoring and regulation to shift between more automatic and controlled ways of acting. In particular, I argued that improvisation involves *metacontrol*: a form of metacognition involved in the maintenance and regulation of antagonistic control states (i.e., automaticity and control). As a form of higher-level cognition that can unfold implicitly and non-propositionally, I think the presence of metacontrol during improvisation gives us reason to support pluralism with respect to improvisation instead of stronger forms of automatism or cognitivism which tend to downplay the role of either automaticity or cognitive control.

Chapter 4: Doomscrolling as Extended Rumination

1. Introduction

This paper aims to be the first detailed philosophical account of *doomscrolling*. I will be making two major claims about doomscrolling. First, I will argue doomscrolling is a kind of *rumination*, "a form of perseverative cognition that focuses on negative content, generally past and present, and results in emotional distress" (Sansone & Sansone 2012, p.29). Second, I will argue that doomscrolling is a form of extended cognition. Extended cognition refers to cognitive processes that incorporate entities external to an agent: in this case, a smartphone (or similar digital computing device). In short, I think doomscrolling is a kind of extended rumination.

The extended mind thesis is the idea that some cognitive processes extend to entities external to an agent (Clark & Chalmers 1998). This chapter will not be arguing that our *minds* are extended into smartphones or that a mental process that was once *inside the head* is now being functionally replaced by a process inside a smartphone. Instead, this chapter will argue for the less radical idea that doomscrolling is a form of ruminative brooding. Whereas rumination is typically thought of as an *internal* cognitive process (involving attention, emotion, memory, metacognitive knowledge, etc.), I think doomscrolling is an interesting example in which regularly engaging with an external artifact can change the way one might engage in rumination. I think doomscrolling ought to be considered a case of *extended* rumination: it would not occur in the same way without continued engagement with the digital device. I am *not* arguing a smartphone is capable of brooding, but I think one's engagement with a smartphone has the potential to change the way one ruminates.

Doomscrolling is typically described as the tendency to scroll through bad news on a social media platform such as TikTok, X (formerly known as Twitter), Facebook, Whatsapp, Twitch, LinkedIn, Reddit, Snapchat, NextDoor, Instagram, YouTube, etc. Clearly, there are a lot of these types of platforms, and they all have different ways of engaging users. I plan to speak generally about social media platforms, while also appreciating the nuances between them. What I'll be discussing is a particular kind of way of using these platforms: doomscrolling. That is, I'm writing about situations when you use a digital device seeking more informational content even though the news or content is perceived as overwhelmingly negative, distressing, or depressing (Barabak 2020; Slaughter 2020).

It should be no surprise that the term "doomscrolling" was popularized during the COVID-19 pandemic. Kevin Roose of the *New York Times* described this phenomenon as "falling into deep, morbid rabbit holes filled with coronavirus content, agitating myself to the point of physical discomfort and erasing any hope of a good night's sleep" (Watercutter 2020). It is unclear exactly where the term originated, but a journalist, Karen K. Ho, helped spread the term after seeing it in a Twitter post from 2018 (Sharma et al. 2022). She popularized the term by tweeting about doomscrolling every day for several months during the COVID-19 pandemic, during the height of social distancing measures, a time that resulted in a great deal of discomfort and anxiety for nearly everyone. Most of her posts were reminders to other Twitter users to stop doomscrolling and do literally

anything else that does not involve dysphoric scrolling through a social media platform. For example, instead of doomscrolling, you could: bake bread, go to sleep, read a book, do yoga, learn an instrument, drink water, play a video game, start a garden, go on a walk, etc. The initial social media posts popularizing the term doomscrolling generally conveyed that message that anything other than doomscrolling might be a good idea.

Individuals studying mental health and well-being in the context of digital technology would indeed seem to confirm that distracting oneself from doomscrolling is a good idea. That is, in the years following Karen K. Ho's anti-doomscrolling PSAs, several studies reported detrimental effects of regularly viewing high volumes of negatively valanced content on social media. These effects included increases in the severity of anxiety, depression, and PTSD, all conditions that become more prevalent and severe during times of crisis and uncertainty (Anand et al. 2022; Price et al. 2022). Additionally, Kaya & Griffiths (2024) found that doomscrolling enhances the risk of developing negative mental health outcomes for individuals with low tolerance for uncertainty. So, doomscrolling may be particularly pervasive during trying and uncertain times, despite its psychological costs. If doomscrolling typically leaves you feeling worse, one might wonder: why does anybody do it at all? I think it is because doomscrolling is a form of ruminative *brooding*. My argument is as follows:

> **P1.** Extended cognitive processes involve cognitive integration with an external artifact or some aspect of the environment such that an existing cognitive capacity is transformed.
>
> **P2.** Doomscrolling involves cognitive integration with an external artifact (e.g., a smartphone or similar digital device) that transforms ruminative brooding.
>
> **Conclusion** Doomscrolling is a form of extended brooding.

The present paper draws on research from philosophy of mind, experimental psychology, communications studies, and clinical psychology to characterize doomscrolling as extended rumination. In the next section, I give a more detailed overview of debates around extended cognition. The following section provides an overview of rumination, distinguishing two different forms of rumination: brooding and reflective rumination. In the next section, I argue that doomscrolling is a form of extended rumination, in particular, extended brooding, by characterizing doomscrolling in the context of several criteria for cognitive integration: reliability and trust, procedural transparency, information flow, and transformation. While doing so, I also distinguish doomscrolling from absent-minded smartphone use: two behaviors that are often conflated. I conclude that doomscrolling is a kind of metacontrol failure.

2. Extended Mind

The extended mind thesis is the idea that some cognitive processes extend to entities external to an agent (Clark & Chalmers 1998). Proponents of this view do not think cognitive processes are bound to one's skin and skull but rather are distributed

among an agent and relevant environmental tools and artifacts. This view is also known as *active externalism*, which is not to be confused with *semantic externalism* which has to do with the meaning of words somehow depending on the external environment (Putnam 1973). Active externalism, in contrast, is concerned with the ways in which external factors that are reliably coupled to agents influence and contribute to cognition.

Clark and Chalmers' (1998) paper on the extended mind primarily targeted internalist theoretical perspectives. Internalism is the idea that cognition occurs entirely within the confines of the skull, more specifically, within the brain. For example, internalists about cognition might reject that doomscrolling can be a form of rumination because rumination is typically something that occurs *inside the head*, not from engaging with an object over time. In contrast, externalists like Clark and Chalmers argue that we do not rely exclusively on internal processing, but rather we often rely on our engagement with environmental tools and artifacts for cognition. The opening example of their original paper involves a group of agents who are asked about how shapes will fit into sockets, but each agent has a different means of rotating mental images before giving their final answer. In the first case, the agent can only mentally rotate the images of shapes. In the second case, the agent can rotate the shapes using a Tetris console. In the third case, the agent can only rotate the shapes using an implanted Tetris console which enables a heads-up display (HUD) in their brain. They claim the first case (mental rotation) and the third case (HUD) are the same: they are both mental rotations of shapes inside the head. They also claim that, *functionally*, the second (Tetris console) and the third (HUD) cases are also equivalent: in both cases, a Tetris console is used and viewed for the sake of completing the cognitive task. Clark and Chalmers conclude that there is no reason to think that any of the cases are more or less cognitive than the others. In particular, they think we should view the second case, in which someone actually uses the Tetris console, as cognitive, even though it involves the use of an external tool.

