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INTERPRETING CONTINUISM AS A MECHANISTIC THESIS

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Abstract

The (dis)continuism debate in the philosophy of memory revolves around the question of whether memory and imagination belong to the same natural kind. Continuism, on the one hand, defends that they belong to the same natural kind. Discontinuism, on the other hand, defends that they do not belong to the same natural kind. By adopting a minimal notion of natural kind, one can recognize that there are different legitimate ways of sorting kinds, which lead to different positions in the debate. In this paper, I interpret continuism as a mechanistic thesis, according to which memory and imagination belong to the same natural kind because they are underpinned by the same constitutive mechanism. I clarify the implications of this thesis and show that most of the discontinuist attacks on continuism do not constitute a challenge to the mechanistic thesis. I also present a possible challenge to mechanistic continuism. This suggests that there may be multiple (dis)continuism debates.

Keywords: Continuism. Discontinuism. Natural kinds. Mechanism. Episodic Memory. Episodic Imagination.

1 Introduction

The distinction between memory and imagination has been present in philosophical discussion at least since Plato. Recently, with new empirical evidence, the (dis)continuism debate has emerged (Perrin, 2016). Philosophers influenced by scientific research on memory have argued that memory and imagination belong to the same natural kind (De Brigard, 2014; Michaelian, 2016).[1] This perspective, known as continuism, suggests that memory and imagination exist on a continuum, with their differences being matters of degree rather than kind. However, other philosophers disagree, asserting that these mental states are distinct enough to belong to different natural kinds—a view known as discontinuism (Robins, 2020; Munro, 2021; Perrin, 2016).

[1] Throughout this paper, the terms "memory" and "imagination" specifically refer to episodic memory and episodic imagination, unless otherwise stated.

The core of this debate lies in the concept of natural kinds. In this paper, I adopt a minimal notion of natural kinds, defining them as natural classifications because they correspond to and are constrained by the causal structure of the world (Khalidi, 2018). This minimal view is less demanding than other approaches, such as essentialism or the homeostatic property cluster (HPC) theory. Despite its simplicity, this view retains the benefits of these more complex theories, including the ability to make accurate predictions, draw relevant novel inferences, and manipulate phenomena. Furthermore, it avoids the issues that plague other views (for critiques of essentialism, see Boyd, 1991, and Massimi, 2022; for critiques of HPC, see Craver, 2009, and Massimi, 2022).

Given this definition, there may be multiple legitimate ways to sort natural kinds (Craver, 2009; Khalidi, 2018; Massimi, 2022). As a result, different approaches to classifying kinds may lead to different positions in the (dis)continuism debate, as noted by Robins (2020). Therefore, it is likely that what we refer to as the (dis)continuism debate actually encompasses several distinct debates. The challenge for philosophers is to recognize this multiplicity; otherwise, participants may end up talking past each other, hindering real progress in understanding the relationship between memory and imagination. Given this potential for confusion, proponents of different versions of continuism and discontinuism should be clear about what exactly their theses entail (cf. Andonovski, 2020, Robins, 2020).

In this paper, I argue that by interpreting the continuist thesis articulated by De Brigard (2014) and Michaelian (2016) as a mechanistic thesis, we can do justice to the thesis and its arguments and, moreover, specify more precisely what the thesis does and does not assert. According to this interpretation, memory and imagination belong to the same kind because they are explained by the same kind of constitutive mechanism. Using this interpretation, I demonstrate that many objections to the continuist thesis do not pose significant challenges because they do not directly address the thesis itself. A problem arises, however, because the evidence in its favor is not as conclusive as its proponents claim. Moreover, there is evidence that contradicts the thesis.

The paper is organized as follows: In Section 2, I briefly present the original continuist thesis, framing it as a mechanistic thesis. In Section 3, I provide a detailed overview of the mechanistic framework to elucidate the meaning and implications of continuism, with a particular focus on the criteria for categorizing natural kinds within this framework. In Section 4, I argue that the responses to the continuist thesis do not pose substantial challenges, with the exception of Trace Minimalism. In Section 5, I introduce a potential problem that deserves the attention of continuists, namely, the

problem that some pieces of evidence can be interpreted differently and other pieces of evidence contradict continuism. Finally, in Section 6, I conclude with some implications for the (dis)continuism debate.

2 The original continuism as a mechanistic thesis

Continuism posits that memory and imagination exist on a *continuum* and belong to the same natural kind. While certain perspectives, such as Hume's, on the relationship between memory and imagination may be considered continuist, Perrin (2016) introduced the term "continuism" with a specific thesis in mind, which I will refer to as "*original continuism*", as proposed by De Brigard (2014) and Michaelian (2016).[2] In essence, both argue that memory and imagination belong to the same natural kind because they are underpinned by the same cognitive system.[3] Therefore, the criterion they use to distinguish kinds is a system-based criterion: if two mental states are underpinned by the same cognitive system, they belong to the same natural kind. Thus, original continuism (OC) can be defined as follows:

> **OC:** memory and imagination belong to the same natural kind because they are underpinned by the same cognitive system.

De Brigard (2014, p. 167ff) explicitly states that he employs a mechanistic definition of a cognitive system. He contends that the episodic thought system, as he terms it, is a mechanism whose function is to produce counterfactual representations of dynamic events (see also De Brigard & Gessell, 2016; De Brigard, forthcoming). As a result, episodic memory and episodic imagination are both underpinned by this mechanism.

A mechanism is used as an explanation for phenomena and consists of a set of entities and activities organized in a specific way to produce or constitute the phenomenon being explained (Craver, 2001, 2013). Mechanisms are inherently multi-level, with lower levels constituting (or standing in a part-whole/supervenience relationship with) higher levels (Craver, 2007). Additionally, mechanisms can be described at varying levels of abstraction (where certain parts are intentionally excluded from the description) and/or idealization (where parts known not to belong to the mechanism are intentionally attributed to it). This approach stems from the fact that proposing a mechanism is an

[2] I refer to this perspective as "original" because it serves as the starting point for much of the current debate on the relationship between memory and imagination (see Perrin, 2016, for a brief historical overview).
[3] Although De Brigard (2014) does not explicitly state that memory and imagination belong to the same natural kind, this assertion is implicitly present throughout his discussion.

explanatory endeavor and, as such, is shaped by the purpose of the research (Craver, 2009; Glennan, 2017; Potochnik, 2017). Depending on the goal of the research, it may be more useful to abstract away certain features and idealize others. For instance, the initial study of action potential in the human brain used the giant axon of a squid due to its size and the ease of inserting electrodes to monitor electrical activities. Despite differences among species, the giant axon was used as a model for action potential across all species (Kandel, 2007). In this case, relevant features of the giant axon were abstracted away, and other features were idealized to create a model applicable to all species (Glennan, 2017).

