

March 2022

Quantitative Character and the Composite Account of Phenomenal Content

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<https://doi.org/10.7275/26687339.0> https://scholarworks.umass.edu/dissertations_2/2476

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Quantitative Character and the Composite Account of Phenomenal Content

A Dissertation Presented

by

KIMBERLY SOLAND

Submitted to the Graduate School of the
University of Massachusetts Amherst in partial fulfillment
Of the requirements for the degree of

DOCTOR OF PHILOSOPHY

February 2022

Philosophy

Quantitative Character and the Composite Account of Phenomenal Content

A Dissertation Presented

by

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ACKNOWLEDGEMENTS

I am deeply grateful for the support and encouragement of my family and friends. I am truly fortunate to keep such lively and devoted company; y'all mean the world to me. I am especially thankful for my husband, Matt, who brightens all my days. I couldn't have done it without you, as you say.

Thank you to the UMass philosophy department faculty, staff, and graduate students; it is by your efforts that I enjoyed a stimulating and rewarding experience at graduate school. Thank you, especially, to the members of my dissertation committee – Joe Levine, Louise Antony, Hilary Kornblith, and Lisa Sanders – for both your guidance on my dissertation and the education you provided me.

I am profoundly indebted to Joe Levine, whose enthusiastic engagement with even my most inchoate ideas was indispensable in shaping my philosophical views. I am honored to have worked with you throughout my time at UMass.

ABSTRACT

QUANTITATIVE CHARACTER AND THE COMPOSITE ACCOUNT OF
PHENOMENAL CONTENT

FEBRUARY 2022

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I advance an account of quantitative character, a species of phenomenal character that presents as an intensity (*cf.* a quality) and includes experience dimensions such as loudness, pain intensity, and visual pop-out. I employ psychological and neuroscientific evidence to demonstrate that quantitative characters are best explained by attentional processing, and hence that they do not represent external qualities. Nonetheless, the proposed account of quantitative character is conceived as a compliment to the reductive intentionalist strategy toward qualitative states; I argue that an account of perceptual experience that combines a tracking account of qualitative character with my functionalist proposal of quantitative character permits replies to some notoriously difficult problems for tracking representationalism without sacrificing its chief virtues.

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CHAPTER 1

TRACKING REPRESENTATIONALISM: MOTIVATIONS AND CRITICISMS

1.1 Introduction

Perceptual experiences seem to report on the state of things in the world. In undergoing perceptual experiences, subjects encounter apparently distal objects and the features they seem to bear. When I look at my mug, for example, my visual experience seems to tell me something about a certain object in my environment; it “says,” as it were, that the item before me is orange and round. Moreover, it seems that perception’s disclosures are truth-evaluable. If the thing before me is not orange and round, or if there is not in fact an item before me, then, intuitively, my visual experience reports something false about the world. Put another way, it seems that perceptual experiences express intentional contents; at least apparently, perceptions are about – they *represent* – things in the world. This insight – call it *the representational intuition* – is relatively uncontroversial.

The representational intuition is only the minimal claim that perceptual experiences *seem* to express intentional contents. This intuition alone does not establish that perceptual experiences *in fact* express intentional contents; as we will see, some theorists accept the representational intuition but deny that perceptual experience is best explained by intentional relations. Nonetheless, the representational intuition is the primary motivation for a prominent family of representational views on which perceptual experiences express intentional contents in some manner or other.

Tracking representationalism is a controversial version of representationalism that claims that perceptual experiences are not merely representational in some manner or other, but representations wholly and fundamentally. Moreover, it claims that these representations

tell us about the world by inheriting their *phenomenal character* from the external properties they represent. The phenomenal character of an experience is “what it is like” for the experience’s subject to undergo that experience; subjectively, there is something it is like to experience orange, and it is different than what it is like to experience blue.¹ The phenomenal character of an experience seems to be distinct from the physical state to which it is related; physical facts about the brain processes and distal qualities that bring about experiences afford no obvious explanation for the phenomenal character of the experiences they cause.² So, the tracking representationalist’s claim that phenomenal character is inherited from the external properties it represents involves stronger theoretical commitments than those motivated by the representational intuition. Those stronger commitments are as follows:

reductive intentionalism: the content of a phenomenal character is the content of the mere representational state that realizes it.³

externalism about phenomenal content (“externalism”): phenomenal characters supervene on the external properties they represent.

These principles are supplemented by a view about the relation that holds between phenomenal characters and external properties by which the former “tracks” the latter. In what follows, I explain and motivate reductive intentionalism, externalism, and two perspectives on the tracking relation. I then survey some influential objections to tracking representationalism.

¹ The “what-it-is-like” locution to describe phenomenal character comes from Nagel (1974).

² This point is famously elaborated in Jackson’s (1982) discussion of Mary, who knows all the physical facts about color but nonetheless seems to learn something new when she experiences red for the first time.

³ A *mere* representational state is a representational state *qua* physical state of a representational system. I say more about mere representations in §1.2.

1.2 Reductive Intentionalism

Reductive intentionalism is the consequence of two ideas. The first of these is intentionalism:

intentionalism: phenomenal character is inherently intentional.

The second idea builds upon the first. It says that the reason phenomenal character is inherently intentional is that phenomenal character reduces to the content of a certain kind of representation. In this section I will examine the motivations for each of these claims.

Intentionality is the feature of a mental state by which it is *about* something. For example, my belief that my coffee mug is empty is about my mug; it represents a state of my mug. Part of the cause for my belief is a perception of the bottom of the mug – orange and stained by a faint brown ring; my visual experience presents me with aspects that seem to belong to the mug – not, or at least not exclusively, to my own experience. This peculiar facet of experience is often targeted as the constitutive feature by which the mental may be distinguished from everything else. Brentano (1874) claims that “every mental phenomenon includes something as object within itself,” – that all mental states are intentional states – and that intentionality is “characteristic exclusively of mental phenomena.” Hence, we may “define mental phenomena by saying that they are those phenomena which contain an object intentionally within themselves,” (p. 68). The idea that intentionality is necessary for mentality and sufficient, at minimum, for the involvement of a mind (often paraphrased as the claim that intentionality is “the mark of the mental”) – is *Brentano’s thesis*.⁴

⁴ Some non-mental items – novels, for example – have intentional contents, and so intentionality is insufficient for mentality. Nonetheless, without minds there could be no novels. So, the idea here is that even though non-mental intentional states are possible, their intentionality is derived from the involvement of a mind in their production.

