

# Mental Strength

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ABSTRACT: Our pains are more or less intense, our mental imagery is more or less vivid, our visual perceptions are more or less striking. These degrees of intensity are explained by the phenomenal property of *mental strength*. In this article, I argue that mental strength is a phenomenal magnitude—shared by all conscious experiences—that explains their degree of felt intensity. Historically, mental strength played an important role; however, in recent times, it has been largely overlooked. Thinking about the degrees of intensity of conscious states and not just about their type, their representational contents or their specific phenomenology is important. Considering mental strength in our reflections about the mind can illuminate discussions related to the relation between representational contents and phenomenal character, cognitive phenomenology, attention, as well as the structure and functions of consciousness.

Hume's starting point in *A Treatise of Human Nature* is that mental states have degrees of strength: "All the perceptions of the human mind resolve themselves into two distinct kinds, which I shall call IMPRESSIONS and IDEAS. The difference betwixt these consists in *the degrees of force and liveliness*, with which they strike upon the mind, and make their way into our thought or consciousness."<sup>1</sup> (Hume, 2000 1.1.1.1; my italics) Under IMPRESSIONS he includes sensations, perceptions, passions, and emotions, while IDEAS are "faint images of these" (*ibid*) that include memories, imaginations, reasonings, and thoughts. He thought that the degree of strength of mental states could be used as a criterion for individuating mental states by type: "[Impressions and ideas] are in general so very different, that no-one can make a scruple to rank them under distinct heads, and assign to each a peculiar name to mark the difference."<sup>2</sup>

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<sup>1</sup> Throughout the *Treatise* Hume refers to this distinctive property with many different terms in addition to 'force' and 'liveliness'. Among others, he uses strength, intensity, vivacity, influence, firmness, violence, vigor, and steadiness (Hume, 2000, see Annotations and Glossary).

<sup>2</sup> The criterion was meant to have a wide scope. However, it is clear that Hume thought there could be exceptions: "The common degrees of these are easily distinguished; though it is not impossible but in particular instances they may very nearly approach to each other. Thus in sleep, in a fever, in madness, or in any very violent emotions of soul, our ideas may approach to our impressions. As on the other hand it sometimes

(*ibid*) Hume has been rightly criticized for using these degrees of “force and liveliness” to distinguish types of mental states.<sup>3</sup> But his insight that conscious states have degrees of strength and that mental strength is a fundamental property shared across different types of conscious experiences, has been wrongly underestimated.

Pains can be more or less strong, perceptions more or less striking, mental images more or less vivid, emotions more or less intense, desires more or less gripping, thoughts more or less absorbing. Are these intensity variations different in kind depending on the type of state that they occur—i.e. phenomenally speaking, the degree of intensity of a headache is unrelated to the degree of intensity of an experience of joy—or is there something that these disparate experiences share with respect to their intensity? Here I will argue that these variations in experienced intensity in otherwise radically different states are explained by variations along a single phenomenal dimension shared across conscious states: *mental strength*.

According to the view I will develop in this article, mental strength is a distinct phenomenal magnitude of conscious experiences. As such, the degree of strength of a mental state can be understood as its degree of phenomenal intensity. My goal here is to develop a framework for understanding mental strength. In doing so, I will distinguish mental strength from related, but ultimately different, phenomena. I will also highlight some philosophical consequences that follow from recognizing mental strength as a domain-general phenomenal property shared by all conscious mental states regardless of their type, content, or type-specific phenomenology.

In section 1, I analyze the representative case of pain strength. In section 2, the view is expanded to mental imagery and perception. In section 3, I distinguish between an intrinsic and a relational understanding of mental strength; the intrinsic, more fundamental, understanding of mental strength prioritizes it as a property of individual states, while the relational, more derivative, understanding of mental strength prioritizes its function when multiple states are considered at once. In section 4, I distinguish mental strength from attention, stimulus salience, psychological salience, and representational contents. Finally, in section 5, I discuss some of the philosophical consequences of admitting mental strength into our explanations of the mental. In particular, I discuss its repercussions in debates about cognitive phenomenology, the structure of the stream of consciousness, and the functions of consciousness in general.

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happens, that our impressions are so faint and low, that we cannot distinguish them from our ideas.” (Hume, 2000, 1.1.1.1)

<sup>3</sup> For example, (Bennett, 1971, p. 255; Stroud, 1977, pp. 28-9); but see (Dauer, 1999; Everson, 1988) who try to make the criterion respectable.

## 1. Pain Strength

Imagine you wake up late for work. You stub your big toe against the bed when rushing to the shower. A sudden painful sensation invades your conscious awareness: your toe hurts. First, the pain is sharp, strong, and unpleasant. You hold your toe and, while doing so, you are unable to focus on anything else except the painful sensation. After a few seconds, your experience starts changing: it slowly becomes weaker while still being a sharp, unpleasant pain in your toe. As the pain decreases, your mind gets back to thinking about being late for work and you resume your plan to take a shower. An obvious phenomenal change takes place as the intensity of your pain first increases and then decreases. This phenomenal change is, I argue, a change in the mental strength of your painful experience.

*Mental strength is a phenomenal magnitude present in all conscious experiences.* This makes it a domain-general phenomenal property. In contrast, other phenomenal properties are domain-specific: only visual experiences have color or brightness phenomenology, only auditory experiences have loudness or pitch phenomenology, only haptic experiences have texture phenomenology, and so on.<sup>4</sup> Mental strength, in contrast, is a domain-general phenomenal magnitude present, in the same way, across experience types. Mental strength increases from zero, as it were, when the conscious experience has not yet arisen, and grows in certain time to a given measure. Different degrees of mental strength result in different degrees with which mental events “make their way to our consciousness,” to use Hume’s phrase. In other words, it is the degree of mental strength of a conscious state what marks the intensity of an experience, or “how much it takes up” of someone’s stream of consciousness at a given time. For instance, the pain becomes “blinding” when you stub your toe. Its intensity makes the pain “take over” your stream of consciousness by reducing or even inhibiting the mental strength of other experiences such as your conscious intention of taking a shower or your experience of anxiety for being late for work.<sup>5</sup>

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<sup>4</sup> Some cases of synesthesia could suggest there are experiences in one domain that also have a phenomenology typically associated to another domain. The key word here is *associated*. These cases do not constitute exceptions to the general notion of independence that I am putting forward here. When the synesthete sees orange when listening to the violin, the causal pathway for seeing orange may not be the typical one, but she is having a *visual* experience as of colors and an *auditory* experience as of sounds likely triggered by an association between the two.