The reasoning above also applies to smartphone use. One person may rely on their memory for spatial navigation, whereas another person might use a GPS application on their phone to navigate their environment. The same applies for other cognitive tasks such as calculation, planning, remembering, communicating, and retrieving information. Each of these cognitive tasks can be done by either relying solely on one's internal cognitive processes or by using external artifacts to aid one's cognition.

So, according to proponents of the extended mind thesis, using a tool does not mean that one's behavior is "less cognitive" than instances when one relies on their brain, and this is because, according to Clark and Chalmers, the two processes are *functionally equivalent*. This is known as the *parity principle*: if some process is considered cognitive when done in the head, then when that process extends into the world, it should also be considered cognitive. They use the example of Otto and Inga to illustrate this point. Otto and Inga both want to go to the Museum of Modern Art on 53rd street. Inga relies on her long-term memory to navigate her way to the museum; however, Otto has a memory impairment due to Alzheimer's disease and must rely on instructions in his notebook to find his way to the museum. Clark and Chalmers argue that both have reliable access to the relevant information needed to get to the museum and further that Inga's memory and Otto's notebook are playing a *functionally equivalent* role: both are said to encode beliefs to Otto and Inga in a way that allows them to successfully navigate their environment and

arrive at the museum. Therefore, according to the parity principle, Otto's notebook use is just as cognitive as Inga's memory retrieval. Similarly, performing cognitive tasks in one's head or using a smartphone are equally cognitive, on this account. We can imagine that Otto's notebook is digital, and the point remains the same.

I share the sentiment that internalism ought to be resisted. That is, I agree that there are interesting ways in which environmental tools, artifacts, and the environment can influence and give rise to certain kinds of cognition. However, I am not committed to an overly restrictive interpretation of the parity principle. That is, I do not think there needs to be a strict *functional equivalence* between internal and external processes. For example, I am not committed to the idea smartphones are doing anything like the internal cognitive processing that might be occurring inside a human brain, nor do the processes occurring in a smartphone have to be functionally identical to anything occurring in the human brain. So, as mentioned above, I do not think your smartphone is capable of ruminative brooding, but it may change the way you experience ruminative brooding.

Some externalists endorse the parity principle whereas others reject it. Sutton (2010) has distinguished between two "waves" of extended mind theorizing. He says the primary difference between the "first wave" and "second wave" extended mind is the principles to which they adhere. The "first wave" extended mind is characterized by a commitment to the *parity principle*, in which the focus is on how internal and external processes are playing similar functional roles in cognition. In contrast, the "second wave" extended mind is characterized by a commitment to the *complementarity principle:* rather than the focus being on how external artifacts and processes are functionally equivalent to internal cognitive processes, the focus is on how external components of a system complement or enable certain kinds of cognition, despite having different dynamics or functions compared to internal cognitive processes. So, first-wave extended mind theories are concerned with how internal and external processes play similar functional roles during cognition, whereas second wave extended mind theories are concerned with how internal and external processes complement one another during cognition.

Another difference between first wave and second wave extended mind theories is the criteria for whether a cognitive process extends to the environment. First-wave extended mind theorists are concerned with the specific criteria for functional parity and how biological and non-biological components of a system are functionally equivalent. This is one strategy to identify which parts of the external environment are part of the cognitive system and which are not. However, these accounts fall prey to the *cognitive bloat* objection: this is the idea that if we take the extended mind to be true, it is unclear what the bounds of a given cognitive system are (Rupert 2004; Adams & Aizawa 2001; Allen-Hermanson 2013). This may lead one to ask questions such as: is the entire Internet a part of my cognitive system or just some parts of it? Is the entire *universe* a part of my extended cognitive system? The second wave of extended mind theorizing is not vulnerable to the same objection. This is because the concern is with how external artifacts *complement* cognitive processes, not whether some external process is a *functional substitute* of some internal cognitive process.

A strict set of criteria for what counts as a part of the extended cognitive system is *not* the focus of second wave extended mind theorizing. Although second wave extended mind theorists sidestep the cognitive bloat objection by rejecting a strict adherence to the

parity principle, there is still no universally agreed upon criteria among second-wave theorists for what constitutes a genuinely extended cognitive process. Recently, debates have centered around the criterion for "cognitive integration" (Menary 2007; Rupert 2009). According to second wave extended mind theorists, a cognitive process is extended if an agent's use of an artifact or the environment is sufficiently functionally integrated (Menary 2007; Heersmink 2015). Rupert (2004) challenges the extended mind hypothesis by arguing that, because the artifacts we interact with are "dispensable and variable," they "do not seem to be parts of an integrated system that persists over time" (p. 426). For Rupert, our interactions with artifacts and the environment are neither stable nor consistent enough to be integrated in such a way that they ought to be considered part of a cognitive system: only internal processes in the brain display this level of cognitive integration. However, others claim that there appear to be instances where an agent and an artifact form a cognitively integrated system, such that neural, bodily, and environmental processes form a complementary whole. Rather than providing strict criterion for cognitive integration, second wave extended mind theorists tend to take a "family resemblances" approach to cognitive integration. That is, cognitive integration is typically explored with respect to several overlapping dimensions, rather than a single criterion (e.g., functional parity). Heersmink (2015) proposes a multidimensional framework for cognitive integration and identifies eight dimensions: information flow, reliability, durability, trust, procedural transparency, informational transparency, individualization, and transformation. He says:

> "These dimensions provide a new perspective on the conditions for cognitive extension. They are, however, not meant to provide a set of necessary and sufficient conditions, but to provide a toolbox for investigating the degree and nature of the integration of agent and artifact into 'new systemic wholes.' The higher a situated system scores on the proposed dimensions, the more functional integration occurs, and the more tightly coupled the system is." (p. 577)

To argue that doomscrolling constitutes an instance of genuine extended cognition, I will focus on the dimensions of information flow, reliability, procedural transparency, and transformation. I will define these dimensions below.

Typically, work on extended cognition highlights situations or instances in which an agent and the environment are coupled in a functional, adaptive manner. When agents are highly integrated with artifacts, this often allows them to achieve feats that would be extremely difficult or impossible without the aid of the environmental resource. Aagaard (2021) has called this the *dogma of harmony:* the tendency to highlight cases of harmonious relationships between agents and the environment while simultaneously deemphasizing agent-environment relationships that are maladaptive or disruptive, leading to "an overly idealized picture of human-technology relations in which all relations are presumed to cooperate and collaborate" (p.165). I think doomscrolling is a kind of disharmony in an agent-environment system. Because I think doomscrolling is a form of *extended brooding*, the following section will present some conceptual background on rumination. After providing background on rumination and drawing parallels between rumination and doomscrolling, the following section will explore the

dimensions of information flow, reliability, procedural transparency, and transformation with respect to doomscrolling. I will argue that doomscrolling is a genuinely extended cognitive process based on these criteria of cognitive integration.