Intentionalism is consistent with but not equivalent to Brentano's thesis. Perception is quite plausibly a uniquely mental phenomenon. If all mental states are intentional states, then all perceptions are intentional states; Brentano's thesis is satisfied. However, the claim that perceptions are intentional states does not require that phenomenal characters – those primitive elements that make up perceptual states – are themselves intentional. It is one thing to hold that perception is broadly representational and another to hold, as intentionalism claims, that the phenomenal characters that make up perceptual experiences are themselves fundamentally representations; representations need not be made up of more representations. For example, push pins might be used to mark locations on a map that have been visited by the pinner, and so they may be said to represent these locations. This is due not to pins being fundamentally representors of locations, but to the meaning they have been assigned. Likewise, one might hold the view that phenomenal characters are not inherently representational, but that they are nonetheless put to representational use in perception. This view is consistent with the representational intuition (and with Brentano's thesis) but not with intentionalism, and is the reason that intentionalism is controversial while the representational intuition enjoys more widespread appeal.

So, the representational intuition does not uniquely motivate intentionalism. The case for intentionalism is made by a conjunction of the representational intuition and *the transparency intuition*:

The transparency intuition: phenomenal characters are always presented as features of something other than experience itself.

Unlike push pins, which only seldom represent locations on maps, perceptual experiences seem to always tell us about features of other things (or at least *apparent* features of *apparent* things; experiences seem to attribute features to some real or imagined object even in cases of hallucination and illusion). The transparency intuition was first expressed by G. E. Moore

(1903), who wrote that “when we try to introspect the sensation of blue, all we can see is the blue: the other element is as if it were diaphanous,” (p. 450). Harman (1990) expounds on the transparency intuition by way of a disanalogy between visual experiences and paintings: if one looks upon a painting of a tree, then one can attend to the intentional object of the painting, namely, the tree, but one can also attend to the particular arrangement of blobs of paint on canvas in which the painting consists. In the case of a visual experience of a tree, however, one can attend only to the tree and its features, as we do not seem to have access to any “mental paint”—intrinsic properties of experience in virtue of which the experience has the content that it does—that make our experience an experience of a tree. Put another way, when we attempt to attend to “mental paint,” we succeed only in attending to features attributable to the intentional objects of experience rather than to experience itself (p. 39).

Tye agrees, noting that:

None of the qualities of which you are directly aware in seeing the various surfaces look to you to be qualities of your experience. You do not experience any of these qualities as qualities of your experience. For example, if blueness is one of the qualities and roundness another, you do not experience your experience as blue or round. (Tye, 2000, p. 46)

Phenomenal characters appear always and only as features of something other than experience, and so direct us away from the experiences they constitute and toward the items to which they are attributed.

If the transparency intuition is correct, then it yields an abductive argument in favor of intentionalism: intentionalism is the simplest explanation for the fact that we never experience phenomenal character without a correspondent intentional dimension. The

proposal here is that we never experience non-intentional phenomenal character because it is impossible to do so; there is no such thing.⁵

Tracking representationalism may now be set apart from many of its rivals. Since reductive intentionalism is a species of intentionalism, views that violate intentionalism are inconsistent with tracking representationalism. Intentionalism is antithetical to adverbialist theories of perception which posit that, contra-transparency, phenomenal characters *are* features of experience itself, and thereby that experiences are not inherently intentional.⁶ Additionally, intentionalism straightforwardly prohibits qualia, understood as non-intentional features of experience.⁷

Intentionalism is also at odds with naïve realism, which regards perceptual experience not as fundamentally intentional, but as a subjective awareness relation holding between a perceiver and objects in her environment. On this view, perceptual experience is not *representational*, but *presentational*; perceptual engagement with distal objects and their properties is direct, unmediated by intentional states standing in for those objects and properties. Perceptual experience is *about* distal objects only insofar as it is partly constituted by them, and the properties apparently borne by those objects are not *about* distal properties – they *are* those properties. So, the naïve realist will reject the intentionalist label; phenomenal characters are no more *about* their contents than anything is about itself.

⁵ Objections to this proposal are discussed in §1.5.

⁶ By ‘adverbialist’ I intend to include only those traditional formulations of adverbialism, e.g. Chisolm’s (1957, chapter 8), that eliminate semantic objects from their theory of perception without providing an alternative intentional mechanism. This excludes Kriegel’s (2007) “adverbialism,” which is straightforwardly intentionalist.

⁷ Many theorists who endorse qualia nonetheless maintain the representational intuition; they object not to the idea that phenomenal characters are (at least sometimes) representations, but instead to the claim that they are *inherently* so. See, for example, Peacocke (1984) and Block (1996).

That said, there may be precedent in the intentionalist literature for thinking of naïve realism as an intentionalist view. In his influential defense of intentionalism, Byrne (2001) argues that sense data theory is a form of intentionalism. Sense data theory is the view that the immediate objects of experience are mind-dependent objects, and that phenomenal characters are their likewise mind-dependent properties; to have a reddish, roundish experience is just to experience a sense datum that is both red and round, where ‘red’ and ‘round’ are understood as subjective properties of the datum. According to Byrne, the sense data theorist holds that phenomenal characters are “about” sense data, and so represent exactly those qualities that sense data actually have, rendering sense data compatible with intentionalism. In his words:

a red' sense-datum seems or appears red'. So it is represented as red'. The sense-datum theorist simply has a strange view about the content of experience - and any view about the content of experience is compatible with intentionalism. (p. 225)⁸

By the same reasoning, it may be argued that naïve realism is an intentionalist view since naïve realists accept that distal objects seem or appear some way. Nonetheless, given their emphasis on perception’s being essentially presentational, direct, and unmediated (c.f. *re-presentational*), it seems clear that the naïve realist would reject Byrne’s maneuver from something’s appearing some way to its being *represented* as being that way; the presentational nature of perception is, for the naïve realist, explicitly *not* due to an intentional relation, and so seemings and appearances need not be resolved by appeal to contents.