<sup>5</sup> Interestingly, Kant seemed to have held a similar view regarding conscious intensive magnitudes in both the *Critique of Pure Reason* (“The anticipation of perception”); also in his *Lectures on Metaphysics*: “For example, when a representation has inhibited many others, we say that this has made a great impression.” (cited in Longuenesse, 1998, p. 320) Longuenesse’s commentary of this passage is illuminating: “Even states of consciousness can thus be [...] compared as to their magnitude. *A representation is ‘more or less intense’ according to the multiplicity of*

Pains are complex, so their mental strength is determined in a complex way. Pains have distinct sensory-discriminative, affective-motivational, and cognitive-evaluative components (Grahek, 2007; Hardcastle, 1999; Langland-Hassan, 2017). All of these components admit degrees and, together, they affect the overall phenomenology of pain. In the stubbed toe example, the affective-emotional and the cognitive-evaluative components—as well as some of the sensory-discriminative components such as felt location and sensory character (pain type)—remain constant throughout the described phenomenal changes. In contrast, its sensory intensity, which is part of the sensory-discriminative component, raises quickly and then slowly starts decreasing. In this case, mental strength changes are driven by variations along the sensory dimension.

The everyday example of stubbing your toe reveals important phenomenal aspects of pains along the sensory dimension that go beyond sheer intensity. Pains have felt locations, that is, they are always felt *somewhere* in the body. Even phantom limb pain patients attribute the source of their pain to a bodily location on their nonexistent limb. Pains can be felt as affecting a volumetric area or just a surface, inside or outside the body, with a precise or an undefined shape. Pains also have pain-specific phenomenal characters that determine their type; a pain can be sharp, pricking, stabbing, gnawing, burning, dull, throbbing, etc. (Melzack, 1975).

Although mental strength naturally latches onto sensory intensity, mental strength is not exhausted by it. Mental strength can be affected by changes in other aspects of the sensory-discriminatory dimension such as felt location and sensory character, and also along the affective and cognitive dimensions, independently from changes in sensory intensity. For example, a sharp and pounding pain may raise the overall mental strength of the experience—“how much it takes up” of the stream of consciousness—more than a dull and flickering pain with an identical sensory intensity. Similarly, assuming equal sensory intensities, a pain in the face may have more mental strength than a pain in the leg. For instance, the pain in the face may be more “blinding” than the pain in the leg; it may occupy more of the conscious stream of the subject, making it more distracting or attention-grabbing. In section 5, I discuss again cases like this one and argue that although salience, attention, and mental strength are related, they are ultimately distinct.

The mental strength of pains can also be affected by changes in their affective-motivational dimension. The overall mental strength of an unpleasant pain may be higher than that of an equally intense (sensorially speaking) but less unpleasant pain. For example, you may

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*representations it inhibits*; a very great pain makes one deaf and blind toward any other representation.” (Longue-  
nesse, 1998, p. 320)

find a paper cut more unpleasant than a prick, even if you rate them as being equally intense. Then, the paper cut may grab more your attention, affect more your capacity to focus on other things, or, in extreme cases, even “blind” you from other experiences even if just for a second. This example suggests increases in mental strength can be modulated by variations in unpleasantness too.

Disentangling the sensory intensity and the unpleasantness dimensions is hard. Stronger pains tend to be nastier and nasty pains tend to be stronger. But sensory intensity and unpleasantness can be dissociated (Rainville, 2002), which indicates they are independent from one another. For example, patients with pain asymbolia report feeling the sensory intensity of being pricked in very similar ways to the normal population. They can detect when more pressure is being exerted on them, thereby discriminating correctly the stimulus intensity, but they do not report feeling the pain’s unpleasantness (Grahek, 2007).<sup>6</sup> This does not mean they find pain pleasant, rather they are just indifferent to it and they do not feel compelled to avoid it. Something similar happens after morphine intake, thalamus lesions, or prefrontal lobotomies: patients detect the intensity of noxious stimuli in a consistent fashion, without reporting any of the suffering typically associated with them. Opiates act as if blunting the subjective appreciation of pain: “Patients who have been treated with morphine because of severe post-operative discomfort or extreme pain from cancer frequently tell their doctors, ‘It’s a funny thing. The pain is still there, but it doesn’t bother me.’” (S. H. Snyder, 1996, p. 44) Similar, if more modest, effects are found in subjects under hypnosis (Rainville, Carrier, Hofbauer, Bushnell, & Duncan, 1999) and in mindful meditators (Gard et al., 2012). Importantly, the dissociation works in the other direction as well. Dental patients whose nerves are electrically stimulated while under the potent analgesic fentanyl report pain to be as unpleasant as without the drug but less intense (Gracely, Dubner, & McGrath, 1979). Note that, in all these cases, the mental strength of the pains is arguably reduced.

The mechanism for increasing (or reducing) mental strength via a non-sensory pathway is unclear. It may be that the sensory-discriminative intensity dimension of pain—and, therefore, mental strength—is affected by changes involved in variations of unpleasantness. Alternatively, it may be that there are in fact non-sensory changes that affect mental strength. If the former, unpleasantness is a means by which sensory pain intensity—and with it, mental strength—is modulated; if the latter, mental strength is a phenomenal magnitude over and above intensity in the sensory-discriminatory dimension. Although I am inclined to believe

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<sup>6</sup> Some patients tend to underrate pain intensity, but they still make no negative comments regarding the experience. In some cases, they willingly offer their hands, smile, or even laugh at the situation, and they do not show normal physical or emotional signs such as grimacing, anxiety, or anger (Grahek, 2007, pp. 43-4).

the second alternative is correct, for our current purposes we do not need to solve this issue, and it suffices to point out these possibilities.

With respect to changes in cognitive appraisal, catastrophizers are an illustrative case. Catastrophizing, an exaggerated negative mental set brought to bear during painful experiences (Sullivan et al., 2001), affects mental strength by changing the cognitive-evaluative dimension of pain. Catastrophizing is comprised of a threefold dimension that includes magnification (“I worry that something serious may happen”), rumination (“I can’t stop thinking about how much it hurts”), and helplessness (“It’s awful and I feel that it overwhelms me”). Catastrophizers rate pains—usually chronic pains—as having higher intensity than non-catastrophizers with similar ailments. In contrast, when pain is reappraised and subjects stop conceiving it as a signal of a potential life-threatening pathology, intensity ratings decrease (Leeuw et al., 2007). As with unpleasantness, this opens two possibilities. One, that catastrophizing is a mechanism that modulates sensory intensity; the other, that catastrophizing affects mental strength independently of the pure sensory-discriminative intensity dimension. Again, there is no need to decide now between these two possibilities.

Pain strength has multiple sources: sensory, affective, and cognitive components. This entails that some mild but nasty pains may have a high degree of mental strength; a pain that is not very strong or unpleasant, but of which we ruminate and obsess about, may have a high degree of mental strength. The interaction between these components can be complex and the mental strength of a given state need not be a simple aggregate of the contribution of each component. This suggests mental strength is not simply reducible to the specific sensory, affective, and cognitive appraisal components that modulate it. This point is important for generalizing mental strength to conscious experiences other than pain, since other mental states do not have these dimensions, and they have dimensions that pains lack.