3. Rumination

Rumination is a form of highly perseverative cognition that is typically focused on one's depression or dysphoria and the causes thereof (Davis & Nolen-Hoeksema 2000; Sansone & Sansone 2012). It is a kind of spontaneously generated thinking that is characterized by high levels of bottom-up attentional constraint and attentional inflexibility (Christoff et al. 2016; Smallwood et al. 2005). Rumination is a unique form of spontaneous cognition because it occurs under strong attentional constraints, unlike other forms of spontaneous cognition which tend to occur under weak attentional constraint. For example, when our minds wander, our minds meander from topic to topic, without our attention fixating on any single topic for too long. During a mind-wandering episode, we might think of what we want to eat later, then recall an interaction at the coffee shop, and then have a thought about butterflies. Rumination, in contrast, involves one's attention being restricted to a single topic or narrow range of topics related to one's dysphoric state. For example, Nolen-Hoeksema et al. (2008) describe rumination as "thinking perseveratively about one's feelings and problems rather than in terms of the specific contents of thoughts" (p.400). Ruminative thinking is described as *perseverative* because individuals often report being "stuck" in a repetitive pattern of thinking. Rumination is similar to other forms of spontaneous cognition because the specific contents of one's mental state are often not being deliberately generated; however, it is a distinct form of spontaneous cognition because of its perseverative and repetitive nature.

Researchers have distinguished between two different kinds of rumination. Treynor et al. (2003) have labeled these two forms of rumination as *brooding* and *reflective rumination*. Whereas brooding involves dwelling on the negative consequences of distress and "a passive comparison between one's current situation and an unachieved standard," reflective rumination involves prolonged examination of reasons for thinking or feeling a certain way and "a purposeful turning inward" to engage in cognitive problem solving (with the aim of alleviating one's depressive symptoms) (p.256). Brooding is said to be a maladaptive form of rumination because it typically leads to an increase in the severity of one's depressive symptoms, whereas the opposite is the case for reflective rumination. That is, whereas both brooding and reflective rumination involve sustained focus on past events and emotions, only brooding is associated with increases in symptoms of dysphoria, anxiety, depression, and PTSD. This is because brooding involves dwelling on an upsetting topic but does not involve any problem solving or resolution seeking (as opposed to reflective rumination). As a result, individuals experiencing brooding often find themselves "stuck" on a particular train of thought or pattern of thinking, seeking more information but not concrete solutions. Joubert et al. (2021) conducted a qualitative study on the experience of rumination, and participants reported the experience of brooding as:

> "...thinking about the same thing over and over, replaying situations in your mind."
>
> "...difficult thoughts you can't think your way out of even though logically you know this thinking isn't helpful."
>
> "...constantly going over something distressing."
>
> "...persistent thoughts in my head that I have difficulty letting go of."

Like doomscrolling behavior, brooding rumination is described as difficult to stop or step back from.

In the same study by Joubert et al. (2021), the authors reported that 48% of the study participants claimed that *distraction* was the best coping strategy. This is consistent with previous research that suggests that distraction and engaging in other activities is the best coping strategy to reduce ruminative thinking (Oliver et al. 2015; Sloan et al. 2021). Pearson (2008) suggests this is because individuals have trouble stopping ruminative thinking by willpower alone, and, as a result, external distractors are often the most effective means of disrupting rumination. However, I do not think all distractions are equally beneficial when it comes to disrupting ruminative thinking. In particular, I think using a smartphone to distract oneself from ruminative thinking can actually have the opposite effect: it may increase ruminative thinking.

In the present paper, my primary focus will be on the *brooding* form of rumination. I think doomscrolling is a form of extended rumination, but more specifically, I think it is a form of extended *brooding*. Recall, doomscrolling is the tendency for individuals to continuously "surf" or scroll through bad news or distressing content on their smartphones, in a manner that is unproductive, emotionally distressing, and often difficult to stop or step back from. Similarly, individuals who experience brooding often describe the experience as one that is difficult to stop. I think reliable coupling and engagement with negatively valanced content on smartphones can lead to episodes of *extended brooding*, in which an episode of brooding rumination is sustained and maintained by continued engagement with the device. In an ethnographic study by Aranda & Baig (2018), smartphone users reported feeling "stuck" sometimes when using their phones, similar to the way individuals describe ruminative brooding:

> "It's like a prison. You can get lost in your phone and not get out."
>
> "I spent 1.5 hours on [social networking site]. I was appalled at myself. I hate when I just spend time scrolling and scrolling… It's all mind-numbing and I don't benefit from any of it."

The quotations above suggest that smartphone users sometimes find it difficult to step away from their phones, often continuing to engage with content even despite knowing it is unproductive or harmful. In the next section, I provide an account of why individuals continue to doomscroll despite the psychological costs.

4. Doomscrolling as Extended Rumination

Most folks who doomscroll tend to regret having done so, often feeling a lot worse than when they started. Why does anybody doomscroll at all? Karen K. Ho's doomscrolling advice during the COVID-19 pandemic seems to equally apply to brooding rumination: those who experience brooding often end up feeling significantly worse than if they had done nearly anything else other than dwell upon dysphoric thoughts and feelings. I short, I think individuals tend to engage in doomscrolling despite the negative consequences because doing so *transforms* the nature of ruminative brooding. By integrating the smartphone into dysphoric information-seeking habits, one has a sense that they may find solutions, explanations, or answers to the source of their distress, yet they are rarely satisfied. In this section, I will argue that doomscrolling counts as an instance of genuinely extended cognition by focusing on doomscrolling with respect to four criteria for cognitive integration presented by Heersmink (2015): reliability and trust, procedural transparency, information flow, and transformation.

4.1 Reliability, Trust, and Doomscrolling

The first criterion of cognitive integration I will discuss is reliability and trust. This dimension of cognitive integration was first put forth in Clark and Chalmers' (1998) original paper and was meant to supplement the parity principle in order to clearly indicate when an artifact ought to be considered part of an extended cognitive system. For example, Otto's notebook is not only a functional replacement for his biological memory, but it is also *reliably* and *easily* accessible as well as a *trusted* source of information. Reliability of access, ease of access, and trust have been collectively referred to as the "trust and glue" criterion for cognitive integration. Clark (2008) states that, for an artifact to count as part of our extended cognitive system, it is required:

> "1.) that the external resource be reliably available and typically invoked.
>
> 2) that any information thus retrieved be more-or-less automatically endorsed. It should not be subject to critical scrutiny (unlike the opinions of other people, for example). It should be deemed about as trustworthy as something retrieved clearly from biological memory.
>
> 3) that information contained in the resource should be easily accessible as and when required." (p.79)

In the remainder or this subsection, I will make the case that doomscrolling behavior involves integration with an artifact that is 1.) reliably, regularly, and easily accessible and 2.) trusted as source of seeking information.

Reliability and ease of access correspond to how often and how effortlessly one engages with an artifact. One only needs to walk around in a public place to observe that individuals can reliably and easily access their smartphones. It would not be surprising to see someone on a phone call, another person idly scrolling through their phone, a group

of teenagers playing an augmented reality game, or two people sitting on a bench, one of which is "phubbing" the other: the act of looking at one's phone while ignoring a conversational partner (Aagard 2020). It seems clear to me that individuals can reliably and easily access their smartphones, assuming they have a full battery and cellphone service or a Wi-Fi signal. However, it may be helpful to consider some statistics on cell phone use as well. According to the Pew Research Center (2024), nearly 90% of Americans own a smartphone and surveys report that Americans check their phones about 144 times per day on average. According to Rainie & Zickuhr (2015), while in public, 65% percent of smart phone users use their device for spatial navigation and 70% use their device to coordinate with others. In the same report, 50% of smartphone users reported checking their phone in public for no reason at all, with 76% percent of smartphone owners ages 18 to 29 claiming to do so. In a 2012 Time Mobility Poll, 84% of respondents reported being unable to go a single day without their smartphones, and in another survey, 50% percent of teenagers reported feeling addicted to their smartphones (Wallace 2016). These statistics clearly suggest that individuals can reliably and easily access their smartphones, and further, that individuals feel distressed when they lose their reliable access.