Intuitively, the relation subjects might bear to sense data is more like the awareness relation envisioned by the naïve realist than an intentional relation. If that is right, then

⁸ Byrne’s use of primed notation (‘red’) is borrowed from Peacocke who, on Byrne’s assessment, uses it indicate properties of the visual field rather than distal properties.

perhaps Byrne's argument that sense data theory is consistent with intentionalism should be rejected. On the other hand, Byrne's focus in the above argument is not so much on the nature of the *relation* obtaining between subjects and intentional objects as it is the nature of intentional objects themselves; his point is that intentionalism does not require the objects of experience to be material, so mental "objects" like sense data may be appealed to in a manner consistent with intentionalism – a point that seems correct, as far as it goes.

Whatever the case, further pursuit of this issue is beyond the scope of this chapter. As we will see, sense data theory is set apart from tracking representationalism by other commitments even if it is consistent with intentionalism, and at any rate sense data theory is typically nothing more than a polemical bugbear in contemporary theorizing. The present point is simply that Byrne's argument does not extend to naïve realism; if we take the naïve realist position at face value, we should not take it to be a species of intentionalism.

The intentionalist position of tracking representationalism is typically defined in terms of identity or supervenience of phenomenal character with, or on, content. Dretske (1995) defines his intentionalist notion as the position that "all mental facts are representational facts and all representational facts are facts about information functions," (p. xiii). Lycan's (1997) view is that "the mind has no special properties that are not exhausted by its representational properties, along with or in combination with the functional organization of its components," (p. 11). Tye has variously claimed that "phenomenal character is one and the same as representational content that meets certain further conditions" (2000, p. 45) and that "the phenomenal character of an experience is one and the same as the complex of properties represented by the experience [that meet certain further conditions]," (2014, p. 56). Byrne (2001) characterizes intentionalism as the view that "the phenomenal character of a perceptual experience is entirely determined...by what it

represents,” (p. 200) which he takes to be equivalent to the claim that “there can be no difference in phenomenal character without a difference in content,” (p. 204). For sake of clarity, let us group formulations of intentionalism into two camps:

The identity formulation: the phenomenal character of an experience is identical to its content.

The supervenience formulation: necessarily, there can be no difference in phenomenal character without a difference in content.

Each of these formulations is consistent with intentionalism as defined above; phenomenal characters are inherently intentional whether they are identical with or merely supervene on their contents.

The reason tracking representationalists waffle between the identity and supervenience formulations of intentionalism is that there is an open question regarding whether distal particulars are part of the content of an experience, e.g., whether the content of a veridical experience of a tomato includes, in addition to redness, roundness, etc., the particular tomato to which these properties are attributed. If distal particulars are included, then phenomenal character merely supervenes on content since there could be content differences without differences in phenomenal character; the tomato could be swapped for an exactly similar tomato, in which case there would be a content difference without a phenomenal difference. Other than that, the tracking representationalist does not think that there can be content differences without phenomenal differences. Hence, both identity and supervenience formulations of the view involve an identity between phenomenal character and whatever part of content makes a phenomenal difference, and so the supervenience and identity formulations may be treated equivalently for most purposes. The question of whether tracking representationalism should include distal particulars in the content of experience will be addressed in detail in Chapter 6.

Neither the identity nor the supervenience formulation of intentionalism adequately distinguishes tracking representationalism from phenomenal intentionalism, a rival view which takes a different tack on the relationship between intentionality and phenomenality.⁹ Whereas tracking representationalism envisions phenomenal character as flowing from intentional content, phenomenal intentionalism understands phenomenality as *constituting* intentionality. Hence, the views seem to disagree about the direction of the pivotal dependence relation – whether phenomenal character depends on content, or the other way around.

However, if the direction of dependency between the intentional and the phenomenal was the core matter of disagreement between these views, then the supervenience formulation ought to distinguish tracking representationalism from phenomenal intentionalism; that is, if tracking representationalism holds that there cannot be phenomenal differences without content differences, then we should expect phenomenal intentionalism to hold that there cannot be content differences without phenomenal differences. Alas, the supervenience formulation does not differentiate the views. As we have seen, tracking representationalists agree that there cannot be content differences without phenomenal differences (except, perhaps, for contents that could never make a phenomenal difference, like distal particulars). Phenomenal intentionalists likewise agree that necessarily there can be no phenomenal differences without intentional differences. Suppose that a subject undergoes two experiences in which the world seems to be a different way in the first experience than the second – that is, the experiences have different contents. Intuitively, the subject must have undergone a shift in phenomenal character; if the two experiences were

⁹ Notable presentations of phenomenal intentionalism may be found in Horgan and Tienson (2002) and Loar (2003).

phenomenally identical, then the world could not have seemed to be two different ways. Moreover, if intentional content is grounded in phenomenal character as the phenomenal intentionalist claims, then *necessarily* there could be no intentional differences without phenomenal differences. So, the supervenience formulation cannot distinguish the views and, by extension, neither can the identity formulation. What, then, is the difference between the intentionalism of tracking representationalism and that of phenomenal intentionalism?

The difference is that tracking representationalists are reductionists about intentionality. *Pace* Brentano (1874), they reject the idea that intentionality is a uniquely mental phenomenon, locating it instead in the deliverances of representational systems including not only brains but – to borrow some of Dretske’s most well-known examples – thermometers, doorbells, and speedometers.¹⁰ Tracking representationalists conceive of intentionality as more fundamental, more naturalistically tractable than phenomenality; intentionality *qua mental* representation is nothing more than a special case of representation, which is itself just a species of causation. As such, the claim that phenomenal character is or supervenes on intentional content as understood by a tracking representationalist is a reductive one; ineffable and mysterious phenomenal character is fully explained by the ordinary causal processes that govern representational systems.

Recall that reductive intentionalism is the claim that the content of a phenomenal character is the content of the *mere* representational state that realizes it. A *mere* representation, as I will call it, is a representation *qua* physical state of a representational system. The above formulation of reductive intentionalism sets tracking representationalism apart from phenomenal intentionalism because it makes explicit the tracking

¹⁰ Dretske discusses these and others at length in his (1988) and (1995).

representationalist's unique commitment to mere representational states underlying phenomenal ones. Mere representations are the representations of computers, gas gauges, and – crucially – brain states *qua* physical realizers of mental representations.¹¹ If physicalism is true, then mental representations are realized by brain states. If tracking representationalism is true, then representation involves states of representational systems standing in a certain causal-historical relation with their contents, and, as we will see in §1.4, the nature of this relation requires its relata to be physical states, at least under some description. So, reductive intentionalism must claim that brain states realizing mental representations are themselves *mere* representations which represent their contents by virtue of standing in a certain causal-historical relation.