## **2. Beyond Pains**

So far, I have focused on pains as an initial case study. Mental strength, however, is a property of all conscious mental states. For brevity, here I only discuss mental imagery and perceptions, but similar arguments can be made about other types of state such as moods, feelings, and emotions. Whether mental strength is a property of desires and thoughts might depend on whether these have phenomenal character or not. Because this is a controversial issue (Bayne & Montague, 2011; Chudnoff, 2015), I do not discuss these mental states further. However, I will discuss briefly mental strength and cognitive phenomenology in section 5.1.

I argued above that pain strength has various sources: sensory intensity, unpleasantness, and a cognitive-emotional dimension. Variation in one or all of them affects the overall mental strength of a painful state, in its turn affecting how much a given painful experience “takes up” of someone’s stream of consciousness at any given moment. This general explanation can be extended to other states. The sources of mental strength of non-painful experiences are diverse too, and they interact with each other to modulate mental strength.

### *2.1 Mental imagery*

The term ‘vividness’ is often used in the imagery domain to capture what I mean by mental strength (Cornoldi, De Beni, Giusberti, & Marucci, 1991; Galton, 1880; Hume, 2000; James, 1950; Kosslyn, 1996; Marks, 1973; McGinn, 2004; Pearson, Naselaris, Holmes, & Kosslyn, 2015). Independently of their visualizing capacity, people consistently use a small set of terms to describe the strength of their mental images.<sup>7</sup> William James (1950 XVIII, vol. II), for instance, offers a compilation of reports by other scientists and reports made by his own students who, besides using descriptors like ‘strength’ or ‘vigor’, appealed to the degree of vagueness, blurriness, sharpness, dimness, clarity, or number of details to capture imagery vividness. Furthermore, subjects have no trouble providing consistent vividness ratings across time (Cui, Jeter, Yang, Montague, & Eagleman, 2007). This convergence strongly suggests that, even though a precise definition of vividness offers some challenges (Kind, 2017), people have an intuitive understanding of the notion of imagery strength.

The strength of mental imagery is affected by, and varies along, at least six dimensions: (1) sensory properties (e.g. brightness, loudness, etc.), (2) clarity, (3) number and (4) salience of details, (5) the feeling of presence of the imagined objects or events, and (6) the overall stability of the image (Cornoldi et al., 1991; Thomas, 2009). When you imagine your childhood’s house, the brightness and saturation of the colors of the mental image you invoke is likely to play a role in the overall strength of your experience. The stability of the imagined house is important too. For instance, the shape of the windows may shift as you struggle to maintain the image in your mind. These shifts are clearly related to the representational contents of the image. But there are non-representational components that affect the intensity of the imagined house too. The intensity of the feeling of presence that you are in front of

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<sup>7</sup> At least since Galton (Galton, 1880) it has been observed that the individual differences in visual imagery capacity are notable. In the extreme case of aphantasia, people do not seem to have the capacity to experience mental images at all (Zeman, Dewar, & Sala, 2015).

your imagined childhood's house is likely to emerge over and above the representational details of the image.

Naturally, all these dimensions admit variations in degree. *Ceteris paribus*, a more stable image will be mentally stronger, as would be a brighter and more saturated image or a more detailed one. Some dimensions covary with others. Increasing the number of details can make it easier to experience the imagined objects as being present, but it can also hinder the stability of the image. Importantly, the overall strength of the imagining experience will be a function of the degrees of intensity along each of these dimensions. Mental images with faint colors and few details may still be strong. Their strength may stem from a very salient feature or from being able to picture a target in a very stable way. Even within a single dimension different objects can contribute to different degrees of strength. For example, the image of your childhood's house could be faint, but the grass and sky could be quite bright and saturated, making the experience strong overall. Alternatively, even if an image is really clear or has lots of stability, few imagined details or no salient features could yield a weak experience overall.

Mental imagery strength cannot be reduced to a single dimension or to a single aspect within one dimension. If sensory properties were picked as the only dimension that mattered for imagery strength, one should not be able to vividly imagine a dim candlelight. However, at least some people can do that, so imagined brightness cannot be simply identified with mental imagery strength. If clarity were selected as the single most important dimension, one should fail to strongly imagine a blurry image of one's childhood's house. But at least some people can strongly imagine their houses even if these have an ill-defined contour. The same applies for other dimensions.

## 2.2 Perception

Perceptual and imagery strength work in a very similar fashion. Hume described imagination as perception that is "faint and languid, and cannot without difficulty be preserv'd by the mind steady and uniform for any considerable time." (Hume, 2000, 1.1.3) In fact, neuropsychological and physiological research shows visual mental imagery shares many of the behavioral and neural profiles of visual perception (Laeng & Sulutvedt, 2014; Pearson, Rademaker, & Tong, 2011). It is not surprising, then, that this overlap has pushed philosophers and psychologists, very much in Hume's spirit, to characterize mental imagery as perception that is "weak" (Pearson et al., 2015), "degraded" (Byrne, 2010), "essentially poor" (Sartre, 2004), or "decayed" (Hobbes, 1962).

An important difference with imagery is that perception is committal about a particular (the representation is caused by a singular object with the attributed properties), while imaginings are noncommittal (Burge, 2010, pp. 74-5).<sup>8</sup> To have a perceptual experience of an object, the perceiver must have a commitment regarding its presence in their immediate environment. (Note that this is true too even in cases of inaccurate representations, illusions, and hallucinations). Imagining does not carry such commitment. Even when the imagined-to-be-present dimension is heightened, in normal cases we are still not committed to the presence of the object in our immediate surroundings. Naturally, as Hume noted, cross-overs in extreme cases are not impossible (e.g. fever, madness, low threshold stimuli) (Hume, 2000, 1.1.1.1). Notwithstanding this obvious difference, the other five dimensions of imagery strength function similarly in perception.

The causal origin of perceptual experiences is not *per se* relevant for our current purposes, but unlike imagery and very much like pain, perceptual strength is modulated by external stimulation. Retinal size, speed, brightness and saturation are important bottom-up modulators of perceptual strength. *Ceteris paribus*, strong stimuli give rise to strong experiences. But things are rarely *ceteris paribus*. Not just because we can misrepresent how things are, but because perceptual strength can be modulated by attention too.<sup>9</sup> An attended weak perceptual stimulus, then, could yield a stronger experience than when it remains unattended. As has been shown in multiple experiments, attention in fact alters appearance and, in consequence, it can alter mental strength too (Anton-Erxleben, Henrich, & Treue, 2007; Carrasco, Ling, & Read, 2004; Fuller & Carrasco, 2006; Fuller, Park, & Carrasco, 2009; Gobell & Carrasco, 2005; Liu, Fuller, & Carrasco, 2006; Montagna & Carrasco, 2006; Tse, 2005).

Much more could be said about the relation of representational contents, salience, attention, and mental strength in perception. However, because of its similarity to mental imagery, for the present purposes this must suffice. In section 4, I will discuss these issues at greater length.

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<sup>8</sup> There are, of course, other differences too. Mental images, for instance, represent objects that need not be clearly located in space. Besides, the imagined objects exhibit an “essential poverty” to use Sartre’s phrase (2004, p. 9). They are deprived of relations, which abound in perceived objects; imagined objects are, in this sense, isolated.