Given this initial definition of a mechanism, we can understand that De Brigard posits the existence of a multi-level set of entities and activities within the brain, organized in a specific manner, that produce or underlie both mnemic and imaginative phenomena—referred to by him as the episodic thought system.[4]

Similarly, Michaelian (2016) adopts a system-based notion of natural kind. However, it is less apparent that he adopts a mechanistic view. Michaelian's framework is based on Marr's (1982) three-level account of cognitive systems: computational, algorithmic, and implementation. According to Marr, a cognitive system can be analyzed at three levels: the computational level (which describes the function of the system), the algorithmic level (which examines the rules and methods for performing that function), and the implementation level (which concerns the brain structures that implement that function). Although these levels are analyzed separately, they can collectively describe the same system. In this sense, Michaelian (2016) maintains that two systems are considered to belong to the same natural kind if they share the same descriptions at all three levels.

At the implementation level, Marr (1982) and others, including Michaelian (2016), refer to a set of entities and activities within the brain organized in a particular way to produce or support the phenomenon in question. Therefore, this level can be understood in mechanistic terms. If Michaelian requires that two systems share the same implementation description, it implies that these systems must be underpinned by the

[4] This interpretation is further supported by De Brigard's subsequent work (2020; forthcoming). Nevertheless, one reviewer pointed out that De Brigard (2017, 2024), in other papers, seems to be of the opinion that the only thing that matters for the definition/individuation of a cognitive capacity is its functional profile and not its mechanistic implementation. Yet, he still appeals to mechanistic implementations to discuss episodic memory (2020, forthcoming). Moreover, he is not sufficiently clear about how to functionally individuate systems, which prevents the precision of the thesis I am aiming for in this paper. Thus, by interpreting OC as a mechanistic thesis (see below), I aim to provide a more precise delimitation of the thesis, with clear empirical consequences that allow us to evaluate the thesis (see Sections 3.3, 4, and 5). For this reason, my argument will not be that OC is a mechanistic thesis, but that if we interpret it as if it were, it gains precision and we can still do justice to it.

same mechanism. Thus, mechanisms become crucial for individuating systems and, by extension, kinds.

Moreover, the computational and algorithmic levels can be viewed as high-level abstractions of a mechanism (Piccinini & Craver, 2011; Glennan, 2017; Piccinini, 2020, see also Elber-Dorozko & Shagrir, 2021). These levels reveal significant causal relationships within neurocognitive mechanisms while abstracting away many of their specific entities, activities, and organizational features. Thus, individuating kinds through parity at Marr's three levels can be understood as categorizing according to the mechanistic description of a system at varying levels of abstraction (Glennan, 2017). For this reason, we can still make justice to OC if we interpret it as a mechanistic thesis. In the next sections, I will argue that this help us understand what the thesis really asserts (Sections 3.3, 4, and 5).

This integration of Marr's levels is indeed part of Michaelian's argument. In this paper, however, I will focus on OC as a mechanistic thesis specifically concerning the implementation level. This choice is motivated by the mechanistic focus on implementation and by a limitation of scope that forces me to follow a simpler path. It is not easy to determine the computational profile of a system (Papayannopoulos et al., 2022). Moreover, the integration of the three levels is not straightforward in cognitive neuroscience research. For example, episodic and semantic memory may be described using the same algorithmic analysis (Gershman, 2017), but they are likely implemented by different brain mechanisms (Ranganath, 2024). Moreover, even if memory and imagination are implemented by the same mechanism, they may have different computational descriptions (Khalidi, 2023a). Furthermore, the use of different levels of abstraction may lead to the inclusion or exclusion of different tokens of mechanisms as belonging to the same kind (Boyd, 1999; Craver, 2009; Glennan, 2017). Thus, it is not easy to align computational and algorithmic descriptions with the same implementation mechanism (see also Khalidi, 2023a). The examples cited illustrate that descriptions at different levels may map onto different implementation mechanisms in scientific practice.[5] To avoid these complications, I will consider the continuist thesis as a mechanistic thesis about the implementation level only. Consequently, we can revise the definition of OC to reflect this focus, resulting in OC_M.

[5] Crucially, I am not suggesting that these levels are not aligned in a mechanism. Rather, due to differences in research projects, cognitive and computational scientists often pursue different mechanisms than neuroscientists, making the alignment of levels a Herculean task (see Elber-Dorozko & Shagrir, 2021), beyond the scope of this paper.

OC_M: memory and imagination belong to the same natural kind because they are underpinned by the same kind of constitutive mechanism.

I will further elaborate on what precisely OC_M asserts in Section 3, particularly in Section 3.3. For now, the notion of a constitutive mechanism aims to capture the concept of implementation discussed. As seen, this interpretation of OC is in line with its thesis and arguments (see Section 3.3). However, this perspective does have a limitation: if we understand OC as OC_M, it may be the case that it can no longer be considered the only legitimate natural kind thesis regarding memory and imagination. As will be discussed in Section 3.2, mechanisms are classified into kinds based on the purpose of the research (Craver, 2009), indicating that there may be multiple ways to categorize memory and imagination based on their constitutive mechanisms.

Indeed, as noted in the Introduction, there are various legitimate methods for sorting natural kinds, with the mechanistic approach being only one among them. Additionally, there are numerous legitimate ways to classify mechanisms into kinds. Consequently, there should not be a single (dis)continuism debate but rather multiple debates, each corresponding to different kinding strategies (see Sections 4 and 5 for an example). I will argue in Section 4 that many discontinuist criticisms of OC_M miss the mark because they utilize different, although equally legitimate, methods for sorting memory and imagination into kinds. Before delving into this argument, I will further develop the mechanistic framework and the process of categorizing natural kinds in the next section.

3 Natural kinds: phenomena and mechanisms

Although what is now known as New Mechanism philosophy is not a monolithic perspective (Craver, 2001, 2007; Bechtel, 200; Glennan, 2017; Piccinini, 2020), these views share several common features (Glennan et al., 2022). In this section, I will elaborate on those aspects pertinent to understanding OC_M and the sorting of natural kinds. Building on the discussion in the previous section, mechanisms explain phenomena and can be used to sort them into natural kinds.[6] In what follows, I clarify what it means.