Crucially, these brain states cannot have their contents in virtue of the phenomenal states they realize. This is due to the ontological priority that reductive intentionalism assigns to physical states over mental ones. If all mental phenomena must ultimately be explainable in terms of physical phenomena, then recruitment of physical states as representations must be explained in terms of the physical state's causal-historical profile rather than its phenomenal one. To see this point, consider what things would be like if the recruitment of realizers for representational states – brain states – depended on the phenomenal states they realize. A state cannot be recruited unless it exists, so phenomenal characters would have to exist prior to their being recruited as representations. However, per intentionalism, phenomenal character is inherently intentional; there can be no content-less phenomenal states available for recruitment as representations. So, on reductive intentionalism, the

¹¹ For sake of brevity I will here and throughout use 'brain states' to mean realizer states of the relevant mind.

recruitment of a brain state as a representational state cannot occur in virtue of the phenomenal state that it realizes.

For the tracking representationalist, phenomenal character is inherited from the content of a mere representation; a brain state must bear the relevant causal-historical tracking relation to some property and achieve the status of mere representation before it may be uplifted to a phenomenal state. Tracking relations will be discussed further in §1.4, but for now there are three important takeaways: first, mere representations are ontologically prior to phenomenal states; second, mere representations are *necessary* for the occurrence of phenomenal states; third, the content of a phenomenal state *just is* the content of the mere representation that underlies it. These considerations support quintessentially reductive identity claims between phenomenal and mere-representational contents; it is in virtue of the role that tracking representationalism assigns to mere representations that the intentionalism of tracking representationalism is reductive.

So, on tracking representationalism, the intentional content of a phenomenal state is necessarily identical to the content of the merely representational state that underlies it. This reductive strategy distinguishes tracking representationalism from phenomenal intentionalism, for the phenomenal intentionalist will deny the possibility of the reduction in question; if intentionality is grounded in phenomenality, then the contents of brain states and intentional states could *never* match, for the notion of a mere representation – which, by definition, has its content in virtue of a certain causal-historical relation – with content grounded in phenomenality is incoherent.

Reductive intentionalism also rules out sense data even if intentionalism does not. Since reductive intentionalism seeks to explain intentionality in terms of naturalistically tractable processes, allowing paradigmatically non-physical entities like sense data into the

ontology of the view undermines its goals. This anticipates the tracking representationalist's motivation for endorsing externalism, to which I now turn.

1.3 Externalism about Phenomenal Content

We have seen that intentionalism distinguishes tracking representationalism from adverbialism, qualia realism, and naïve realism, and that reductive intentionalism sets it apart from phenomenal intentionalism and sense data theory. Externalism, the view that phenomenal characters supervene on the external properties they represent, is nearly as effective at locating tracking representationalism in the space of views about the nature of perception; of the views discussed above, only naïve realism, and only to the limited extent that it countenances perceptual content, accepts that this content supervenes on anything external to the mind. Unlike intentionalism, which is reasonably well-motivated among its competitors, the reason that externalism sets tracking representation apart from its rivals is that externalism is unappealing. The case against externalism is strong; there are independent reasons to deny that phenomenal characters are moored to external properties and to accept that they are so moored to internal ones. I will survey some objections to externalism in §1.5. For now, I will discuss why, in the face of poor outlook, tracking representationalism takes on externalism as a central tenet.

Intuitively, phenomenal characters apparent in typical perceptual experiences represent properties of ordinary external objects. The orange I experience when I look at my mug seems to be one of the mug's properties, not a property of my experience or a property of my brain. A very simple explanation for this observation is that the orange I experience *is*, or at least supervenes on, some property of the mug – its surface spectral reflectance, perhaps. However, an immediate problem with this sort of account is that experience frequently reports things incorrectly; my mug might look orange even if it is in fact a white

mug bathed in orange light. When we undergo illusions, external objects do not have the properties that perception presents them as having. The *prima facie* case for externalism seems to fall apart nearly as soon as it is made.¹²

Externalism is a viable option for tracking representationalism because handling cases of illusion such as the one described above is usually uncomplicated for the view. Per reductive intentionalism, phenomenal characters are representations, and the capacity for representation carries with it the capacity for *mis*representation. Misrepresentations may arise when a representational system is used outside of the conditions it which it is meant to operate.¹³ For example, in the case of the mug we might say that the visual system is not meant to operate in orange-light conditions – the system “assumes,” as it were, that the range of light wavelengths available to be reflected are representative of the entire visible light spectrum. As such, the visual experience misrepresents the color of the mug because the mug’s effect on the visual system’s receptors is typical of orange surfaces in good lighting conditions.

The intuitive case for externalism and the fact that tracking representationalism is well-positioned for defending it are not the full explanation for tracking

¹² One avenue of reply available to the externalist representationalist is to identify the contents of experience with *appearance properties*. There is no standard analysis of appearance properties, but the rough idea is that an appearance property is a complex relational property obtaining between objects and the environment and/or perceivers that fully – or at least quite broadly – accounts for the myriad appearances that objects may bear. Such views deny (or significantly limit) the possibility of illusion. For example, some analyses of appearance properties hold that an experience of a white mug in orange light *accurately* depicts what white mugs in orange light look like. On such a view, it is no objection to externalism to say that experience frequently gets things wrong, for experience very reliably represents appearance properties. Proponents of appearance properties include Antony (2011), Hill (2009), and Shoemaker (1994).