<sup>9</sup> An ongoing discussion, however, is whether attentional influence on appearances in fact implies inaccurate perception or not (Block, 2010; Stazicker, 2011).

### *2.3 Mental strength is domain-general*

The lessons learned from pain, mental imagery and visual perception can be extended to other sensory modalities and types of experiences such as auditory and olfactory experiences, moods, or emotions. Mental strength is a phenomenal magnitude present in all kinds of conscious experiences. This makes it a domain-general phenomenal magnitude. This fact is evidenced when increasing mental strength in one experience reduces the mental strength in others. When you stub your toe and as pain becomes more prominent, your worries about being late for work and your thoughts of taking a shower disappear. It is almost as if the total mental strength one can have at any given moment has to be shared among simultaneous states in one's stream of consciousness, effectively reducing the strength of some states when others become stronger. This could explain why mental states with high strength become "blinding". When they dominate the stream of consciousness, they sometimes do it to the detriment of other states. For instance, an effective remedy against pain consists in increasing the strength of other experiences. This could be achieved by focusing attention on something else, imagining one is in a different situation and, in the most extreme cases, by inducing a new source of pain. Something similar happens while vividly daydreaming. A faint image that flickers in and out of consciousness is not very distracting. But when someone gets completely lost daydreaming, imagination can be so strong that one becomes perceptually "de-coupled" or unaware of one's surroundings (Hove et al., 2016; Schooler et al., 2011).

Research in psychophysics shows something like blinding takes place within the perceptual domain too. Load Theory holds that perception is automatic and it has a limited capacity. It predicts that perceptual load in a task modulates whether other stimuli enter conscious awareness or not independently of attention and the properties of non-target stimuli (Forster & Lavie, 2016; Lavie, Beck, & Konstantinou, 2014). In Load Theory, perceptual load is understood as the number of target items that need to be perceived in a task. For example, in a search task, when perceptual load is high, conscious awareness includes only the main task's stimuli and it does not "spillover" to others. When perceptual load is low, other stimuli enter awareness too, distractors affect task performance, attentional capture is increased, etc. (see Lavie et al., 2014 for a review). When the target is very different from the non-targets or when there are few non-targets, subjects become aware of task-irrelevant stimuli. These effects are found across identical attentional conditions and independently of whether stimuli are in the periphery or at fixation, whether they are objects of socio-biological significance or not, or whether subjects are expecting the task-irrelevant stimuli or not. In contrast, when perceptual load is high, task-irrelevant stimuli go unnoticed, as if the main task blinded subjects from seeing them.

While Load Theory is cashed out in terms of perceptual processing and informational load, its results could be recast in terms of mental strength. As I argued above, mental

strength is increased by quantitative stimulus properties, number of features, and so on. In my terms, then, these experimental results confirm that when perceptual experiences are strong (like when there are many target stimuli), other experiences (or other objects in the visual experience) become weaker.

These examples from everyday life and from the psychophysics lab indicate that “blinding” is possible because the degrees of strength of simultaneous states interact with each other, which in turn is possible because of the domain-general nature of mental strength. In other words, if the mental strength of pains were of a different nature from the mental strength of visual experiences, we would have more trouble explaining why an increase in pain strength affects visual strength and vice versa. But these interactions happen all the time, suggesting that mental strength is a shared property across different kinds of mental state. Incidentally, note that “blinding” goes against Hume’s goal of using mental strength to rank *types* of states. Hume’s idea of strength as a means of ordering types of mental states by the range of mental strength they normally have does not survive scrutiny. Imagination, which is conceived to be systematically weak in Hume’s ontology, can dominate over allegedly stronger states such as perceptions or pains.

In the next section, I explain how mental strength, which is an intrinsic property of conscious experiences, can explain “blinding” in particular, and the structuring of the stream of consciousness in general, when it is considered in a relational way.

### 3. Intrinsic and Relational Mental Strength

Mental strength is an *intrinsic* magnitude of phenomenal states that explains the degree of intensity with which they are experienced.<sup>10</sup> Derivatively, mental strength is a measure of phenomenal prominence of a given conscious state at a given time in someone’s stream of consciousness. What this means is that mental strength effectively structures the stream of

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<sup>10</sup> We can only speculate about the precise nature of mental strength as a magnitude. However, insofar as mental strength is a property of subjective experiences, it is clear that it should be thought of as an intensive magnitude (like temperature), rather than an extensive magnitude (like length). Intuitively, an intensive magnitude allows for rankings of magnitudes of the same type (e.g. greater than, lesser than, equal to). For example, we can say that one object is hotter or cooler than another one. And we can certainly rank conscious experiences by their strength: this toothache is stronger than this headache. However, intensive magnitudes are not suitable for ratio scales: they do not allow assignments of a ratio to two unequal magnitudes. It is not meaningful to say that a cup of tea is twice as hot as a glass of cold water. In contrast, it is meaningful to talk about ratios of extensive magnitudes, for which an intuitive notion of addition of the magnitudes is acceptable (Peacocke, 2015). An object can have twice or half the length of another object. But, can we say that this toothache is twice as strong as this headache? Probably not.

consciousness. This structuring role allows us to understand mental strength in a *relational* way. To show why this is so, consider the following HEADACHE/READING examples where the prominence of a mild headache depends on the strength of other concomitant states:

HEADACHE/MAGAZINE: A mild headache may be prominent in your conscious stream when you are quietly skimming a boring magazine at home. Even though it is mild, this headache is really bothering you, from all your concurrent experiences, it is one of the most prominent ones.

HEADACHE/NOVEL: In contrast, an intrinsically identical headache might not be prominent at all if you are completely absorbed reading an interesting novel.

The HEADACHE/NOVEL scenario may be explained by “blinding”: your pain strength is literally reduced (as if being overcrowded) by the stronger experience of imagining the scenes of the novel you are reading. However, another explanation of why your mild headache is less prominent is that, *by comparison*, it became weaker even though its intrinsic strength did not change. By having a simultaneous, stronger (but not quite “blinding”) experience, your mild headache occupies less of your stream of consciousness, effectively becoming weaker compared to the experience of reading the novel. The higher mental strength of the experience of reading the novel effectively reduces the prominence of your mild headache, without altering its intrinsic strength. In the end, it is the relative strengths of your experiences what determines their influence in the stream of consciousness in this case. Naturally, their ranking and, thereby, their prominence is determined by their intrinsic strength, which is why this relative understanding of mental strength is derivative.

This dual role of the intensity of experiences is echoed in the writings of William James and David Hume. James thinks that the stream of consciousness, and thereby how we experience each individual state in it at any given moment, is largely dependent on other states. When discussing perceptual experiences, James writes: “What appeals to our attention far more than the absolute quality or quantity of a given sensation is its *ratio* to whatever other sensations we may have at the same time. [...] We feel things differently according as we are sleepy or awake, hungry or full, fresh or tired [...]” (James, 1950 232-3, IX, vol. I) These differences, however, never make us “doubt that our feelings reveal the same world, with the same sensible qualities and the same sensible things occupying it.” (James, 1950, pp. 233, IX, vol. I) Here, James’s suggestion is that we can distinguish the contents of our perceptions from the strength with which they shape our minds at any given moment.