3.1 Explanation, phenomena and natural kinds

[6] I should highlight that I am not subscribing to the view that all explanations in the cognitive sciences and neurosciences appeal to mechanisms (Craver, 2007). However, I am concerned with how mechanistic explanations work and, particularly, how they relate to sorting natural kinds.

Explanations generally reveal counterfactual dependencies (Woodward, 2003; Glennan, 2017, Potochnik, 2017). Counterfactual dependencies not only elucidate why a phenomenon happens but also how it would alter under different circumstances (Woodward, 2003, Woodward & Hitchcock, 2003; Craver, 2007). In this framework, a counterfactual dependence is conceptualized in terms of ideal interventions.[7] Specifically, a variable *E* is counterfactually dependent on a variable *C* if and only if an ideal intervention that alters the value of *C* also alters the value of *E*. Thus, *C* explains *E* if and only if the relationship between them—where a change in *C* results in a change in *E*—holds across a range of interventions. This property is referred to as invariance. In summary, explanations are framed in terms of invariance.

Returning to OC_M, the clarification provided suggests that it asserts memory and imagination are phenomena explained by the same constitutive mechanism. In other words, both are counterfactually dependent on the same constitutive mechanism. Phenomena refer to stable patterns in the world identified through patterns in data. For instance, when using fMRI to study brain regions associated with memory and imagination, each participant produces different results. No two images are identical, and even the same individual produces different images on different trials (Ridgeway, 2021). Traditional scientific inquiry does not focus primarily on these particular variations, but rather seeks to explain stable and repeatable properties. In this context, science aims to understand why, despite variability, there is a significant degree of stability and repeatability across participants. These stable and repeatable properties are called phenomena. The stability of phenomena is assessed by the consistency and repeatability of their properties as a cluster, even when different methods of investigation are deployed (Bogen & Woodward, 1988; Bechtel, 2008, Craver & Darden, 2013; Colaço, 2018, 2020).[8]

Scientists characterize a phenomenon by identifying these stable properties, including its effects, and by determining the conditions under which the phenomenon occurs. These conditions can be producing conditions (which induce the phenomenon), inhibiting conditions (which prevent the phenomenon), and modulatory conditions (which alter some properties of the phenomenon) (Craver & Darden, 2013; Colaço, 2018,

[7] Woodward (2003) proposes that interventions are indicative of causation. However, I align with Kästner (2017), who argues that interventions reveal different types of counterfactual dependence, not exclusively causal ones.

[8] Unrepeatable phenomena, such as the Big Bang, are also subjects of scientific inquiry. In such cases, phenomena are studied through stable evidence that can be repeatedly assessed. For instance, the Big Bang is investigated through consistent effects like the cosmic microwave background and the Doppler redshift, which can be repeatedly assessed (Bechtel, 2008).

2020). It is noteworthy that the properties used to characterize phenomena are causal in nature (Harinen, 2018). Therefore, these characterizations reflect aspects of the causal structure of the world. Furthermore, the characterizations of phenomena are constrained by this causal structure, as they are accepted, modified, or rejected based on their correspondence with the causal aspects they represent (Colaço, 2018, 2020). Given that characterizations both point to and are constrained by a part of the causal structure of the world, they serve as a method of individuating natural kinds (Colaço, 2022, Khalidi, 2018). In line with Glennan (2017), I consider that characterizations are a means of *sorting kinds (or kinding) according to phenomena*. In this sense, the criterion for sorting natural kinds is: if two phenomena share the same characterization, then they belong to the same natural kind.

Crucially, characterizations of phenomena are explanatory because they reveal counterfactual dependencies.[9] For instance, the conditions under which a phenomenon occurs form part of its characterization and constitute variables that are, to some extent, invariant with respect to the phenomenon. By delineating these variables, characterizations have explanatory power. In particular, characterizations are explanatory because they point to variables that belong to either producing or constituting mechanisms. Most of the time, however, they point to variables that are components of producing rather than constitutive mechanisms (Craver & Kaplan, 2020, Siegel & Craver, 2024).

3.2 Kinds of mechanisms

Mechanisms can be classified and individuated in various ways. A pertinent classification for our discussion is the distinction between producing and constitutive mechanisms. For instance, the mechanism of communication between the motor neuron and muscle cells explains muscle contraction by demonstrating a relevant causal dependence. Interventions on the motor neuron lead to changes in muscle cells, as evidenced by habituation studies (Kandel, 2007). Here, the communication mechanism between the motor neuron and muscle cells acts as a *producing mechanism* for muscle contraction, as it is a condition that induces the phenomenon (Craver & Darden, 2013; Glennan, 2017). In contrast, the sliding of filaments within sarcomeres constitutes the phenomenon itself

[9] It is important to emphasize that mere patterns in data are not sufficient to characterize a phenomenon. Conditions are required, and thus characterizations appeal to causal or constitutive relationships. Mere patterns in data are not explanatory (Siegel & Craver, 2024), but if they include explanatory variables, including conditions, patterns become explanatory and may count as characterizations (Colaço, 2018, 2020).

and is thus termed a *constitutive mechanism*. The constitutive mechanism underlies the phenomenon itself, meaning it represents the underlying process that realizes the higher-level phenomenon (Craver & Darden, 2013; Piccinini, 2020). Put another way, the phenomenon can be considered as the highest level of its constitutive mechanism. Constitutive mechanisms are explanatory in that they reveal counterfactual dependencies, as higher-level phenomena are realized by their lower-level constituents (Piccinini, 2020). In sum, producing mechanisms are causally related to the phenomenon while constitutive mechanisms are part-whole related to the phenomenon.

Producing and constitutive mechanisms differ not only ontologically, in terms of their entities and activities, but also explanatorily, as they exhibit different invariants. For example, electrically stimulating the filaments (intervening in the constitutive mechanism) results in muscle contraction, even without intervention in the producing mechanism (the motor neuron). This illustrates that producing and constitutive mechanisms explain phenomena in distinct ways: the former through external (causal) dependencies and the latter through internal (part-whole) dependencies. [10]

Both types of mechanisms can be sorted into natural kinds in various ways, considering the phenomenon they explain, the nature of their entities, activities, or organization, or even their etiology (Glennan, 2017). All these methods are legitimate as they point to and are constrained by the causal structure of the world (i.e., the mechanisms themselves). In this paper, I will consider that two mechanisms belong to the same kind if they share the same types of entities, activities, and organization. Following Glennan (2017), I term this approach as *sorting kinds (or kinding) according to mechanisms*. In the rest of the paper, I will consider exclusively the approach of kinding according to *constitutive* mechanisms unless expressed otherwise (particularly, in Section 5).[11]

A clarification is needed here. The individuation of kinds of mechanisms depends on the level of abstraction of the mechanistic description. In the case of a constitutive mechanism, its components, internal activities, and organization are found via mutual manipulability (MM), which consists of intervening in the phenomenon and tracking the putative components that are changed by these interventions (top-down interventions)

[10] Some call internal dependences supervenience (Craver *et al*, 2021), while others disagree (Kästner, 2017).