¹³ Though convenient, the teleological language here is misleading; the conditions in which a representational system is “meant” to operate should here be read as including both the operating conditions that teleological views of mental content hold to be inherent in the design of representational systems, and – with apologies to Fodor – the sort of conditions that apply to expressly non-teleological views such as the asymmetric dependence theory of content. Fodor’s view is discussed (sans-intentional metaphors) in Chapter 2.

representationalism's endorsement of externalism. In the end, there is hardly a choice; reductive intentionalism is unattractive if phenomenal contents do not at least supervene on external ones. Recall that on reductive intentionalism, the contents of phenomenal characters are underwritten by mere representations – states of representational systems located in brains – that bear some relevant causal-historical link to their contents. If these contents are not external properties, then they are either internal properties of some kind (*internalism*) or they are purely mental properties. If phenomenal content is purely mental, then reductive intentionalism is incoherent; mental properties cannot stand in causal-historical relations to brain states. If the contents of phenomenal states are internal states of some kind, then one major difficulty for the reductive intentionalist is to pick out properties of brain states that can plausibly underlie phenomenal character. After all, if phenomenal character is a matter of tracking properties of an internal state, then some brain states have properties represented in experience – properties like orangeness. A second issue is simply that internalist reductive intentionalism is just phenomenal intentionalism with contentious extra steps. If one is comfortable with phenomenal character supervening on internal states, there is no reason to require, in addition, that these internal states are mere representations that have as content *other* internal states.

This is not to say that representationalism, broadly construed, is inconsistent with internalism. Narrow representationalists such as Rey (1998) hold that the phenomenal character of an experience supervenes on its narrow content. Such views are motivated principally by the intuition that phenomenal differences supervene on differences in one's internal state, not necessarily on changes in one's environment. Since narrow content depends in the first instance on internal states of the perceiver – functional states, as they are ordinarily conceived – this motivating intuition is satisfied. Both internalist and externalist

representationalists will accept that phenomenal characters are realized by functional states, but where the tracking representationalist will insist that the relevant functional state is a mere representation, the internalist claims that the functional state is not itself a representational state (though it realizes one) and that the content of the phenomenal state it realizes is cordoned off from the external world. So, though narrow representationalism is inconsistent with the externalist aspect of tracking representationalism by definition, it is reductive intentionalism's incompatibility with narrow content that commits the tracking representationalist to externalism.

But tracking representationalism does not endorse externalism merely because it has no other choice. Reductive intentionalism's fit with externalism is by design, for tracking representationalism is motivated above all by naturalism; it seeks to explain how perceptual experiences are brought about exclusively by non-mental ingredients. Tracking representationalism is not the only game in town for the naturalist, of course – representationalists of any stripe tend to be naturalists – but it is the most ambitiously reductive, and many naturalists who otherwise share reductionist tendencies have a variety of reasons for rejecting the reduction of phenomenal characters to distal features. Nonetheless, reductive intentionalism is immensely naturalistically satisfying if it can be made to work. If intentionality turns out to be nothing more than a certain causal process involving only ordinary physical states, and if that process can explain phenomenal character by appeal to ordinary distal properties, then there is reason to be optimistic about the prospects of a naturalistic theory of consciousness. In the next section I present two influential reductive intentionalist conceptions of the causal process by which the brain states realizing phenomenal characters are endowed with representational contents – that is, by which these states “track” their contents.

1.4 Tracking Theories of Content

According to tracking representationalism, the content of a phenomenal character is whatever it “tracks” – a special kind of causal-historical relation – under certain conditions. Accounts of the tracking relation vary.

Dretske’s (1995) version of tracking representationalism holds that representations, including perceptions, are states with indicator functions. Indication is an information-theoretic notion: a state S indicates that p only if there is lawlike correlation between tokens of S and tokens of p . Only if S indicates that p can S be said to carry information about p . Indication is not sufficient for representation, though, for the content of a representation may be determinate even when it does not uniquely indicate; S might indicate both that p and that q but represent only that p (Dretske, 1988, pp. 56-59). Indication is likewise not necessary for representation, for a representation represents even when it *misrepresents* – when it fails to indicate what it is supposed to. So, on Dretske’s view, representations are distinguished from indications in that the former possess *indicator functions*; S represents that p if and only if, by virtue of reliably indicating p ’s, tokens of S have been given the job of indicating p . Hence, Dretske holds that representation is a matter of *functional indication*:

functional indication: tokens of state type S represent that p if and only if S has the function of indicating p . (1995, pp. 2-3)

Dretske identifies qualitative features of experience with the properties that objects are *systemically* represented as having. Systemic representations are unique in that their content is determined by the system of which they are a part – more specifically, in virtue of changes in the state tokened by the system covarying with changes in the determinable the system represents (1995, p. 15). For example, the level of mercury in a thermometer systemically represents temperature; because mercury density covaries with temperature, its determinate level within a closed tube represents a determinate temperature value.

Analogously for perceptual systems: Dretske supposes that phenomenal characters have their contents in virtue of being realized by states of a representational system that change in accordance with some determinable. Assume, for example, that color experiences represent surface spectral reflectances. On Dretske's account, this means that visual perception includes a system in which changes in the state tokened vary nomically with changes in the surface spectral reflectance under observation. Because a whole system is selected for representing the relevant determinable, the content of each state of these representational systems is implied by the relation the system bears to the determinable rather than explicitly acquired by learning or some other ontogenetic process.

It is assumed that we have the perceptual systems that we do because they have been favored by natural selection, which is how these systems come to have indicator functions. So, the part of the visual system that produces color experiences was selected for its ability to indicate surface spectral reflectances, and as such the state underlying, e.g., a reddish experience was not explicitly selected for representing such-and-such reflectance, but instead inherited its content from the broader system of which it is a part. There may be other properties that the states of this system covary with – states of the proximal stimulation on the retina, for example – but because the system was (presumably) selected in virtue of its states covarying with reflectance properties, those states track reflectances, not proximal stimulations. The conditions in which these systems were selected are thereby the conditions in which they were designed to operate – the *ideal conditions* relevant to the production of veridical representations.

Tye maintains that tracking is a matter of causal covariation: a phenomenal state tracks its content in virtue of causally covarying with it.

Causal covariation: tokens of state type S in an individual x represent that p if and only if under optimal conditions, x tokens S iff p and because p . (Cutter & Tye, 2011, p. 91)

As with Dretske's account, causal covariation requires lawlike covariation between representations and their contents; the "if and only if" condition in causal covariation does the same work as "indication" in functional indication. "Because" in causal covariation and "has the function of" in functional indication are also used to the same end – to ward off indeterminacy of content. Optimal conditions – the conditions which obtained when the relevant perceptual system was selected – guard against misrepresentations violating the causal covariation account. Though a red experience may be tokened when observing a white surface in red light, our visual systems were not selected in conditions of ambient red light and so the experience arises outside of optimal conditions.