James explanation of the interaction between intrinsic and relative mental strength is better expressed in his example of the prominence of the different parts of a thought (but his view equally applies to the interaction between different sensory experiences). When entertaining the thought «*the pack of cards is on the table*», it is reasonable to say that we are entirely conscious of it throughout the duration of the thought. However, James insightfully remarks, we are not equally conscious of each part as the thought progresses in our stream of consciousness. In the first, say, half second, the words «the pack» are more prominent in consciousness; in the following half second, the words «of cards» will gain prominence; and in the end, the words «is on the table» dominate one's consciousness over the rest of the sentence. Very sensibly, James predicts that mental strength and how it shapes our stream of consciousness should be reflected in its neural correlates too:

[W]e may be sure that, could we see into the brain, we should find the same processes active through the entire sentence in different degrees, each one in turn becoming maximally excited and then yielding the momentary verbal 'kernel', to the thought's content, at other times being only sub-excited, and then combining with the other sub-excited processes to give the overtone or fringe. (James, 1950, pp. 282, XI, vol. I)

Hume scholars agree that his views are consistent with the intrinsic and relative aspects of mental strength that I have been highlighting. For instance, the terms 'force' and 'liveliness' used by Hume to describe mental strength, "refer to intrinsic properties of images and are non-relational. Whether, and to what degree, a 'perception' has force and vivacity can be determined by examining that perception *by itself*." (Everson, 1988, p. 404) On the other hand, "Hume is explaining force and vivacity in functional terms. One 'perception' has greater force or vivacity than another if it is such as to produce a stronger effect on the mind." (Everson, 1988, p. 406) In Hume's own words, mental strength causes experiences "to weigh more in the thought, and gives them a superior influence on the passions and imagination." (Hume, 2000, 1.3.7.7)

This interplay of the mental strength of simultaneous sensations is fundamental for understanding how the stream of consciousness is structured moment by moment. I will have more to say about the structuring functions of mental strength in section 5 where I elaborate on some philosophical consequences of the theory. But first, in the next section I discuss (and reject) alternative explanations for the phenomena I have been focusing on thus far.

#### 4. What Mental Strength Is Not

One may question, upon reflecting on the examples in the previous sections, whether mental strength is truly a distinct trait of mental states. After all, the cases I discussed seemed to involve either bottom-up stimulus-driven intensity changes or top-down attention effects. Mental strength then could just be garden-variety sensory intensity driven by the representational contents of the state (e.g. potential tissue damage, a bright light, etc.) or by attention. If this were correct, mental strength would not be a distinct, domain-general phenomenal magnitude of conscious experiences. It would be, at best, a domain-specific phenomenal magnitude. At worst, mental strength would be reducible to something else. Here, I discuss attention, stimulus salience, psychological salience, and representational contents as the most likely candidates for reduction. I will argue that mental strength is not reducible to either of them.

##### 4.1 *Mental strength is not attention*

Is mental strength just attention? It is true that mental strength and attention tend to covary with.<sup>11</sup> Moreover, it is well known that attention affects phenomenology (Carrasco et al., 2004), and that it can be captured by sudden stimuli (so-called exogenous attention) (Wright & Ward, 2008). So, someone could argue that what I call mental strength is just the orientation of attention.

Despite the initial plausibility of this objection, attention and mental strength are distinct. First, they do not belong to the same metaphysical category: mental strength is a phenomenal property of conscious experiences themselves, whereas attending is the exercise of a cognitive capacity. Second, while mental strength can be *modulated* by attention, they are not identical. Presumably, your toe pain comes into existence *before* you attend to it. Or at least, counterfactually, we can say that attention would not have been directed to your toe had you not experienced pain. It would be odd to claim that the cause of your pain or the cause of the intensity of your pain is *that* you attended it. This order of explanation is backwards.<sup>12</sup>

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<sup>11</sup> Attention and mental strength certainly interact, even if they are not identical. It is not a coincidence that notions similar to, but ultimately different from, mental strength involve attention. Some of such notions include Beck and Schneider's mental primer (2017) and Wu's phenomenal saliency (2011).

<sup>12</sup> Some philosophers and psychologists have argued that attention is necessary for consciousness (M. A. Cohen, Cavanagh, Chun, & Nakayama, 2012; Prinz, 2012). They would probably disagree that a conscious pain is felt before it is attended. The debate is complex. Here, I just want to highlight that my view is compatible with

This observation does not annul the important role attention performs in modulating strength. In the case of pains, for example, subjects whose attention is distracted away from a noxious stimulus (e.g. by engaging cognitive resources in a demanding task), generally report less intense pains (Bantick et al., 2002; Legrain et al., 2009; Miron, Duncan, & Bushnell, 1989). The opposite effect takes place too. When noxious stimulation becomes the main focus of attention, subjects rate pains as being stronger (Miron et al., 1989), and physiological markers along with neural activity of areas known to encode pain strength become more active (Hauck, Lorenz, & Engel, 2007).<sup>13</sup> Remarkably, even in cases where external stimulation is lacking altogether (e.g. in phantom limb patients), attention also modulates experienced pain strength (Nikolajsen & Jensen, 2001). However, and to the point of its distinctness, attention typically modulates pain strength only within a limited range. Normally, even if you give your full attention to a weak pain, it does not become excruciating. Alternatively, you can try to distract your attention away from an excruciating pain and, unfortunately, it probably will not completely go away.

The case for distinguishing mental imagery from attention is similar. Attention can increase the strength of mental images. By focusing on the generated image and attending to its features, more clear, stable, salient, and bright details may be experienced, in turn making the image stronger. But this kind of attentive focusing need not translate into a stronger experience. First, as already mentioned in section 2, increases in one isolated dimension do not necessarily imply increases in the strength of the image overall. Second, sometimes we just fail, in spite of our attentive efforts, to picture a strong image. Thinking otherwise would amount to saying it is always in our hands to generate strong images given that it is always in our hands to attend to their features. Rather, like in the case of pains, attending can enhance the strength of an already existing image only within a limited range. A similar line of reasoning can be applied to perception.

#### *4.2 Mental strength is not stimulus salience*

Salience is another candidate mental strength could be reduced to. In vision science it is well established that salient stimuli grab attention (for a review see Itti & Koch, 2001), alter appearance by increasing apparent contrast and apparent saturation (Kerzel, Schönhammer,

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unconscious attention, or subpersonal mechanisms necessary for attention, being engaged before a pain becomes conscious. Unconscious attention may even cause pains to become conscious. However, at the personal level conscious attention is attracted to the pain only as a result of being antecedently conscious.

<sup>13</sup> The value of this kind of reverse inference, however, requires careful consideration (Machery, 2014; Poldrack, 2006).