What accounts for these staggering rates of screen time? One reason may be that individuals spend a lot of time on their smartphones because they are highly portable. They can easily fit inside one's pocket, are lightweight enough to carry around, and are designed to be readily accessible. Often, individuals perform operations on smartphones that would be difficult or impossible to do with their brains alone, seeking information that is currently unavailable to them. Recall the Tetris example from earlier: some individuals use the Tetris console to find the correct orientations for their blocks, rather than relying on mental rotation. Kirsh and Maglio (1994) have defined actions in which an agent uses an artifact or environmental resource to "uncover information that is hidden or hard to compute mentally" as *epistemic actions (*p. 513). Smartphones are designed in such a way that individuals may use them to perform epistemic actions anywhere and at any time (assuming their phone is charged, and they have cell-phone service or a Wi-Fi signal). Heersmink (2015) illustrates how the portability of an artifact can influence how easily they are used for epistemic actions:

> "Cognitive artifacts like smart phones, slide rulers, compasses, or watches are worn or carried on one's body and are thus very portable. As a result, they are (when fully operative) easily, repeatedly, and reliably accessible. The physical design of these artifacts is such that they are small, light, and (ideally) ergonomic, because the epistemic actions that are performed with these artifacts require them to be small, light, and ergonomic. If not, then they are not suitable for their function. A large and heavy compass, for example, is, in virtue of its physical properties, not particularly portable and thus non-functional for hiking." (p. 586-587)

So, the physical design and portability of smartphones make it such that they are reliably and easily accessed to seek information.

In the case of doomscrolling, I think one reason many individuals slip into this pattern of habitual or problematic smartphone use is that they 1.) have reliable and easy access to a means of getting information they desire to uncover (via smartphone), but 2.) may have limited means of finding that hidden information outside of their smartphone. For example, if you are in the middle of a global pandemic and required to stay inside your home, a smartphone may be an essential means by which you learn more about the state of the world. It is therefore no surprise that the popularization of the term "doomscrolling" occurred at the height of COVID-19 lockdowns. Recall, the "trust and glue" criterion requires that an individual regularly resort to using the artifact in order to accomplish some task, as with Otto and his notebook. One might accept the fact that smartphones are reliably available and can be easily used, but they may question whether smartphones are "typically invoked" enough to be a suitable candidate for genuine cognitive integration. In the case of doomscrolling under lockdown, one's smartphone (or similar digital computing device) is not only "typically invoked" to seek hidden information, but it may be the *primary* means by which one can discover information. The extent that someone regularly resorts to using their smartphone to complete some task will likely differ across individuals and circumstances. However, I think the rise of doomscrolling under lockdown suggests that individuals were reliably and regularly using their phones to seek information that was otherwise inaccessible to them.

In sum, doomscrolling appears to fit the "trust and glue" criteria for cognitive integration. When individuals engage in doomscrolling behavior, this involves engaging with an artifact that is 1.) reliably, regularly, and easily accessible and 2.) trusted as source of uncovering information.

4.2 Procedural Transparency and the Doomscrolling Dad

Procedural transparency is a criterion of cognitive integration that refers to the extent to which one's use of an external artifact is automatized and perceived to be effortless (Sutton 2010). As one becomes more skilled and comfortable using an artifact, one no longer requires the assistance of conscious attention to guide the specifics of one's movements. Instead, one may rely on proceduralized motor routines to engage with the artifact so they may complete the task at hand without having to carefully think about the specifics of their actions. This is thought to occur by a process known as "chunking." Chunking, in the context of action, refers to the process by which different motor movements are consolidated in procedural memory such that one can perform higher-level actions which are composed of several lower-level actions (Gobet et al. 2001; Yamaguchi et al. 2016). The proceduralization of motor routines for engaging with a smartphone allows for one's interaction with the device to become transparent: one can complete a task on the device automatically and effortlessly, without having to think too much about the requisite motor movements to do so.

In the last chapter, I briefly discussed how chunking can lead to increases in levels of skilled behavior: the more automatized an action is, the more fluently the action may unfold, freeing up higher-level cognition to engage in other problem-solving tasks. However, here I will discuss the dark side of chunking: the same process that may lead to increases in skilled behavior may also lead one to develop bad habits. If doomscrolling is

indeed a form of extended brooding, this would be consistent with the "habit-goal framework of rumination," which describes rumination as occurring when one develops a mental habit of automatically perseverating on the source of one's distress as well as dwelling on a mismatch between one's current state and some unachieved standard (Watkins & Nolen-Hoeksema 2014).

Before discussing doomscrolling, I will briefly discuss another bad technohabit, "phubbing," the act of ignoring someone by instead looking at one's phone. Aagard (2020) has described phubbing as a "bad technohabit" in which one experiences what he calls "digital akrasia." Akrasia is a Greek word that means "weakness of the will" and refers to instances when someone continues to do something despite knowing they should not (e.g., a smoker who continues to smoke despite knowing about the long-term health consequences of doing so). For Aagard, phubbing can be seen as a form of digital akrasia: individuals continue to ignore their conversational partners despite knowing it is likely perceived as rude or inconsiderate to do so. He describes digital akrasia as:

> "…the result of a prolonged sedimentation that makes our habits manifest with a degree of automaticity and stubbornness that challenges the conventional conceptions of agency: sometimes, our habitual use of technologies inclines us to do things that we do not intend to do." (p. 241-242)

Like phubbing, I think doomscrolling is also a bad technohabit that may be described as a form of digital akrasia. In the above quotation, Aagard suggests that such habits require proceduralization: digitally akratic actions only occur following prolonged engagement with a digital device, such that our use of the device occurs effortlessly and automatically. His account is informed by his previous work, in which he found that individuals frequently reported being habitually distracted by social media websites (Aagard 2015). So, as one's engagement with smartphones becomes more proceduralized, this opens new opportunities for one to develop bad technohabits, such as phubbing or doomscrolling.