[11] As Craver (2009) notes, this might lead to an infinite regress of kinds. Continuists categorize phenomena (memory and imagination) based on the mechanisms that underpin them, and mechanisms themselves are categorized by their entities, activities, and organizational structure. However, these categories can be individuated in various ways, making classification potentially impractical without some level of convention (see also Tobin, 2018). For this reason, I will assume that the kinds of entities, activities, and organization are determined by convention.

and intervening in the putative components and tracking the changes in the phenomenon (bottom-up interventions). Components, activities, and organizational structures that are invariant with respect to both types of interventions are inferred to be constitutive of the phenomenon in question. A problem that arises is that different people, different tasks, and even the same people performing the same task in different circumstances activate different mechanisms. For this reason, hypothesizing about kinds or types of mechanisms requires a certain level of abstraction (Boyd, 1999, Craver, 2007, Craver et al, 2021).

The appropriate level of abstraction depends on the explanatory purpose. For example, before performing brain surgery, a surgeon can both track the electrical activity of specific brain areas and find a correlation between the feeling of remembering and a specific brain region (top-down intervention) and electrically stimulate that region and induce the feeling of remembering (bottom-up intervention) (Gillinder et al., 2022), using MM to identify the brain mechanism of the feeling of remembering. If the purpose of this research is to build a model of the human mechanism of the feeling of remembering, scientists will abstract away from individual differences. If the purpose of this investigation is to build a model of the mechanism of the feeling of remembering across species, more differences will be discarded as not relevant to the purpose at hand, and only the components that are shared by these species will be considered. However, if the purpose of the study is to help a surgeon perform brain surgery and avoid damaging the mechanism of the sensation of remembering of that particular patient, no components should be discarded and only the mechanism of the patient undergoing surgery will be relevant (cf. Boyd, 1999, Craver, 2009).

In this sense, depending on how the abstraction is made, kinds of mechanisms can go beyond task-dependent phenomena (e.g., Dewey, 2024) to encompass cognitive capacities involved in multiple tasks (Francken et al., 2022). Some examples are Bechtel's (2011) reconstruction of the mechanism of the visual system and Francken et al.'s (2022) discussion of the response inhibition mechanism traced across tasks.

For this reason, mechanisms are taken to be perspectival, which may mean that OC_M is not the only or even the best way to sort memory and imagination into natural kinds.[12] This is especially the case because mechanisms explain phenomena, and the appropriateness of an explanation depends on the purpose of the research, the specific variables of interest, and what needs to be explained. Sometimes the underlying mechanism may not be the best explanation, especially if it does not allow for the specific

[12] Craver (2009) provide other reasons to consider mechanisms as perspectival.

interventions sought in that particular research. Moreover, science arguably has multiple goals beyond uncovering underlying mechanisms (Potochnik, 2017), and methodological strategies, including kinding strategies, depend on the goal at hand (Massimi, 2022).

Thus, OC_M is unlikely to be based on the only or even the best way to sort memory and imagination into natural kinds; it is one possible way among many. For certain research purposes, such as investigating the mechanisms of mental time travel or the mechanisms underlying mental simulation, it may be the most effective approach (Addis, 2020; Robins, 2020). However, for other purposes, such as exploring how memory and imagination affect human communication, it may not be the most appropriate sorting method (Mahr, 2020; Andonovski, 2020). In section 4.1, I will explore how different legitimate sorting methods lead to different kinds of the same set of phenomena, and in section 4.2, I will show the consequences of this multiplicity for discontinuist objections to OC_M. Before doing so, I will clarify the meaning of OC_M in light of the framework presented so far.

3.3 Mechanistic continuism

Given the discussion in this section, we can clarify the meaning of OC_M. OC_M posits that memory and imagination are phenomena explained by the same constitutive mechanism, thereby classifying them as phenomena of the same natural kind when sorted according to their constitutive mechanism[13]— potentially the Default Mode Network or the hippocampus (Addis, 2020; De Brigard, forthcoming). However, they may differ in their producing, inhibiting, and modulatory conditions, as well as in their effects.[14] This divergence could lead to different scientific characterizations of memory and imagination as phenomena, causing them to be sorted into different natural kinds according to phenomena. Nonetheless, this difference is not problematic for OC_M because distinct characterizations do not preclude the possibility that both phenomena are constituted by the same mechanism, as I will argue in the next section.

As noted briefly in Section 3.2, evidence for constitution comes from MM (Craver, 2007; Craver et al., 2021). Thus, if memory and imagination share the same MM inferences, we can conclude that they are constituted by the same mechanism. Such MM inferences can be drawn from various bottom-up and top-down interventions on memory

[13] I interpret the continuist claim as constitutive rather than producing mechanistic claim because implementation, the notion adopted by continuists, indicates constitution rather than mere production.

[14] For instance, Sant'Anna (2023) argues that memory and imagination have different control constraints. Others defend that, in human communication, they have different effects (see Mahr & Csibra, 2018, Andonovski, 2020).

and imagination. This is the same kind of evidence that continuists like De Brigard (2014) and Michaelian (2016) have presented in support of their view (see also Perrin, 2016).[15] For example, neuroimaging studies, which serve as exploratory interventions (Craver, 2007; Bechtel, 2008), have shown that the same brain areas are involved in both memory and imagination (Schacter & Addis, 2007; Addis, 2020). This involves inducing the phenomenon and monitoring changes in the related mechanisms, qualifying as a top-down intervention (Craver, 2007; Bechtel, 2008). Top-down interventions also include altering external conditions and observing changes in the mechanism of interest, such as in studies where hippocampal activity is monitored while both memory and imagination are induced, showing similar changes in hippocampal cells (Buckner, 2010). Bottom-up interventions further support the sameness of MM in memory and imagination. For instance, damage to the same brain areas—natural interventions (Bechtel, 2008)—results in impairments in both memory and imagination (Hassabis & Maguire, 2009). Additionally, artificial activation of the same mechanisms can lead to the recall of experienced events or the representation of new/unexperienced events (Ramirez et al., 2013; Vetere et al., 2019; Luis-Islas et al., 2022; Najenson, forthcoming). Given this evidence, if MM is sufficient for constitution, as mechanists argue, then it is reasonable to conclude that memory and imagination are constituted by the same mechanism.