Burra, Born, & Souto, 2011), increase reaction time and performance (as measured by accuracy) in a wide variety of tasks (Donk & van Zoest, 2008) and, in general, salient stimuli effortlessly stand out from their neighbors in a visual scene. A salient stimulus, say, a red letter in a page full of black letters, immediately seems to attract attention and facilitate detection. Could salience be a better explanation than mental strength of why we have a strong experience of the red letter? Pain strength could also be attributable to pain salience. After all, the sensation of pain in your toe stands out from the non-painful sensations in the neighboring parts of your body, and the effects of pain salience and pain habituation are very similar to those in visual perception (Legrain, Iannetti, Plaghki, & Mouraux, 2011).

Salience, like attention, is a modulator—not a substitute—of mental strength (J. Beck & Schneider, 2017). For example, Kerzel and colleagues (2011) showed that salient stimuli (e.g. a tilted bar in a set of upright bars) increase their apparent contrast and color saturation. It is reasonable to suppose that the mental strength of the experience of the tilted bar was heightened along these other changes in appearance. However, mental strength cannot be identified with salience. The most obvious reason is that salience, as it is understood in psychology, is typically a property of stimuli, not of the mental states that represent them. Moreover, mental strength and salience have different time courses and they provide different benefits, which suggest they are not identical. For instance, accuracy in a visual task is increased when salient stimuli are used, but this benefit is only short lived (Donk & van Zoest, 2008). Salient stimuli may improve performance, but only when responses are produced very fast (in less than 200ms after the stimulus appears on a screen). Responses with longer latencies—which constitute the majority of responses we produce outside the laboratory—do not seem to benefit as much from salience. The effects of a mentally strong state, however, last much longer than a few milliseconds. When a strong experience dominates the stream of consciousness, it can attract attention and rearrange the subject’s mental structure for several seconds and, in some cases, even minutes. So, even though a salient stimulus can increase the strength of an experience, they are not the same.

Perhaps the strongest argument in favor of distinguishing salience and mental strength does not come from the lab, but from everyday experience. It should be obvious that an experience has a degree of strength even when there is nothing salient in its representational contents. If shown a display with a homogeneous set of stimuli (say, a matrix of white dots on a black background), your experience of the individual dots will have certain mental strength, even though none of the dots is (represented as) salient. This simple example shows that there is mental strength even when there is nothing salient in the environment or in the experience itself.

These results, along with the ones discussed in the previous subsection, suggest an intricate relation between mental strength on one hand, and attention and salience on the other. This relation, however, is not that of identity.<sup>14</sup>

#### 4.3 *Mental strength is not psychological salience*

According to a recent proposal, attention is an “activity of creating, maintaining, and changing a certain structure of the mind” (Watzl, 2017, p. 70). Watzl’s view, according to which attention regulates mental priority structures, provides a good contrast with the view about mental strength that I am presenting here. He suggests, correctly I think, that the elements of the mind, namely, its mental states, are organized in priority structures. Priority structures are regulated by attention, and attention is guided by psychological salience (passive attention) and executive control (active attention). Unlike stimulus salience, psychological salience is a property of mental states themselves.

According to Watzl, “an occurrent state is passively attention-guiding in virtue of being psychologically salient. And it is psychologically salient, because it presents an *attention command*. When priority structures evolve passively, they follow *psychological imperatives* issued from within those structures themselves.” (Watzl, 2017, p. 115) In other words, when subjects are not actively guiding their attention, mental states themselves become like “basins of attraction” for attention. For Watzl, “psychological salience consists in having an imperatival content of roughly the form <put  $x$  on top of a priority structure!>.” (*ibid.*)

Whether psychological states have, in addition to their regular representational contents, imperative contents to which subject-level attention is sensitive to is something I do not discuss here. I cannot help but express skepticism, although it is irrelevant for my current purposes. What matters here is that psychological salience is not what I mean by mental strength. I take mental strength to be conscious intensity, a phenomenal magnitude, which cannot be simply identified with any kind of content (see next subsection). Thus, by necessity, mental strength cannot be some kind of imperative content.

Watzl thinks that priority structures also have unconscious states as parts (2017, pp. 76, and chapter 12) and, therefore, psychological salience can be a property of unconscious states. I do not dispute that attention can be grabbed by unconscious stimuli (Mulckhuysen &

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<sup>14</sup> Here I did not discuss the relation between salience and attention. While some have argued for a necessary connection between conscious attention and phenomenal salience (Wu, 2011), there is some empirical evidence suggesting attention and salience are independent (Kerzel et al., 2011).

Theeuwes, 2010), and maybe unconscious mental states have some kind of psychological salience that attracts attention unconsciously, which, thereby, regulates an all-encompassing priority structure of the mind as a whole. Nevertheless, mental strength as I understand it is exclusively a property of conscious experiences, and because of that it cannot be equated to psychological salience.

#### *4.4 Mental strength is not representational contents*

Two questions may be asked about the relation between mental strength and representational contents. First, is the intensity of experiences modulated by their representational contents? Second, is the intensity of experiences reducible to their representational contents? An affirmative answer to the first question would indicate that the representational status of experiences and their mental strength are related, but mental strength might still be a distinct phenomenal magnitude. An affirmative answer to the second question would put pressure on the claim that mental strength is distinct. Here, I will argue that mental strength may be modulated by the representational contents of experiences, but that strength is ultimately distinct from representational contents. Before proceeding, it is worth noting that this is also Hume's view. He thinks that we should distinguish between the mental strength of a conscious mental state and its contents. Impressions and ideas in general, and ideas of memory and ideas of imagination in particular, differ "in having a greater degree of vivacity, or force and liveliness—conceived not as an additional perception or mental content but rather as a 'manner' in which these ideas occur" (Garrett 2002, 26). Hume refers to this 'manner' also as a 'feeling' that varies in its degree of intensity (Hume 2000, 1.3.7.7).

Now, in a slogan, representationalist philosophers about the phenomenal character of conscious experiences hold that "if two experiences are alike representationally, then they are alike phenomenally (and vice versa)."<sup>15</sup> Hence, contrary to my proposal, the representationalist would say that changes in mental strength are really just changes in represented strength (Byrne, 2001; Dretske, 1995; Harman, 1990; Tye, 2000).<sup>16</sup> The representationalist's

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<sup>15</sup> This slogan marks the commitment of what has been called 'weak representationalism'. 'Strong representationalism', in contrast, holds that the qualitative character of our experience *consists in* the representational content of such states (Tye, 2000). The discussion in this subsection is concerned only with weak representationalism.