Here, I will provide a brief sketch of how doomscrolling might become proceduralized. I'll refer to this as the "doomscrolling dad" example. Imagine someone gives their father a digital notebook as a gift. At first, their father may be perplexed as to how to use the device at all: they may have never scrolled on a touchpad before nor have the slightest clue what any of the many buttons do. The father might ask how to install Facebook and the applications for various news sources (the father in this example likes to keep up to date on things going on in the world). At first, they may struggle to adapt to scrolling with their finger. Their motions may start out too quickly or slowly, scrolling either too fast or too slow for their needs. They may accidently zoom in on a word, having no idea how they did it in the first place, nor how to zoom back out, hopelessly stuck viewing two words at a time. However, over time, they learn how to use the device fluidly. They recognize common mistakes and correct them. Over time the actions needed to engage with the device become more automatic and effortless. For the sake of the example, let's say the father becomes extremely interested in getting news from social media: "I'm sick of Fox and CNN," they say. Now that they are adept with their new device, they find that there are lots of ways of getting information on their digital

notebook compared to a television. Before, downloading a new application required careful attention to each step of the process: click the home screen button, find the application store icon, tap the application store icon, click the home screen button again because they forgot to connect to Wi-Fi, click on the settings icon, scroll until you find the Wi-Fi, connect to Wi-Fi, press the home screen button again, click on the application store icon, type in your desired application, and click download. However, now that the father is an experienced digital notebook user, all of these lower-level behaviors (that once required careful attention and often resulted in frustration) have been "chunked" into a single higher-level behavior (e.g., "download TikTok"). Now that downloading and navigating social media applications can be done without careful attentional control, the father may start to find himself habitually using the device. Sometimes, when he catches wind of a major event, he will go to social media websites to learn more about the event. He finds that he has a sense of control over the way he receives information when he uses the device. Instead of passively receiving the news from two-minute snippets on traditional cable news or radiobroadcasts, the father enjoys being the one to seek out the information. However, perhaps the father makes a habit of this behavior: with his newfound skills, he starts seeking information on social media sites even though doing so seems to make him miserable. Having become accustomed to the feeling of being the one seeking out information, rather than merely passively receiving it from a broadcast, the father may continue the doomscrolling behavior to reduce uncertainty about the state of the world, yet this habit often comes at the expense of his mental well-being.

It should be noted that habitual smartphone use does not necessarily lead to what is known as *problematic smartphone use*. Habitual smartphone use refers to "repetitive smartphone use without self-instruction or conscious thinking, such as automatically checking a smartphone" (Park et al. 2021, p.118). In contrast, problematic smartphone use refers to instances where individuals become "overly immersed in the virtual world of their smartphones" and is associated with "uncontrollable use, preoccupation, and neglect of other activities" (Li et al. 2023, p. 1). Oulasvirta et al. (2011) found that habitual smartphone checking led to an increase in problematic smartphone use, but habitual smartphone itself is generally "experienced as an annoyance rather than an addiction" (p.105). The "dooomscrolling dad" example above is supposed to illustrate how doomscrolling can be sedimented into a habit; however, whether this doomscrolling habit counts as instance of *problematic* smartphone use will likely depend on how compulsive the behavior is, how frequently it takes place, and whether or not there are withdrawal symptoms characteristic of addiction. So, a doomscrolling habit does not necessarily mean one has a "doomscrolling addiction;" however, making a habit of doomscrolling certainly may be a risk factor for developing patterns of problematic smartphone use.

In sum, doomscrolling seems to fit the procedural transparency criterion for cognitive integration. It requires a period of learning as well as the automatization of one's interactions with a digital computing device. Having proceduralized the requisite motor actions, one's interactions with the device become more transparent, and they may become engrained into one's information seeking habits. This may lead to a doomscrolling habit in some cases, in which one repeatedly seeks out distressing or disheartening news despite coming at a significant psychological cost. In severe cases,

doomscrolling habits may lead to patterns of problematic smartphone use in which the doomscrolling behavior becomes compulsive and incurs an even greater cost to one's mental health.

4.3 Two-Way Information Flow

Another dimension that Heersmink (2015) identifies is information flow. Information flow refers to "the direction and kind of information flow between the components" of an extended cognitive system (p. 583). I will focus on three different forms of information flow: one-way information flow, two-way information flow, and reciprocal information flow. One-way information flow refers to information flow that flows unidirectionally from an artifact to an agent. An example of one-way information flow is a newspaper: an agent may look at a newspaper and information flows from the artifact to the agent, yet the agent does not change the information contained in the newspaper. In contrast, two-way information flow occurs when information flows bidirectionally: from artifact to agent and from agent to artifact. An example of two-way information flow is a cartographer who is actively making a map while exploring an unknown area: the cartographer creates the informational content of the map, yet it can still be consulted rather than the cartographer relying on their memory. Reciprocal information flow refers to instances when:

> "…we offload small bits of information onto the artifact, and the nature and content of the offloaded information contributes to and partly determines the next step in the overall process." (p. 584)

Of all the forms of information flow described, I think doomscrolling is best characterized as an instance of *reciprocal information flow*.

Why ought doomscrolling count as an instance of reciprocal information flow, but not one-way or two-way information flow? The main reason is that the information we offload onto the artifact can be used to inform the next step of the process (i.e., what sort of content you might see next as you continue scrolling). Interacting with traditional news media publications is best characterized as a form of one-way information flow. Information flows from the source to the agent, yet the agent is not influencing the informational content they are receiving. It may be tempting to consider doomscrolling a form of two-way information flow; however, in two-way information flow, generally, according to Heersmink (2015), "once information is offloaded, it remains fixed and is thus not transformed during a task" (p.584). I think doomscrolling is best described as reciprocal information flow because the actions we take during doomscrolling give information to the artifact, which influences the content we see, which changes the information we give the artifact, which changes the information the artifact gives us, and so on.

Social media companies tend to use machine learning techniques to make this possible. One technique is called word-embedding. This is a natural language processing technique that involves machine learning algorithms that quantify the extent to which text, images, and video are related (Wang et al. 2019). This allows one's interaction with a newsfeed at one moment to influence what sorts of content they are exposed to in the future. For example, imagine the "doomscrolling dad" above sees a particularly upsetting

piece of news: perhaps the doomscrolling dad then explicitly gives the post an "angry reaction." This information can be used to introduce similarly "engaging" content into one's newsfeed. Alternatively, the doomscrolling dad may not react explicitly; however, algorithms get information about the duration of time spent looking at the post, which can be used to generate similar content in the future (for the sake of increasing engagement). It is also possible that the doomscrolling dad regularly interacts with other users who share similar concerns: algorithms may generate content based on the doomscrolling dad's peers' viewing habits. When one doomscrolls, they send enormous amounts of information to social media platforms, which can then be used to tailor the content specifically for the doomscroller.

In sum, because each step of information exchange between an agent and a digital computing device is crucial for the next step, I think doomscrolling is best characterized as an example of reciprocal information flow. So, doomscrolling also appears to involve information flow between an agent and artifact, another dimension of cognitive integration.

4.4 Transformation

The final criterion for cognitive integration I will discuss is transformation. Transformation refers to the fact that interactions with artifacts can "shape and transform cognitive capacities" (Menary 2010, p. 273). Typically, this is discussed in the context of language and mathematics (Dehaene 2005). After repeated interaction with symbol systems such as language and math, one's cognitive capacities are transformed as our brains re-organize to develop skills such as reading or calculation. Dehaene and Cohen (2007) refer to this idea as the neuronal recycling hypothesis: "cultural inventions invade evolutionarily older brain regions and inherit many of their structural constraints" (p.384). In this section, I will argue that doomscrolling is an example in which interacting with an artifact can transform an existing cognitive capacity: in this case, ruminative brooding. After prolonged seeking and dwelling upon negative information with a smartphone, processes involved in rumination now also incorporate perception and action, which help perpetuate the doomscrolling behavior. In this section, I will also contrast doomscrolling from absent-minded smartphone use, two terms that I argue are often conflated.