At this point, a brief excursus is necessary for clarification. OC_M asserts that memory and imagination belong to the same natural kind. However, it is not always clear what is meant by "memory" and "imagination" in this context. Some philosophers have noted that it is even less clear what imagination refers to in this debate (Robins, 2020; Langland-Hassan, 2022). As mentioned in footnote 1, the focus in the (dis)continuism debate is on *episodic* memory and *episodic* imagination. The definition of episodic memory has been object of interest of philosophical and scientific work (Andonovski, 2023, Andonovski *et al*, 2024, De Brigard, 2024). In contrast, little attention has been paid to defining more precisely what imagination means in the debate. Since this debate has a naturalistic motivation, a close look at how scientists use the term in the aforementioned studies might be relevant. What scientists mean by imagination in studies supporting OC_M is representations that are somewhat equivalent to episodic memory representations but differ in that, while memory represents real or actual past events, imagination represents non-real, fictitious, or non-actual events. For example, Hassabis and Maguire (2009) propose a brain construction system that constructs representations

[15] They also discuss computational evidence in favor of OC_M, but as said in Section 2, in this paper I focus exclusively on implementation.

whose content is a scene—a coherent representation of relations among objects in a specific local context and involving temporal sequences. In this framework, imagination refers to scenes of non-actual events, while memory refers to scenes of actual past events. Addis (2020) offers a slightly different view, suggesting that simulations, rather than scenes, are the key representations. In her view, simulations are quasi-perceptual, temporally dynamic representations. Imagination, in this case, refers to simulations of non-actual events, while memories are simulations of actual past events. Others, such as De Brigard & Gessell (2016), De Brigard (forthcoming), and Comrie and colleagues (2022), argue that the episodic mechanism underlies representations with a temporally dynamic structure of either past or counterfactual events. In this case, memory refers to dynamic representations of past events, whereas imagination refers to dynamic representations of counterfactual events.[16] Consequently, in OC_M, imagination refers to a very specific type of imagining, whether it be a scene or a simulation or a dynamic representation, and not to all forms of imagining.

With this clarification of OC_M, I will now move on to discuss recent responses to the thesis and demonstrate that they do not present a strong challenge to it in Section 4.

4 Assessing responses to continuism

In this section, I will summarize the critiques of OC_M and argue that they do not present significant challenges to the thesis. I will exclude discussions that explicitly do not target OC_M, as noted in Section 2. For example, Sant'Anna (2023) addresses a version of continuism proposed by Langland-Hassan (2022), which differs from OC_M. The responses are organized not chronologically but by the degree of challenge they pose to continuism, starting with the least challenging and moving to the most substantial. My argument proceeds in two steps. Firstly, drawing on the distinctions outlined in Sections 3.2 and 3.3, I will show that different legitimate methods for categorizing kinds can lead to different outcomes (Section 4.1). Secondly, I will argue that most critiques of continuism fail to engage with the constitutive mechanism underlying memory and imagination and, therefore, do not directly challenge the thesis (Section 4.2).

4.1 Different legitimate kinding methods, different legitimate results

As seen, phenomena can be sorted according to their characterizations (kinding according to phenomena) or according to the kind of mechanism the underlie them (kinding

[16] I thank an anonymous reviewer for reminding me of this third view.

according to mechanism). Some think that there is a necessary match between these two kinding methods (Craver, 2004, 2009). In this view, the phenomenon acts as the defining constraint for the mechanism, meaning the mechanism is described precisely as what explains the phenomenon—neither more nor less. This perspective leads to a form of sorting kinds where phenomena are also necessarily categorized based on their mechanisms (see also Kaiser & Krickel, 2017). If two phenomena that are considered different are found to be explained by the same constitutive mechanism, they are grouped together into the same natural kind (the lumping strategy). Conversely, if phenomena that are considered the same are found to be explained by different constitutive mechanisms, they are classified as phenomena of distinct natural kinds (the splitting strategy) (Craver, 2004, 2009). This reasoning likely motivates OC.

However, kinding according to phenomena and kinding according to mechanisms might lead to different sorts of the same phenomena. Kinding according to phenomena relies on the shared characterization of stable properties and conditions (as discussed in Section 3.1), whereas kinding according to mechanisms depends on the shared entities, activities, and organizational structure of mechanisms (see Section 3.2). These criteria for sorting kinds are distinct and can result in the same phenomena being classified differently. This discrepancy becomes more apparent when considering the different types of interventions required for each approach. Kinding according to phenomena involves various types of interventions, while kinding according to (constitutive) mechanisms, as seen, specifically relies on MM (Craver, 2007; Craver et al., 2021). Therefore, the methods for kinding according to phenomena and kinding according to mechanisms are not directly interchangeable, highlighting the limitations of a strict match between kinding according to phenomena and kinding according to constitutive mechanisms. [17]

Some still may argue that since phenomena and mechanisms are in a part-whole relationship, their kinding will naturally yield the same results (Craver, 2009, Craver & Darden, 2013). [18] In other words, they suggest that the classification of a phenomenon necessarily will find its way to match its underlying constitutive mechanism. As a consequence, some defend that the only legitimate way of kinding phenomena is according to their underlying mechanism. However, this is not always the case. Different

[17] Glennan (2017) and Piccinini (2020) are representants of mechanists who accept that these two ways of kinding result in different ways of sorting phenomena.

[18] To be honest, Craver (2002, p. 68) recognizes that there are many ways to individuate mechanistic kinds, including kinding according to phenomena and kinding according to mechanisms (Section 3.1) (see also Siegel & Craver, 2024).

phenomena might be constituted by the same mechanism, and the same phenomenon might be constituted by different mechanisms (Piccinini, 2020). Hence, kinding according to phenomena and kinding according to mechanisms might sort the same phenomenon differently.