<sup>16</sup> Representationalism is part of a wider view sometimes called intentionalism, according to which, phenomenal characters can be reduced to contents, even if not representational ones. For pains, intentionalism can take the shape of imperativism, according to which, the contents of painful experiences are commands (Klein, 2015; Martínez, 2010). Imperativists have recently addressed the issue of pain strength (Klein & Martínez, 2016), but here I only address representationalist concerns.

argument could unfold as follows. For ease of exposition, here I will only focus on pain strength. Suppose that a painful state's content is something like "«there is a disturbance of type *d* in location *b*»" (Cutter & Tye, 2011, p. 92). Assume too that "the physiological type *d* includes information about the shape, volume, and *intensity* of the disturbance" (*ibid.*; my emphasis). Thus, under disturbance type, spatial extent (i.e. shape and volume) and the intensity of pain are included.<sup>17</sup> The changes in felt strength, the representationalist continues, are effected by changes in how spatial extent and intensity are represented. As with any other representation, the representational accuracy of the actual spatial extent and intensity of the tissue damage can vary. Phantom limb pain, for instance, would be an extreme case of inaccurate representation. But even in that case, pain intensity could be explained as the (inaccurate) representation of (potential) tissue damage.

Here I focus on how the representationalist's argument deals with attention and representational accuracy. First, let us review some basic known facts about attention. In the perceptual domain, attention systematically makes subjects faster and more accurate when discriminating stimuli (Carrasco, 2011; Posner, 1980; Posner, Snyder, & Davidson, 1980; Wright & Ward, 2008). In the classic Posner attention paradigm, subjects discriminate (detect or identify) a stimulus briefly presented at one of two possible locations of a screen while directing their gaze to a central fixation point throughout each trial. A cue indicating with a certain probability the location of the target in the next trial is briefly presented before the stimulus appears on the screen. Subjects are instructed to use this cue to direct their attention internally toward the expected target location. Their responses are systematically faster and more accurate in valid/attended trials (i.e. when the target appeared at the location predicted by the cue) than in invalid/unattended trials. There is a consensus that these behavioral improvements are achieved via perceptual signal processing enhancement and noise reduction that lead to increased representational accuracy (Carrasco, 2011).<sup>18</sup>

If mental strength is just represented tissue damage, it is not surprising, the representationalist would argue, that attention affects the precision of the relevant pain representations. As noted above, attending increases pain and distracting attention decreases it. The representationalist would say this is not surprising because this modulation of representational precision is well established for the perceptual domain and pain is not different in this respect

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<sup>17</sup> In earlier formulations (Tye, 1995), the spatial extent of tissue damage seemed to be identified with the intensity of pain. In this more recent presentation, Cutter and Tye seem to assume these are orthogonal dimensions. For simplicity, I address them together.

<sup>18</sup> The precise neural mechanisms enabling this enhancement and noise reduction are the object of current research (Carrasco, 2011; Carrasco, Eckstein, Krauzlis, & Verghese, 2013; M. R. Cohen & Maunsell, 2009; Desimone & Duncan, 1995; Pestilli, Carrasco, Heeger, & Gardner, 2011; Reynolds & Heeger, 2009).

(cf. Aydede, 2009). Consider this example. Let us stipulate that the actual extent and intensity of the bodily disturbance that produces your stubbed toe pain has 5 (arbitrary) units. Then, you try to ignore the pain by occupying your attention with something else. The effect, we can anticipate, will be the reduction of pain. The alleged explanation is that because of the lack of attention your pain experience represents inaccurately the extent and intensity of bodily disturbance and, thus, you now experience, say, 3 units of pain.

This explanation is consistent with the experiments described in the previous subsections. Despite its *prima facie* plausibility, however, this explanation cannot fully account for the data. As presented above, we know that inattention systematically *decreases* pain strength. But there is nothing about inaccurate representation due to inattention that requires *unidirectional* inaccuracy. It is hard to see what a representationalist explanation would be. Appealing to inaccurate representation does not explain why, when distracted, subjects do not feel stronger pains sometimes. Inaccuracy implies variability in any direction. Why are inattentive subjects not inaccurate by representing, say, 7 units of pain instead of 3 units?

The representationalist could try to insist that subjects are systematically biased to underestimate the extent and intensity of bodily damage when they are not attending. While not impossible, a systematic bias for being wrong in one particular direction in this case would be bizarre. It would be bizarre in the perceptual domain too. It would be surprising to discover that when not paying attention, humans always see things, say,  $10^\circ$  of visual angle to the left of where they really are. Note that I mean misrepresenting the location of objects, not just having a computational bias. Certainly, unidirectional computational biases in the perceptual domain are not unheard of. For example, our visual system solves convex-concave ambiguity by assuming light comes from above (and slightly to the left) (Sun & Perona, 1998). However, this is not a bias that makes us systematically *wrong*. Rather, it is a computational bias that makes us, in fact, accurate on the vast majority of circumstances *despite* informational ambiguity. Furthermore, a systematic underestimation of the extent and intensity of bodily disturbances is not a prediction of representationalism and it would seem *ad hoc* to assume it unless independent reasons were offered. In stark contrast, the evidence can be simply explained by appealing to a direct modulation of pain strength by attention.<sup>19</sup>

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<sup>19</sup> An interesting case is precisely that of attention altering appearance. It has been repeatedly shown that attention alters appearances along several dimensions. Typically, these changes take place in one direction (i.e. stimuli become brighter, larger, etc.) (Anton-Erxleben et al., 2007; Carrasco et al., 2004; Fuller et al., 2009; Fuller & Carrasco, 2006; Gobell & Carrasco, 2005; Liu et al., 2006; Montagna & Carrasco, 2006; Tse, 2005). I think that this is *precisely* because what is being altered in those cases is mental strength, rather than the perceptual representations. This would be consistent with those views that hold that changes in appearance through attention do not necessarily involve inaccurate representations (Block, 2010; Stazicker, 2011).

In summary, felt pain strength can vary independently of the representation of external stimulation. The evidence for this comes largely from experiments that manipulate pain strength via attention while keeping stimulation constant. I argued that these results cannot be easily explained by a representationalist account of pain strength. This does not mean I have refuted the representationalist's position as such.<sup>20</sup> For example, I have not shown that pains do not have contents (they probably have some), that they do not have representational contents of the extent and intensity of external stimulation (they probably have some), or that other phenomenal properties of experiences are not reducible to representational contents. Moreover, I do not deny that the representational contents of an experience have a role in modulating the mental strength of an experience (as should be clear from the explanation of mental strength in imagery and perception that I offered in section 2). However, the objections laid out here against the representationalist position make plausible that mental strength is a distinct phenomenal property of experiences that cannot be simply reduced to their representational contents.

## 5. Philosophical Consequences

Characterizing mental strength is a valuable project in its own right, independently of its philosophical consequences. Nevertheless, making explicit some of these is important. I will finish by pointing out how mental strength sheds light onto some relevant philosophical issues related to cognitive phenomenology, the structure of the stream of consciousness, and the functions of consciousness.