Before discussing extended *brooding*, I will overview some previous work by Bruineberg and Fabry (2021/2022). There, they discuss the ways in which smartphones have transformed the nature of mind-wandering, arguing that habitual and diversionary smartphone use can be characterized as *extended mind-wandering*. They were primarily interested in *absent-minded smartphone use* (Marty-Dugas et al. 2018) or *smart-phone related inattentiveness* (Liebherr et al., 2022), which refers to smart-phone use in the absence of strong, task-related, attentional constraints. They connect this research with work on mind-wandering, a form of spontaneous cognition that is often task-unrelated and relatively free of attentional constraint (Christoff et al. 2016). Their account utilizes Irving (2016)'s characterization of mind-wandering as "unguided attention." In both normal mind-wandering and absent-minded smartphone use (i.e., extended mind-wandering), attention is said to be *unguided*, that is, one's focus drifts from one topic to

another without strong top-down attentional constraints. Both normal and extended mind-wandering involve one's cognition drifting from one topic to the next, but extended mind-wandering episodes involve perception-action coupling with the smartphone (or some other digital device).

Importantly, characterizing instances of smartphone use as extended cognition requires abandoning the idea that perceptual decoupling (directing attention internally, away from the external sensory environment) is essential for mind-wandering (Schooler et al. 2011). Bruineberg and Fabry (2022) suggest that the *family resemblances* approach to mind-wandering can accommodate instances of extended mind-wandering that do not involve perceptual decoupling. The family resemblances approach treats mind-wandering as "a heterogenous, fuzzy-boundaried construct that coheres amid patterns of overlapping and non-overlapping features" (p. 480) (Seli et al. 2018). In this approach to mind-wandering, some instances of mind-wandering will involve perceptual decoupling, whereas others will not[10]. Similarly, some instances of mind-wandering will be extended, whereas others will not, according to Bruineberg and Fabry (2022). I will adopt a similar approach for extended brooding: despite often being an internal cognitive process, sometimes ruminative brooding can involve integration with an external artifact.

The present chapter has a proposal similar to Bruineberg and Fabry (2022), but instead of focusing on habitual and diversionary smartphone use and mind-wandering, I have focused specifically on *doomscrolling* and rumination. I agree with Bruineberg and Fabry (2022) that *some* instances of habitual and diversionary smartphone use can be characterized as extended mind-wandering; however, I do not think that all instances of habitual and diversionary smartphone use are best characterized this way. Doomscrolling may be habitual and diversionary, but I think it is best characterized as extended *brooding*, not extended mind-wandering. Both can be said to be extended spontaneous cognitive processes. However, just as spontaneous cognition has multiple sub-categories (e.g., mind-wandering, dreaming, rumination, creativity), I think there are also different categories of habitual, diversionary smartphone use. Specifically, I think we can distinguish between absent-minded smartphone use and doomscrolling by appealing to differences between the kinds of underlying spontaneous cognitive processes that are involved in the two behaviors. Just like rumination and mind-wandering, I think absent minded smartphone use and doomscrolling can be differentiated by one's 1.) underlying state of arousal 2.) mood 3.) the dynamics and contents of one's thinking patterns. In short, I think absent-minded smartphone use and doomscrolling are transforming two separate cognitive capacities: mind-wandering and rumination, respectively.

4.4.1. Doomscrolling, Absent-minded Smartphone Use, and Arousal

Arousal level is one factor that can be used to distinguish extended brooding and extended mind-wandering. In short, extended mind-wandering involves *lower* levels of arousal compared to extended rumination. For example, during absent-minded smartphone use, one's arousal level is typically lower than average, and usually

[10] Similarly, some instances of mind-wandering will be task-unrelated or not, intentional or not, etc. The important part of this approach is specifying precisely what kind of mind-wandering one is studying.

individuals are engaging with their phones to remedy boredom. For example, Zhao et al. (2021) found that boredom proneness (i.e., trait boredom) positively predicts habitual smartphone use and internet addiction. Similarly, using interviews and an experience sampling method, Lukoff (2018) found that low arousal states such as boredom predicted habitual smartphone usage. Here are a couple of quotes from participants in the study:

> "I mostly scroll on social media just to get through the day, like I'm bored and so I scroll through social media. Otherwise, I don't think I scroll through social media when I'm happy."

> "When my mood or when my energy was lower, I tended to reach for my phone to perform tasks that were very nonspecific or did not have any sort of value associated with them. I would get on Facebook and scroll through my feed or go to my YouTube or any activity that had no purpose associated with it other than to pass the time or to distract me from what was going on at the moment" (p.22)

The above quotes suggest that absent-minded smartphone use is a maladaptive strategy to cope with low levels of arousal and boredom.

Doomscrolling, in contrast, is best characterized as a maladaptive strategy to cope with *high* levels of arousal and a response to distress. For example, Shabahang et al. (2023) found that a majority of participants reported high levels of arousal during doomscrolling, which led the authors to characterize the phenomenon as a kind of "primary" addiction to a smartphone, which means that it is a behavior associated with seeking elevated arousal levels and feelings of a "high" (as opposed to a "secondary" addiction characterized by seeking numbness and escapism). Although I do not think all instances of doomscrolling reflect an underlying addiction, it is notable that most participants in the study reported elevated levels of arousal, much like the elevated levels of arousal during ruminative thinking (Ottaviani et al. 2015).

So, whereas absent-minded smartphone use (i.e., extended mind-wandering) is characterized by low arousal, doomscrolling (i.e., extended rumination) is characterized by high arousal. This is because absent-minded smartphone use and doomscrolling involve the transformation of different cognitive capacities: mind-wandering and rumination, respectively. Mind-wandering is associated with lower levels of arousal and typically occurs when one is bored, whereas rumination is associated with higher levels of arousal and typically occurs when one is distressed about a particular event or one's own circumstances. In both absent-minded smartphone use and doomscrolling, the maladaptive smartphone use is being influenced by the underlying spontaneous cognitive processes: low arousal mind-wandering may initiate or perpetuate absent-minded scrolling behavior and high arousal rumination may initiate or perpetuate more targeted doomscrolling behavior.

4.4.2 Doomscrolling and Absent-minded Smartphone Use: Mood and Affect

Another factor to distinguish extended rumination from extended mind-wandering is mood. In short, in most instances, doomscrolling is typically characterized by feelings

of dysphoria whereas absent-minded smartphone use is not. This is because the underlying spontaneous cognitive processes which are being transformed have different valences. For example, whereas rumination is associated with highly negatively valenced moods, mind-wandering tends to occur in the context of more neutral moods (Ottaviani et al. 2013). So, whereas doomscrolling behavior is likely influenced by dysphoric states such as distress, sadness, anxiety (highly negative emotions), absent-minded smartphone usually occurs when a smartphone user is bored or in a more neutrally valanced mood.