For instance, broccoli and cauliflower share genetic mechanisms and are both classified under the same species, *Brassica oleracea L.* (Hu & Quiros, 1991). When sorted according to mechanisms, they could be considered the same natural kind. However, they differ significantly in stable properties such as physical appearance, taste, nutritional content, and responses to external conditions (Shetty et al., 2007; Jiang et al., 2022). These differences would lead to them being classified as different natural kinds when sorted according to phenomena. Conversely, Alzheimer's Disease is likely realized by a variety of genetic mechanisms, which could suggest it should be classified into multiple natural kinds according to mechanisms. Nevertheless, these different mechanisms result in similar clusters of stable properties, relevant conditions, and effects, likely making it a single natural kind when sorted according to phenomena (Šerý et al., 2017; Scheltens et al., 2021).

This dissociation between the outcomes of these two kinding methods is supported by studies showing that characterizations and classifications of phenomena in scientific practice sometimes are independent of their constitutive mechanisms. For instance, Colaço (2020) demonstrated that Long-Term Potentiation (LTP) was initially identified in hippocampal mechanisms, but subsequent studies revealed similar phenomena in different brain mechanisms. Despite differences in constitutive mechanisms, all of these phenomena were categorized under the same characterization and grouped into the same natural kind according to phenomena (see also Najenson, 2023). The splitting strategy, which might have categorized them differently based on mechanisms, did not occur until significant differences were found in the characterization of these phenomena.

In summary, phenomena can be sorted into kinds in multiple ways, such as according to phenomena or according to mechanisms. These different sorting methods do not always lead to the same categorization of phenomena into natural kinds. Therefore, when comparing different hypotheses about how to sort kinds, it is essential to establish whether the same criteria (phenomena or mechanism) are being used. Since both sorting methods are legitimate, if two hypotheses use different criteria, they should not be seen as competing because both can be true—one does not negate the other. For example, phenomena P_1 and P_2 could be considered the same natural kind when sorted according to mechanisms and different natural kinds when sorted according to phenomena, or vice

versa. Hence, there is pluralism with respect to sorts of natural kinds. This pluralism is further emphasized by the fact discussed in the introduction, that because natural kinds point to the causal structure of the world and there are many different ways to sort parts of the causal structure, then, there are different sorts of natural kinds. Moreover, as seen in Section 3.2, even kinding according to mechanisms may lead to different sorts because this method is highly perspectival. In light of this pluralism, I will argue in Section 4.2 that some objections to the OC_M are based on different kinding methods (i.e. not in according to the constitutive mechanism) and, thus, do not directly compete with the OC_M thesis.

Before proceeding with the discussion, one might wonder why the continuist thesis adopts the lumping strategy at all, if it is not necessary. Sorting phenomena into kinds according to their mechanisms can be of great explanatory value. For instance, uncovering underlying/constitutive mechanisms allows for more comprehensive explanations by revealing previously undiscovered variables that may have been missing in the characterization of the phenomenon (Andonovski, 2023). Such an approach allows for novel and reliable inferences that would not be possible at the phenomenon level alone. In other words, OC_M is strongly explanatory and should, therefore, be defended and pursued if correct. However, even if correct, OC_M is not the only legitimate way of sorting memory and imagination into natural kinds and depending on the method of carving the joints of nature, memory and imagination will end up in different kinds.

4.2 Different responses to continuism

Since different methods of categorizing kinds yield distinct yet valid types of natural kinds, any direct objection to OC_M must meet one of two criteria: either it must address the constitutive mechanism of memory and imagination, which is the basis for OC_M's categorization, or it must provide reasons to reject the evidence supporting OC_M presented in Section 3.3. In this subsection, I will argue that most discontinuist critiques of OC_M fail to meet either of these criteria and, therefore, do not constitute direct challenges to the thesis. To support this, I have grouped various responses to continuism under distinct categories of discontinuist views.

The first response to OC_M can be called the *epistemic view*. According to this view, OC_M is incorrect because memory and imagination have different epistemic roles (Munro, 2021) or different epistemic features, such as imagination being immune to error through misidentification, whereas memory is not (Perrin, 2016). However, according to OC_M, memory and imagination are phenomena explained by the same constitutive

mechanism, with kinds sorted according to (constitutive) mechanisms. Epistemic features like those highlighted by this view have not yet been established as stable and repeatable features that allow for scientific investigation (Craver, 2020). The epistemic view tends to assume memory as necessarily successful, but as Robins (2020) points out, there is no clear scientific marker to differentiate successful memory. Thus, it is unclear how the epistemic view directly responds to continuism. It neither addresses the scientific characterization of memory and imagination nor discusses the constitutive mechanisms underlying them. Furthermore, it does not question the evidence in favor of continuism. Consequently, it appears to be talking past OC_M rather than directly engaging with it.

The second response, the *representational view*, argues that OC_M is wrong (at least in some cases or at least incomplete) because memory and imagination present different attitudes associated with their contents (Robins, 2020; McCarroll, 2023; see also Sant'Anna, 2022, Langland-Hassan, 2023, for discussion). It remains unclear whether attitudes directly address the constitutive mechanisms of memory and/or imagination. For this view to compete with OC_M, its defenders must argue that the attitude associated with memory is explained by the constitutive mechanism of memory and that this distinguishes it from imagination. To support this claim, it is necessary first to better define attitudes as scientific explananda. Robins (2020), along with others (e.g., Teroni, 2024), considers attitudes to be (epistemic) feelings associated with mental states. Robins refers to this as the feeling that characterizes the experience of seeming to remember. However, there are compelling reasons to believe this feeling is constitutively explained by a mechanism distinct from that of memory (Sant'Anna, 2024). In fact, Robins (2020) acknowledges pluralism about natural kinds and recognizes that she is proposing an alternative method of sorting memory and imagination that, while different, is not incompatible with OC_M. Notably, proponents of this view do not challenge the evidence supporting OC_M. Therefore, philosophers who adopt this position in the (dis)continuism debate must clarify how attitudes relate to the constitutive mechanism of memory or, at least, critique the evidence favoring OC_M. To date, no such substantive critique has been offered.

The third response, encompassing *computational* (Khalidi, 2023a, 2023b) and *functional* views (Langland-Hassan, 2022, 2023; McCarroll, 2023), argues that memory and imagination differ in their etiologies (external conditions) and effects. Khalidi (2023a, 2023b) specifically contends that memory and imagination draw on distinct information sources, implying they have different inputs. In response, OC_M proponents (e.g., Michaelian, 2016; Schacter, 2021) emphasize that memory and imagination share similar functional profiles. Moreover, while differences in external conditions and effects

are relevant for kinding according to phenomena, they are less pertinent for uncovering constitutive mechanisms, as discussed in Sections 3.1 and 4.1. External conditions pertain to producing mechanisms rather than constitutive ones (Section 3.2). Consequently, it is unclear how these views directly challenge OC_M.