1.5 Objections

The path to tracking representationalism from a broadly representational view of perception begins by taking the transparency intuition to motivate intentionalism. From there, a reductionist proclivity impels reductive intentionalism, which requires a theory of tracking and all but necessitates externalism about perceptual content. Some critics are opposed to intentionalism; they deny that experience is genuinely transparent or accept transparency but deny that it motivates intentionalism. Other detractors argue that intentionalism is incompatible with the externalist reductionist treatment under review. In this section I survey some prominent objections from each front.

1.5.1 Transparency and Intentionalism

There are two ways in which challenges to tracking representationalism invoke transparency. The first sort of challenge targets intentionalism, the foundational commitment of tracking representationalism. Since intentionalism is crucially motivated by

the transparency intuition, arguments that deny transparency are by extension arguments against intentionalism. Alternatively, some arguments of this type accept the transparency intuition but deny that it counts in favor of intentionalism.

The other sort of transparency-invoking challenge is neutral with respect to intentionalism but denies that experience is transparent in the way required by *reductive* intentionalism, specifically. This line of criticism rests on the assumption that reductive intentionalism requires a stronger notion of transparency than is required by intentionalism. Though there is precedent in the literature for thinking this is so, I believe it is mistaken; tracking representationalism requires only the minimal notion of transparency that motivates intentionalism. Moreover, it seems to me that even the first class of transparency-invoking arguments, those ostensibly against a broad construal of intentionalism, have in mind an unnecessarily strong conception of the transparency intuition.

I begin this subsection by surveying these transparency-invoking objections: first, to intentionalism; second, to tracking representationalism. Then, I discuss the transparency intuition as it is understood by these critics and compare that conception to the minimal notion of transparency required to advance intentionalism. I will demonstrate that these challenges do not go through on this notion of transparency and explain why tracking representationalism does not require more than this minimal notion.

Block contends that some experiences – phosphene experiences, for example – are not transparent. A phosphene experience may be induced by closing and lightly pressing on one’s eyes, which causes a patch of color to appear in the visual field. “What would the world have to be like for a phosphene experience to be veridical?” asks Block, who holds that whether phosphene experiences have representational content is debatable (1996, p. 35). For, if phosphene experiences were representational, they would be transparent, and if they

were transparent, then they would present us with apparent features of apparent objects. On Block's assessment, "[n]o one should conclude that introspecting a phosphene experience is purely a matter of attending to an intentional object of perception" – phosphene experiences do not obviously represent features of something other than experience itself. The transparency intuition is dubious, he concludes, and intentionalism with it.

Kennedy (2009) accepts the transparency intuition but denies that it motivates intentionalism on the grounds that naïve realism provides a better explanation for transparency phenomena.¹⁴ To this point, he suggests that transparency constitutively involves two distinct aspects: the *manifest presence* of material objects and their perceptible properties, and the *apparent absence* of experience during these episodes. Kennedy elucidates the notion of *manifest presence* as follows:

Keeping the focus on material objects, they have a substantial perceptual presence to us. Adding a bit to this point, material things have a *dominant* perceptual presence to us. In many paradigmatic cases of visual experience, material objects seem to exhaust the territory of which we have a view. They have a "monopoly" on our subjective attention. They are, at least apparently, the only things of which we are aware. (p. 576)

Of *apparent absence*, he says the following:

[A]s compared to the objects of experience, our experiences themselves lack any such immediate, obvious, dominant presence. In fact, as Moore says, we are apt to think that our experiences are not present to us at all. When we try to become aware of our experiences, it is natural to conclude that such awareness is impossible. (p. 576)

Each is a familiar point after a fashion. *Apparent absence* closely resembles the transparency intuition as I have formulated it, to wit, that phenomenal characters are always presented as features of something other than experience itself. While it is unusual to include *manifest presence* as a constitutive aspect of transparency phenomena in the intentionalist literature, it

¹⁴ Kennedy notes that arguments of this form appear also in Alston (1999, 2005) and in Martin (2002).

can hardly be denied that intentionalists appeal to it; in the most prominent discussions of transparency, our failure to attend to the so-called “mental paint” standing between us and tomatoes, trees, and other ordinary objects in our environment invariably results in *successfully* attending to those external, worldly objects.

Kennedy argues that intentionalism is not enough to account for *manifest presence* on the grounds that the phenomenology of manifest presence outstrips what could plausibly be attributed to an intentional relation. On naïve realism, material objects are not merely causes but *bona fide* constituents of perceptual experience. This requires that experiences are not exhausted by their representational contents; objects and their properties are *presented* in experience in a way that intentionality alone purportedly cannot capture. If this is right, then intentionalism is not the best fit for the transparency data. If the transparency of experience motivates any view of perceptual experience, Kennedy argues, it is naïve realism, not intentionalism.

Siewert (2004) aims to show that the notion of transparency required to motivate *reductive* intentionalism is too strong to defend. The transparency intuition says only that phenomenal characters are always presented as features of something other than experience itself; Siewert points out that their being so presented is consistent with their *also* being presented as features of experience. However, reductive intentionalists are committed not only to the transparency of experience, but also to “displaced perception,” the idea that we are made aware of the phenomenal character of our experience only by attending to the properties of objects of perception.¹⁵ If displaced perception is to be motivated by transparency, then the notion of transparency to which reductive intentionalists are

¹⁵ See, e.g., Dretske (1995, p. 41-44).

committed involves two stronger claims than the one expressed by the transparency intuition: first, that the phenomenal character of one's experience must not be a feature of experience to which one *can* attend (not merely that one *does not* so attend); second, that one *cannot* be aware of the phenomenal character of one's experience (and, again, not merely that one *is not* aware of it) (pp. 20-26). Siewert objects to these two claims by identifying some experiences in which it seems like we *can* be aware of or attend to experience itself. I will focus on his treatment of the Necker cube, pictured here:

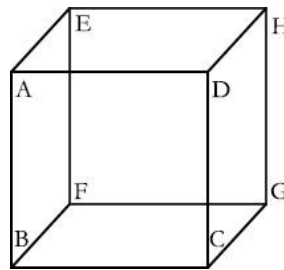


Figure 1. Necker cube

The Necker cube may look to a subject as having either the ABCD or the EFGH face “in front,” so to speak. These different ways that the cube may look are phenomenal differences. Siewert alleges that no representational fact can constitute the phenomenal difference between these looks unless one can attend to (and can be aware of) a certain phenomenal feature of one's experience of the Necker cube. After all, the distal stimulus is *and appears* unchanged, and so the relevant phenomenal difference cannot be explained by a corresponding difference in apparent distal qualities. “[W]hen I attend to how the figure looks to me,” Siewert explains, “first-person reflection affords me no conception of a difference in *how* it looks to me, identifiable with a difference in *what* it looks to me to be, which would leave its looking to me some way out of the story,” (p. 33, emphasis in original). In other words, because the Necker cube can look two distinct ways without the figure on the page *seeming* to be the way it looks, it cannot be the case that the figure's

looking a certain way just is its being represented as bearing certain external features; just because the figure looks to have its ABCD face “in front” does not mean that the figure on the page *seems* to have that face in front. If that is right, then the two additional claims required to get from transparency to displaced perception are false. The first claim says that we cannot attend to the phenomenal character of our experience, but if there is no available representational fact to constitute the difference between the phenomenal feature one has when the ABCD face versus the EFGH face of the Necker cube is seen as in front, then we can so attend. The second claim says that we cannot be aware of the phenomenal character of our experience, but if we are aware of the difference between the ABCD and the EFGH Necker cube, and if the difference is not a representational difference, then we can be so aware. If these claims are false, then transparency is not enough to motivate displaced perception, and by extension reductive intentionalism (p. 32-33).

The common thread that runs through each of these objections is the supposition that transparency requires that the intentional objects of perception appear to be material particulars, and hence that intentionalism (reductive or otherwise) is committed to claiming that experience is exhausted by apparent material particulars. Block thinks that phosphenes are a challenge to intentionalism because it is difficult to imagine what sort of distal object could possess the properties that phosphenes appear to have. Kennedy believes that transparency supports naïve realism over intentionalism only because he takes “manifest presence” – apparent material particularity – to be an essential aspect of transparency. Siewert claims that since features of Necker cube figures do not settle the phenomenal facts about experiences thereof, we can attend to (and be aware of) phenomenal features that are not fully determined by external representational content, undermining displaced perception and thereby the strong notion of transparency to which he thinks reductive intentionalists

are committed. I will show that each argument goes through only if apparent material particularity is bound up with transparency, a claim required of neither intentionalism generally nor reductive intentionalism specifically.

Very often, intentional objects of perception *are* material particulars. In an important sense, my visual experience of the orange mug is about that specific object before me. However, neither intentionalism nor reductive intentionalism requires that the intentional objects of experiences *must* be material particulars, or even that they must *look* to be so. To that point, I must say more about the formulation of the transparency intuition that I have endorsed, to wit, that phenomenal characters are always presented as features of something other than experience itself. Putting the intuition this way is meant to capture the fundamentally attributive structure of perceptual experience; experiences attribute features to intentional objects, not to subjects and not to the relation that subjects bear toward objects of experience. Levine puts the point as follows:

[We] shouldn't think of what it's like to perceive the redness of the tomato as other than the perception's representing the tomato as possessing a certain property: namely, redness. Our experience presents the redness as in the tomato, not in us. (2006, p. 272)

This formulation of transparency is atypical in its simplicity; most formulations appeal to attention, introspection, externality, or some combination thereof.¹⁶ By shifting the focus away from the attributive structure of experience and toward orthogonal issues such as the

¹⁶ Here are some notable formulations of transparency (emphasis added): "In normal perception, we cannot be aware of features of our experiences via *introspection*" (Tye, 2014, p. 43); "When we pay *attention* to our experiences, we don't notice qualitative properties attributed to our experiences themselves [and] when we pay *attention* to our experiences, the qualitative properties that we notice are attributed to the objects of our experiences" (Bourget and Mendelovici, 2014, p. 217); "*Attention* to one's perceptual experiences is, or is intimately involved with, *attention* to the objects and properties those experiences present *as in one's environment*" (Speaks, 2015, p. vii); "The properties we are aware of during a perceptual experience all seem to us to be *externally located*" (Gow, 2016, p. 723); "It is impossible to *attend* directly to our experience, i.e., we cannot *attend* to our experience except by *attending* to the objects represented by that experience," (Kind, 2003, p. 230).

limitations of attention, deliverables of cognitive activities like introspection, and the appearance of externality, these unnecessarily complicated formulations of the transparency intuition render it vulnerable to criticisms like those discussed above. Appeals to the apparent externality of features and objects are especially pernicious in this regard. It is certainly true (at least in normal visual experience) that phenomenal characters appear to be features of distal objects, and the transparency of experience is surely responsible for some of that work since objects must seem apart from their subject in order to appear distal. However, it is a mistake to suggest that the objects of experience always seem to be external if what is meant by 'external' is something like "public" or "out there in the world." Block (1996) is correct that sometimes the items apparent in experience, like phosphenes, seem to be on the mind-side of the mind-world divide.

On the reading of the transparency intuition that I have endorsed, phosphene experiences are transparent. Granted, phosphenes do not look like *distal* objects, but whether an object of experience is a distal object or a private one is not crucial to whether one's experience of it is transparent. What matters, rather, is that the subject of the experience feels herself to be apart from its object; even though it is my own mind that instantiates the phosphene, it feels as though something, some quasi-spatial gulf, stands between me and it such that when I observe the phosphene's features – its redness, say – those features seem to be located not with me, and not in the strange waters that separate us, but with the object on the other shore of that gulf. The waters are clear, transparent; it is the intentional object of experience, be it a phosphene or an actual tomato, which appears to bear the property of redness.