The idea that doomscrolling should be more negatively valenced than absent-minded smartphone use is, admittedly, an open empirical question. For example, Marty-Dugas & Smilek (2020) found that absent-minded smartphone use was associated with negative affect (as well as increases in depression, anxiety, and stress), but general smartphone use was not. This might suggest that both extended rumination and extended mind-wandering are associated with negative affect and moods, and as a result, mood and affect won't be a good criterion by which to distinguish absent-minded smartphone use and doomscrolling. However, in the study, the authors used two smartphone usage scales to distinguish between absent-minded and general smartphone use. It is possible that the scale they used to measure "absent-minded smartphone use" does not distinguish it from doomscrolling. For example, the following questions from the Smartphone Usage Questionnaire-Absent-Minded seem associated with absent-minded smartphone use:

> "How often do you find yourself checking your phone without realizing why you did it?"
>
> "How often do you find yourself using your phone absent-mindedly?"
>
> "How often do you open up your phone to do one thing and wind up doing something else without realizing it?" (p.2)

However, other questions used to calculate the participants' absent-minded smartphone use could be related to either doomscrolling or absent-minded smartphone use:

> "How often do you check your phone out of habit?"
>
> "How often do you lose track of time while using your phone?"
>
> "How often do you wind up using your phone for longer than you intended to?" (p.2)

It is possible the results from Marty-Dugas & Smilek (2020) treat absent-minded smartphone use and doomscrolling as a single phenomenon, which may explain why the absent-minded smartphone use was associate with negative affect. Like the authors noted, "not all ways of using a smartphone can be considered the same" (p.2). Therefore, more conceptual distinctions between kinds of smartphone use as well as further experimentation will be necessary in order to explore differences in mood between doomscrolling and absent-minded smartphone behavior.

In sum, mood and affect are likely to be a distinguishing factor between doomscrolling and absent-minded smartphone use; however, existing studies on smartphone usage tend to treat the two as a single phenomenon, which may obscure important differences between the two kinds of maladaptive smartphone engagement. This points to the need for researchers to develop questionnaires that distinguish between general smartphone use, absent-minded smartphone use, and doomscrolling. For example, it is possible that doomscrolling is associated with more negative outcomes (e.g., increases in severity of depression, anxiety, PTSD, etc.) compared to absent-minded smartphone usage; however, it is impossible to know for sure without distinguishing the two.

4.4.3 Doomscrolling and Absent-minded Smartphone Use: Dynamics and Content

I think doomscrolling and absent-minded smartphone use can also be distinguished by their *dynamics* of thought (i.e., how thinking unfold over time) and the *content* of those thoughts (i.e., the number of topics). For example, whereas absent-minded smartphone use (i.e., extended mind-wandering) involves scrolling through many different topics over a period of time, doomscrolling (i.e., extended rumination) involves targeted scrolling about a single topic or narrow range of topics that are the source of one's distress. Once again, I think the differences between doomscrolling and absent-minded smartphone are related to the transformation of different underlying cognitive capacities: ruminative brooding and mind-wandering.

To illustrate why the dynamics and content of extended mind-wandering and extended brooding differ, I will draw on Irving (2021)'s notion of *attentional guidance*. In short, the two extended mind-wandering and extended brooding differ with respect to the level of attentional constraint involved in each process, and this is why their dynamics and content differ. According to Irving, mind-wandering is an *attentionally unguided* process because it occurs in situations where both bottom-up and top-down attentional constraints are low: this is what allows thoughts during mind-wandering episodes to meander from topic to topic over time without getting "stuck" in any single pattern of thinking. Attention is said to be *unguided* when one would not feel pulled back by distractions. For example, when a mind-wandering episode is interrupted, you don't feel pulled back to that particular train of thought. In contrast, rumination is highly guided attention: when something distracts you from your ruminative pattern of thinking, you may likely feel pulled back to that particular pattern of thinking.

Similarly, when an episode of absent-minded smartphone use gets interrupted, one will likely not feel particularly drawn back to one's absent-minded smartphone use. In contrast, if an episode of doomscrolling gets interrupted, one will likely still feel pulled back towards the doomscrolling behavior, because bottom-up, affective attentional processes *guide* one's attention back to the distressing topic or topics. So, whereas absent-minded smartphone use may persist because someone is bored and does not realize they are continuing to scroll aimlessly, doomscrolling is likely to persist because someone feels compelled to seek information on a particular topic.

In sum, doomscrolling involves a kind of cognitive integration such that an existing cognitive capacity is transformed: ruminative brooding. Doomscrolling, a form

of extended brooding, can be contrasted with absent-minded smartphone use, a form of extended mind-wandering. In both cases, an underlying spontaneous cognitive process has been transformed, yet the two forms of habitual smartphone use can be distinguished along several dimensions including arousal level, affect, mood, dynamics, and content.

5. Doomscrolling as Metacontrol Failure

So far I have argued that doomscrolling ought to be considered a kind of extended *brooding* rumination, the sort of rumination that is maladaptive and generally leads to negative outcomes. I contrasted doomscrolling with another form of problematic smartphone use, absent-minded smartphone use or (an instance of extended mind-wandering). I think doomscrolling and absent-minded smartphone use, at least in highly problematic or disruptive instances, both reflect kinds of *metacontrol failures.* Recall, metacontrol is metacognitive monitoring and regulation directed at antagonistic control processes (e.g., flexibility and stability, control vs. automaticity, exploration vs. exploitation). Whereas excessive and prolonged absent-minded smartphone use may be described as an inability to switch *to* more stable modes of responding, excessive and prolonged doomscrolling can be described as instance of an inability to switch *away from* stable modes of responding.

So, I think doomscrolling seems to reflect a failure of metacontrol: a breakdown in one's ability to disengage from dysphoric, highly stable modes of engaging with one's smartphone. Hitchcock & Frank (2024) suggest that metacontrol failure may underly the repetitive negative thinking characteristic of rumination. They claim that repetitive thinking may underly adaptive decision making in some circumstances, but rumination and other highly repetitive and negative thinking styles may the result of this same process malfunctioning, resulting in dysphoric, unproductive thinking. They propose "rumination and worry are coarse terms for failures in metacontrol, just as tripping and falling are coarse terms for failure in motor control" (p.1). Similarly, I think doomscrolling may be a coarse term for a kind of metacontrol failure involving both cognition *and* action.

Hitchcock & Frank (2024) propose four stages at which metacontrol failures might occur during rumination. The first stage is referred to as the "outer loop" or "gate" stage, in which one maintains a task goal in mind. The second stage involves completing a series of subproblems to in the service of the overarching task. The third stage is referred to as the "switching" stage, which involves switching between the subproblems in the previous stage. The final stage is reinforcement of the behaviors within the ruminative episode, which can come outside or within the agent. Here, I will go through each stage to show how metacontrol failure may result in doomscrolling, an instance of extended rumination.

Let's return to the doomscrolling dad, and for the sake of the example, let's say he developed a particularly nasty doomscrolling habit during the COVID-19 pandemic. In a state of general distress given the uncertainty surround the state of the world, he may entertain some abstract thoughts such as "the world is so messed up, why is the world so messed up?" He may at this point start to seek out information to evaluate this hypothesis: by having a generally vague task at hand (the first stage at which a failure

might occur), this may result in prolonging the repetitive doomscrolling behavior. However, once a hypothesis has been selected, in this case "the world is so messed up," one might continue to execute subgoals (the second stage) related to evaluating the hypothesis, leading to one to seek out more information, thus prolonging the repetitive doomscrolling behavior. The doomscrolling dad may also have difficulty switching between subgoals while evaluating the hypothesis "the world is so messed up." He could evaluate this hypothesis without the aid of a smartphone by doing just about anything else; however, because he is often reinforced by the doomscrolling behavior (i.e., he receives information that seems to confirm his initial hypothesis), he continues to evaluate the hypothesis with the aid of his smartphone. More specifically, most social media platforms are structured such that the user gets variable reinforcement. Given that there is uncertainty surrounding the outcome of one's scrolling actions, this possibility of disappointment or reward (like gambling) keeps the user endlessly scrolling. At each stage, from task selection, subgoal selection, switching between subgoals, to reinforcement, a metacontrol failure might occur such that the doomscrolling behavior persists.