Non-competition between computational-functional views and OC_M is further supported by Khalidi's (2023a) claim that functional individuation can proceed independently of information about underlying mechanisms. Khalidi's position may be interpreted as advocating a non-pluralistic approach to natural kinds in cognitive science, wherein cognitive capacities, including memory and imagination, are defined solely by their functional profiles. From this perspective, neurocognitive mechanisms would be irrelevant for classification (see also De Brigard, 2017). However, this stance remains highly contested within cognitive science (see Francken et al., 2022). Moreover, continuists could counter that different functionally individuated cognitive capacities might still belong to the same natural kind if they are constitutively explained by the same type of brain mechanism (Section 4.1). This argument aligns with Khalidi's earlier views (2018). In addition, these views also do not dispute the evidence in favor of OC_M. Thus, the computational-functional perspective on the (dis)continuism debate does not directly oppose OC_M.

The fourth response, known as *Trace Minimalism* (Werning, 2020; Cheng & Werning, 2016), presents the most direct challenge to OC_M. According to Trace Minimalism, memory has a dedicated mechanism, meaning that the memory mechanism is dedicated solely to memory and does not underlie/constitute imagination. Whether OC_M or Trace Minimalism is correct is an empirical question. In this paper, I will not delve deeply into whether Trace Minimalism is accurate. However, there are theoretical issues with Trace Minimalism. Firstly, it assumes an essentialist notion of natural kinds, which deviates from how scientists typically individuate kinds (Craver, 2009; Andonovski, 2018, Massimi, 2022), and possibly from the reality of kinds (Glennan, 2017, Khalidi, 2018). Secondly, one of its most important arguments—regarding the necessity of causation in the case of memory—is based on a priori reasoning and fails to adequately engage with empirical evidence on the issue (Andonovski, 2022). These are problems that Trace Minimalism must address and are not issues that OC_M faces. Despite these theoretical reasons, which are problematic, there is no strong empirical evidence for trace minimalism and against OC_M that has been published to date. As with the other views, Trace Minimalism also does not challenge the evidence in favor of OC_M.

In summary, the responses to OC_M either do not present arguments that genuinely undermine continuism (first to third responses) or fail to provide strong evidence against it (Trace Minimalism). A significant implication of the understanding of OC_M proposed here is that, to present more incisive arguments, philosophers should clarify the criteria they use for individuating kinds in the (dis)continuism debate. In addition, if they are responding to OC_M or another view, they should clarify how the criteria they adopt relate to those of the view to which they are responding.

5 A possible challenge for continuism

In the previous section, I argued that most responses to OC_M fail to present a significant challenge to it. In this section, however, I introduce a neglected challenge to OC_M. First, I highlight a critical issue with the evidence supporting OC_M (see Section 3.3), namely the problem of underdetermination due to the limitations of MM as evidence for constitution. Next, I outline alternative hypotheses that directly compete with OC_M and discuss the evidence supporting them—evidence that serves as a counterpoint to OC_M.

The core issue is that MM leads to underdetermination, making it insufficient for ascribing constitution. Three main reasons illustrate why MM may not be sufficient for this purpose. Firstly, MM is inferred from a variety of interventions (Kästner, 2017). This variability presents a problem because in many cases, there is no mutual manipulation of every entity, activity, or organization within a mechanism, even considering different levels of abstraction. Top-down and bottom-up interventions do not always track the same entities or processes, which results in partial rather than complete evidence of MM. Consequently, this partial evidence is insufficient for claiming that memory and imagination share the same set of entities, activities, and organizational structures. Therefore, the evidence provided in Section 3.3 might not be sufficient to establish OC_M as the best hypothesis.

Secondly, each intervention analyzed in MM inferences provides underdetermined evidence due to the phenomenon of fat-handedness. Ideal interventions in C would be associated with changes in E whether C and E are causally connected or part-whole connected (Kästner, 2017; Harinen, 2018). Consequently, interventions alone cannot distinguish between causal and part-whole counterfactual dependencies. Since MM is inferred from a set of interventions, it is unlikely that this set can determine whether the relationship between C and E is causal or constitutive. This means that MM

is not sufficient to differentiate whether memory and imagination share a constitutive mechanism or if they are simply causally connected.

Defenders of MM as sufficient for constitution argue that the two-way counterfactual dependence demonstrated by MM can distinguish constitutive relationships from causal ones (Harinen, 2018; Craver et al., 2021). The idea is that MM reveals a symmetry in interactions—intervening in both the cause and effect results in changes in each other—which should rule out mere causation. However, this response overlooks the third reason: MM may fail to rule out causal feedback loops and non-linear causal systems (Kästner, 2017; Krickel, 2020). In complex non-linear systems, entities or activities may influence each other causally without implying a constitutive relationship. As a result, the ability of MM to rule out such causal interactions is limited, further contributing to the underdetermination problem.[19] Hence, MM is not sufficient to differentiate whether memory and imagination share a constitutive mechanism or if they are simply causally connected.

Due to these reasons, the evidence in Section 3.3 presented in favor of OC_M is underdetermined. Specifically, the evidence cannot definitively distinguish between the following four hypotheses:

- **H_1**: Memory and imagination are underlain by the same constitutive mechanism.
- **H_2**: The constitutive mechanism of memory is the producing mechanism of imagination.
- **H_3**: The constitutive mechanism of imagination is the producing mechanism of memory.
- **H_4**: Memory and imagination result from the same producing mechanism.

As noted in Section 3.2, constitutive and producing mechanisms are distinct. Constitutive mechanisms are in a part-whole relationship with phenomena (non-causal), whereas producing mechanisms have a causal relationship with phenomena. Therefore, H_1-H_4 are mutually exclusive. Given that MM cannot resolve the distinction between causal and part-whole relationships, it results in underdetermination concerning these hypotheses.

[19] Craver *et al* (2021) aim at avoiding the third reason by positing that the strength of influence of C on E (and vice-versa) must be proportional to the strength of the intervention on C (and vice-versa). In their argument, non-linear causal systems are unable of holding the intensity of influence backwards while constitution holds the intensity of influence. The problem with this response is twofold. Firstly, it is not clear what intensity/strength of influence means and how to assess proportionality between intervention and output intensity/strength. Secondly, both alternatives are possible: 1) non-linear causal systems can hold the intensity of the intervention; 2) constitutive systems can spread the intensity and its proportionality might be lost when investigating just one element/activity/organization.