### 5.1 *Cognitive phenomenology*

It is not a trivial finding that mental strength is a domain-general phenomenal magnitude. Phenomenal character is often described only in terms of domain-specific sensory qualities: the redness of a tomato (vision), the complex flavor of wine (taste), or the odor of a rose (smell). Mental strength, in contrast, is present in all experiences in spite of originating from diverse phenomenal and representational components unique to each domain. The domain-generality of mental strength in the sensory domain should make us think that other conscious, non-sensory states such as thoughts and desires may also have mental strength. This does not address whether cognitive states have *distinct* phenomenology from sensory states, which is a question that drives most debates about cognitive phenomenology. However, in

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<sup>20</sup> For arguments against pain representationalism, see (Aydede, 2009; 2017).

virtue of having mental strength, cognitive states may have a phenomenal character of intensity if nothing more. This much can be accepted even if it turns out that cognitive states lack any other distinct, cognitive-specific phenomenal character.

### 5.2 *The structure of the stream of consciousness*

Philosophers and psychologists often describe the structuring relations between mental states using the familiar terminology of ‘center’ and ‘periphery’.<sup>21</sup> Naturally, this structuring relation does not have to be binary, it could be graded. On my view, mental strength is the structuring property of the stream of consciousness. This should be clear from the relational reading of mental strength I discussed in section 3. Importantly, when mental strength is considered in our explanations of the mental, structuring comes for free.

This is not true of all proposals that highlight the importance of central/peripheral relations. For example, Watzl’s priority structures theory requires both bottom-up and top-down attention (see section 4.3 above). On my view, in contrast, the explanation is straightforward and uncostly. Conscious mental states have an intrinsic property, mental strength, by means of which they fall into a natural ordering. Our conscious life *is* structured, rather than having to be constantly structured. The difference is subtle but important. In Watzl’s view mental states are, so to speak, inert. It is the powerful action of the constant deployment of attention that keeps them ordered. This criticism should not rest importance to attention as a source of mental strength and, hence, as a powerful structuring tool. In the case of voluntary attention, it is a subject-guided structuring tool, which entails that the shape of our conscious life is to a large extent under our control. This, however, does not mean that attention is the ultimate explanation of the conscious mind’s structure. Rather, the structure of the conscious mind depends on mental strength. Thinking otherwise risks attributing attention powers it does not have, as William James sharply points out:

Thus the notion that our effort in attending is an original faculty, a force additional to the others of which brain and mind are the seat, may be an abject superstition. Attention may have to go, like many a faculty once deemed essential, like many verbal phantom, like many an idol of the tribe. It may be an excrescence on Psychology. *No need of it to drag ideas before consciousness or fix them, when we see how perfectly they drag and fix each other there.* (James, 1950, p. 452, XI, vol. I; my emphasis)

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<sup>21</sup> There is a large tradition within Gestalt psychologists and phenomenologists like Husserl, Sartre and Merleau-Ponty. For a recent approach, see (Watzl, 2017).

One must agree with James that there is no need for an “additional force” to structure consciousness other than mental states themselves. I would not go as far as to deny the existence of attention and its important role structuring the stream of consciousness. But the distinction between attention and its effects, as well as their limits, must be clear. The conscious mind is ultimately self-structuring.

### *5.3 The functions of consciousness*

Consciousness is often thought to perform important functions: flexible control of behavior, rational thought, and cognitive control (e.g. action inhibition and preparation, task switching, control of attention, working memory). Recently, philosophers (Phillips, 2016) and psychologists (Peters & Lau, 2015) have questioned whether perception is even possible without conscious awareness. Some philosophers have sometimes gone as far as to argue that consciousness is the mark of the mental (for example, Locke; see Coventry & Kriegel, 2008).

There is, however, abundant evidence that some mental states, which often take place consciously, can also occur unconsciously. Subjects who fail to report awareness of stimuli can perform above chance in a wide array of visual and cognitive tasks, such as stimulus discrimination, word meaning extraction, simple arithmetic operations, and cognitive control in general (Dehaene, 2014; Dehaene, Charles, King, & Marti, 2014). Performance can be matched between more conscious and less conscious conditions in visual tasks (Lau & Passingham, 2006). Blindsight patients who have sustained damage to visual cortex areas can detect and discriminate stimuli they are unaware of (Weiskrantz, 1986). In the most striking cases, blindsight patients can even avoid obstacles while walking down a hallway (de Gelder et al., 2008). Even when nuanced methods are used, researchers have often failed to demonstrate a clear advantage provided by conscious awareness in various laboratory tasks (Kozumi, Maniscalco, & Lau, 2015; Samaha, Barrett, Sheldon, LaRocque, & Postle, 2016). Moreover, many philosophers have forcefully argued that consciousness does not have a function, or at least that it was not evolutionarily selected for performing any function (Robinson, Maley, & Piccinini, 2015; Rosenthal, 2008). Together, this evidence suggests that many cognitive abilities exist (or could have existed) without consciousness, which puts pressure on the intuitive necessary link between consciousness and rational thought and action.

Despite these empirical findings and philosophical arguments, it should be highlighted that mental strength performs at least two important functions: structuring the conscious mind and justifying self-guided action and reasoning. As argued above, mental strength structures the conscious mind. This structure has clear behavioral and cognitive effects. By prioritizing some states, mental strength guides action and cognition. Note that the fact that this

could be done without consciousness and, therefore, without mental strength, does not mean that creatures like us can do it without consciousness or without mental strength or that we do, in fact, do it unconsciously most of the time. The same reasoning can be applied even if consciousness and, thereby, mental strength, was not selected for (Robinson et al., 2015). That would not mean that in creatures like us, today, mental strength does not perform an important role.

Conscious mental states do not have the same effects in our decision-making and in our mental lives independently from their strength. Certainly, there would be no reason to take an aspirin if one were undergoing an unconscious pain (even if we were told by third-personal means that this was the case). There is less motivation for taking an aspirin when experiencing a mild headache than when experiencing a strong headache; stronger states seem easier to introspect than mild ones; a more vivid mental image is more useful for simulating a future scenario than a weak mental image; there is also less justification to take weak visual experiences at face value, and therefore act upon them, than when these are strong.

Philosophers and psychologists have overemphasized the significance of the research discussed above showing unconscious perception; this overemphasis ignores the role of mental strength in our lives in the initiation of action, the justification of perceptual beliefs, and the structuring of the stream of consciousness.

## 6. Conclusions

Mental strength is a distinct phenomenal magnitude of individual conscious mental states. As the mental strength of a state changes, it changes the degree to which it makes its way to our stream of consciousness. This important role of mental strength has been often underplayed by philosophers and psychologists in their theorizing and experimental designs. I offered an account of mental strength understood as a domain-general property of conscious experiences themselves, rather than as some aspect of their representational contents or attentional status. Instead of explaining the degrees of consciousness in each domain by appealing to domain-specific representational and phenomenal characteristics, the theory of mental strength offers a parsimonious account of the intensity of experiences by postulating the existence of a single domain-general intensity phenomenal property. Mental strength explains the synchronic and diachronic dynamics of the structure of the stream of consciousness. Finally, mental strength can also explain some of consciousness's functions in action and cognition. For all these reasons, it is important to reconsider Hume's intuition and bring back mental strength to our theorizing about the mind.

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