In sum, not only do I think doomscrolling is a form of extended rumination, I also think it is a form of metacontrol failure such that one's information seeking patterns, involving both thought and action, become highly dysphoric and stable. This results in the individual feeling "stuck" dwelling on distressing information.

6. Conclusion

I have argued that doomscrolling is best characterized as a form of extended cognition: in particular, *extended brooding*. By integrating a smartphone (or a similar digital computing device) into dysphoric information-seeking habits, one has a sense that they may find solutions, explanations, or answers to the source of their distress, yet they are rarely satisfied with any of the content they receive. Sustained sessions of doomscrolling often leave individuals feeling worse than they did before and can potentially lead to significant mental health costs over time. I characterized doomscrolling as a form of extended cognition to highlight how the cognitive integration between an agent and a digital device might lead one to develop a doomscrolling habit. Because smartphones are reliable, accessible, and trusted sources of information, they are frequently and repeatedly used. Over time, one's interaction with the device can become proceduralized, and one may adopt certain information-seeking habits which are automatic and effortlessly deployed. As each step of information exchange between an agent and a digital device contributes to the next, one's engagement with the device becomes specifically tailored to the user. In the context of this proceduralization and individualization, one may find themselves using their phone in habitual or diversionary ways. I argued that doomscrolling ought to be considered a case in which an existing cognitive capacity, ruminative brooding, is transformed by sustained and repeated interaction with a digital device. I also argued that extended brooding is distinct from extended mind-wandering by highlighting differences between doomscrolling and absent-minded smartphone use. Finally, I claimed that doomscrolling reflects a kind of metacontrol failure

Chapter 5: Conclusion

Throughout the dissertation, I have hoped to convince the reader spontaneous cognition and action are not pervasively passive phenomena. At times, I argued individuals can use metacontrol to engage in episodes of spontaneous thinking and acting. This may result in highly flexible modes of thinking as in intentional mind-wandering or lucid dreaming, and in other cases highly stable modes of thinking such as in rumination. In the case of skilled action, I think metacontrol underlies expert improvisers' ability to shift between more flexible and stable modes of responding. In the cases of intentional mind-wandering, reflective rumination, and improvisation, one might describe these as adaptive uses of metacontrol. One intentionally engages in spontaneous cognition or action in an effort to perpetuate a state of flexibility or stability.

In a way, one might consider this dissertation to be about both adaptive and maladaptive metacontrol processes. In Chapter 1 and Chapter 2, I described instances of metacontrol that are successful. However, in the case of doomscrolling, this is an example in which metacontrol *breaks down*. In Chapter 3, I argued that doomscrolling may be characterized as a kind of *metacontrol failure*. To conclude the dissertation, I will suggest that future research might benefit from a metacontrol perspective on similar breakdowns of cognitive control.

Whereas lucid dreaming, intentional mind-wandering, reflective rumination, and spontaneous, skillful action such as improvisation might be characterized as involving adaptive and successful metacontrol, there are likely to be instances in which metacontrol fails, malfunctions, or is in some sense *maladaptive*. For example, in contrast to lucid dreaming, lucid nightmares are characterized by incredibly frightening dreams, often characterized by violence and an inability to wake up (Stumbrys 2018). In the case of mind-wandering, some individuals experience what is known as maladaptive daydreaming, "an excessive and vivid fantasy activity that interferes with an individual's normal functioning and results in severe distress" (Schimmenti et al. 2019, p.865). In Chapter 1, I argued that metacontrol may be responsible for intentionally engaging in episodes of spontaneous cognition. Future research might investigate the extent to which metacontrol failures contribute to excessive or maladaptive mind-wandering. Whereas metacontrol may allow some individuals to *let* their minds wander, for others, failures of metacontrol may result in excessive and disruptive daydreaming, with individuals being unable to *stop* their minds from wandering, such as maladaptive daydreaming disorder. Future work might investigate the extent to which metacontrol failure might underly extreme shifts towards spontaneous cognition, as in the case of excessive mind-wandering.

Similarly, whereas reflective rumination may lead to adaptive problem solving, *brooding* rumination may lead one to dwell on the sources of their distress in unproductive and harmful ways (Satyshur et al. 2018). In each of the above cases, individuals seem stuck in either highly flexible or highly stable modes of cognition, which ultimately has disruptive and harmful effects. Because individuals experiencing these states find themselves unable to switch to either more flexible or more stable modes of responding, I think they ought to be considered instances of metacontrol failures.

Because maladaptive or excessive mind-wandering and ruminative brooding are often associated with significant mental health costs, further research on metacontrol failures may yield new insights related to effective mental health interventions for those suffering from excessive mind-wandering or brooding.

As mentioned above, I also think that metacontrol failure may be an interesting lens on several other phenomena discussed in the dissertation. Having already focused on doomscrolling, mind-wandering, and rumination, I will now suggest directions for future research on metacontrol failure in the context of skilled behavior.

In Chapter 2, I argued that improvisation involves metacontrol to shift between more automatic and controlled ways of acting. Typically, debates around skilled behavior often focus on the pinnacle of expertise: masters of their craft having their best performances under optimal conditions. An interesting avenue for future research might be how metacontrol can either speed up or slow down the rate of learning a new skill across the stages of skill development. In particular, it would be interesting to investigate how metacontrol failures might impede skill development. For example, learners may be stuck acting in highly stable, yet unproductive modes of responding, and learning how to flexibly adjust one's actions is likely beneficial to the learning process. A metacontrol failure in skill learning might look like overly sedimented or overly flexible actions that disrupt the learning process. I think metacontrol is important for the highest levels of performance in skills such as improvisation; however, I think it is likely that it is equally important individuals at novice and intermediate levels who are still developing their expertise.

It might also be fruitful to investigate how suboptimal conditions may lead to metacontrol failure during expert performance. Most theories of skilled behavior make claims about the nature of expert action, assuming optimal conditions. However, many performances occur in suboptimal circumstances, and metacontrol may underlie experts' ability to not be derailed by ongoing distractions. For example, one might investigate the extent to which choking under pressure or the yips are influenced by metacontrol processes. It is possible that suboptimal circumstances may lead to metacontrol failures that lead to overly stable or controlled modes of responding that disrupt performance.

To conclude, I hope my dissertation contributes to a growing recognition that spontaneous cognition can also be beneficial and intentional, while at the same time highlighting instances where spontaneous thinking and action can go awry, as in the case of doomscrolling. I argued throughout the dissertation that metacontrol of spontaneous cognition and action underlies a wide range of adaptive cognitive processes, such as reflective rumination and skillful improvisation. Further, I also argued that metacontrol failures may underly maladaptive behavior such as doomscrolling. In short, I have argued that spontaneity in thought and action does not imply mental passivity and, further, that metacontrol underlies one's capacity to adaptively and intentionally engage in spontaneous thought and action.

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