In fact, Hassabis and Maguire (2009) use similar evidence from Section 3.3 to support H_3, which suggests that memory and imagination, while related, rely on distinct constitutive mechanisms. According to their view, a brain construction system generates various types of scenes. The memory system uses the outputs of this system, i.e., it is uses scenes, and adds metacognitive information to these scenes, thereby distinguishing them as memories. As they understand the construction system as underlying imagination, the memory system utilizes the outputs of the imagination system to create episodic memory. Thus, while memory and imagination are closely linked, memory is not constituted by the same mechanism as imagination; rather, it is constituted by a mechanism that depends on the outputs of the imagination mechanism.

Evidence supporting this hypothesis includes cases demonstrating dissociation between the mechanisms of memory and imagination. Such evidence directly contradicts OC_M and suggests that memory and imagination are explained by distinct constitutive mechanisms. For example, individuals with onset amnesia or hippocampal damage during infancy often show impairments in episodic recall while retaining the ability to engage in episodic imagination (Dede et al., 2016; Cooper et al., 2011; Hurley et al., 2011; Mullaly et al., 2014). Moreover, although hippocampal damage is famously associated with impairments in both memory and imagination, this is not universally the case. A significant number of patients with hippocampal damage exhibit severe deficits in memory but retain the ability to imagine future scenarios (Schacter et al., 2012; Mullaly & Maguire, 2014). Additionally, brain imaging studies reveal that while memory and imagination both activate a core network, they engage distinct subsystems: one specific to memory and another to imagination (Addis et al., 2009).

This dissociation challenges OC_M's thesis that memory and imagination are constituted by the same mechanism. If they are not constituted by a shared mechanism but are still closely related, this raises two possibilities: (H_2) memory serves as an external condition for imagination, or (H_3) imagination serves as an external condition for memory, as proposed by Hassabis and Maguire (2009). For instance, imagination might rely on memory mechanisms under normal conditions but use alternative sources when memory mechanisms are impaired. Alternatively, as Hassabis and Maguire suggest, memory might depend on imagination mechanisms.

Based on the same findings, some researchers, such as Ranganath (2024), have supported H_2, which posits that imagination mechanisms draw on the performance of memory mechanisms. Evidence for this hypothesis includes findings that imagination relies more on semantic than episodic memory mechanisms (Irish et al., 2012; Duval et

al., 2012; Strikwerda-Brown et al., 2022). According to Ranganath, imagination mechanisms utilize the operations of both semantic and episodic memory mechanisms. However, this evidence remains insufficient to fully justify adopting H_2. While empirical support for this hypothesis is limited, computational models based on it have demonstrated performance consistent with human memory and imagination performances (Whittington et al., 2020; Ranganath, 2024).

For OC_M proponents, the primary challenge is to argue in favor of H_1 against H_2, H_3, and other competing hypotheses. They could begin by defending the claim that MM is sufficient for constitution. Existing work by Harinen (2018), Krickel (2020), and Craver et al. (2021), among others, provides a starting point for addressing these issues. If MM is ultimately found insufficient for this purpose, proponents of OC_M will need to provide additional evidence for H_1, specifically addressing the dissociations observed in conditions like onset amnesia and hippocampal damage and accounting for differences in brain imaging. In other words, continuists must directly respond to the evidence presented in this section, which contradicts their thesis.

Unlike the responses discussed in the previous section, the challenge posed here directly competes with OC_M. As seen, OC_M argues that memory and imagination belong to the same natural kind due to a shared constitutive mechanism. In contrast, H_2 and H_3 propose different constitutive mechanisms for memory and imagination, suggesting that memory and imagination might belong to different natural kinds when sorted according to (constitutive) mechanisms. This highlights how multiple (dis)continuist debates can exist, each with its own criteria for sorting natural kinds, making the dispute between these hypotheses a significant one. In the case discussed in this section, the debate is for a (dis)continuism regarding the constitutive mechanism. Some might propose a (dis)continuism debate regarding many other criteria to sort kinds (see Langland-Hassan, 2023, McCarroll, 2023, for a debate regarding the functional characterization of memory and imagination; Robins, 2020, Sant'Anna, 2021, Langland-Hassan, 2022, for a debate regarding the attitudes of memory and imagination; Liefke, 2024, Liefke & Werning, 2024, for a debate regarding the semantics of memory and imagination).

The mechanistic framework has been instrumental in refining the scope of OC_M. It has clarified which criticisms genuinely challenge the thesis (Section 4) and what constitutes valid evidence for or against it (Sections 3.3 and 5). Moreover, it has shown that the evidence supporting OC_M is less definitive than it initially seemed. While some might worry that this discussion is confined to mechanistic philosophy, this is not the case. Pluralism about natural kinds can be defended through alternative approaches (e.g.,

Khalidi, 2018; Boyd, 2021; Massimi, 2022), and the competing hypotheses and contradictory evidence addressed here are not restricted to a mechanistic perspective. Yet, the mechanistic framework has provided a coherent structure for understanding original continuism, situating it within the broader (dis)continuism debate and highlighting its relevance in navigating different criteria for sorting natural kinds.

6 Conclusion

In this paper, I have interpreted the original formulation of continuism using a mechanistic framework. This interpretation clarifies the original thesis, thereby allowing for distinctions (such as those of phenomena, productive, and constitutive mechanisms) relevant to the current state of the (dis)continuism debate. The interpretation also clarified what is or is not a challenge to the thesis among the responses it received. In light of this interpretation, I also introduced a possible challenge to the view: the constitutive mechanism of memory may not be the constitutive mechanism of imagination.

This interpretation is relevant to the (dis)continuism debate for several reasons. Firstly, it gives continuists a clearer framework for developing their position. Secondly, continuists can focus on responding only to what really challenges their view. Thirdly, discontinuists can have a clearer understanding of the continuist thesis in order to respond to it. Finally, both sides can see that whether memory and imagination belong to the same natural kind depends on the criteria used to individuate kinds. Natural kinds are natural insofar as they point to and are constrained by the causal structure of the world. However, there are many legitimate ways to individuate kinds and still point to the causal structure of the world. In the (dis)continuism debate(s), philosophers should make clear how they individuate memory and imagination, and whether (and how) their view relates to previous positions, in order to make clear which particular debate they are engaging.

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