This modest reading of the transparency intuition is likewise invulnerable to Kennedy's objection. If the transparency intuition does not involve the appearance of

material particularity, then apparent material particularity is not an aspect of transparency that a view must explain, and so intentionalism is no worse off than naïve realism in explaining the transparency data. That said, it seems to me that those who find the notion of manifest presence compelling, who agree that material objects at least typically “exhaust the territory of which we have a view,” may find satisfaction in the move from intentionalism to reductive intentionalism; perhaps the reason that apparent material particulars are so pervasive in experience is that the properties we ascribe to the intentional objects of experience are exclusively material properties. Though reductive intentionalism is not committed to the intentional objects of experience being, or even *appearing* to be, material particulars, the view does seem to go some way in explaining why the objects of experience so often seem to be material ones.

At any rate, the point is that apparent material particularity must be held apart as a separate phenomenon from transparency. Siewert’s Necker cube objection rests on a conception of the transparency intuition that is meant to motivate both the appearance of material particularity and the attributive structure of perceptual experience, and hence is a stronger conception than is in fact required by reductive intentionalism. The problem for reductive intentionalism, Siewert claims, is that there is a difference in the two Necker cube “looks” that outstrips the way that the distal figure appears to be. The experiences of it are different, but the difference does not seem to be a difference in the external world; it does not seem to us that something on the page changes when we switch between the looks of the Necker cube. Since we can be aware of, perhaps even attend to, this phenomenal difference, and since the difference is not manifested, even apparently, in the external world, it must not be the case that awareness of phenomenal features is necessarily mediated by our attending to the objects that bear them, as displaced perception claims. Here Siewert makes

the crucial assumption that according to displaced perception, a change in the apparent properties of an intentional object of perception must also appear to be a change in the world. This assumption is not baseless. After all, if the intentional object of an experience is a material object, if the features apparent in experience are exclusively material properties, and if the intentional object undergoes an apparent change, then it stands to reason that the relevant material object must also appear to change.

Nonetheless, this is mistaken. Though intentional objects of experience very often are material particulars, this is of no phenomenal consequence. Phenomenally, it is irrelevant whether the intentional object of experience is a material particular, and so it does not follow that differences in the apparent properties of the same intentional object, when that object is a material object, must correspond to an apparent material difference in that object. For example, suppose I am looking at a white vase in clever red lighting such that I have an experience as of a red vase. If asked, I would report (incorrectly) that the color of the vase is red. Now, suppose the lighting is changed from red to green, such that I now have an experience as of a green vase. Were it not for my prior experience as of a red vase, I would be inclined to report that the vase is green. However, having encountered clever lighting before, it does not seem to me that the vase has changed its color even though the intentional object of my experience, the vase, has changed in apparent color. Similarly for the Necker cube figure on the page that does not seem to undergo any change; because I am in control of the “switching” between looks and because I do not expect the world to conform to my will, I do not experience the phenomenal difference as a change in the world.

So, the intentional object of a Necker cube experience is the Necker cube figure, which is to say that the two Necker cube “looks” are experiences that have the figure as their object. It is the Necker cube that looks to have one face or the other “in front” on either

look, but the Necker cube does not thereby appear to change. Siewert is correct, I think, that it is in an important sense our *experience* that seems to change. However, this does not pose any problem for the reductive intentionalist, for it is not experience *simpliciter* that changes, but the experience *of the Necker cube*. As we have seen, transparency requires only that one cannot attend to phenomenal character without seeing it as a feature of some intentional object. Reductive intentionalism requires, in addition, that the properties attributed to intentional objects of experience are material properties. This does not entail that the collection of material properties apparently borne by an intentional object must be a collection of properties that a material particular could bear, e.g. that a static figure printed on paper actually could change its orientation. So, Necker cube experiences satisfy both reductive intentionalist commitments. I cannot attend to which face of the Necker cube appears to be “in front” except by taking that orientation as a feature *of the Necker cube*, the intentional object of the experience. The property ascribed to the Necker cube – having a certain face “in front” – is a distal property that three-dimensional objects may bear (or, for those who prefer to think of the Necker cube “looks” as possible features of *pictures* of cubes, a property that two-dimensional pictures of objects may bear). Hence, displaced perception is satisfied; it is true that we are made aware of the phenomenal character of our Necker cube experiences, in Siewert’s words, “only indirectly, by being aware of or attending to external objects and qualities,” (p. 17). We attend to an external object, the figure, and to the external properties it seems to bear, one-or-the-other face being “in front,” in order to become aware of the character (or changes to the character, as it were) of our experience.

So, the simple formulation of the transparency intuition to which I appeal is immune to objections that take transparency to imply that experience must be exhausted by apparently external objects, or that changes in experience must be changes in the world.

While the objects of experience *are* very often external objects, this is not established by the transparency intuition; experience might be relevantly attributive even to brains in vats. At the same time, this formulation is sufficient to motivate intentionalism: the occurrence of phenomenal character is always accompanied by some object, real or imagined, to which that character seems to be attributed, and so it is reasonable to suspect that phenomenal character may arise only in an intentional context. In other words, on the basis of transparency, it seems that phenomenal character is inherently intentional.

That said, not all objections to intentionalism invoke transparency. If intentionalism is true, then all phenomenal characters have content. Counterexamples to this claim pick out some specific phenomenal character and argue that it does not have content – a bit of “mental latex,” in Block’s (1996) terminology. There is a paucity of such examples, for theorists who agree that experience is broadly representational tend to be hard-pressed to come up with any phenomenal characters that are always devoid of content. Nonetheless, Block argues that a certain feature of orgasms – the “phenomenally impressive” element – is an example of mental latex. If tracking representationalists want to claim that orgasms are exhausted by their representational content, then the burden is on them to say what that content *is*; the “phenomenally impressive” aspect of orgasms, and affective states more generally, do not obviously ascribe any feature to their objects. There is more to be said about this sort of objection, but for now I will table the issue. I revisit this type of problem amid discussion of the content of the negative affective dimension of pain in both §2.2 and §5.4.

1.5.2 Externalism and Tracking

If phenomenal experiences are representations, then they have veridicality conditions: an experience is veridical just in case it portrays things as they are. If phenomenal

content is external to the mind, then the world determines whether an experience's veridicality conditions are met; each phenomenal character must correspond to some distal quality such that the presence or absence of that quality in the world determines whether the experience is accurate.

Per tracking representationalism, experiences that differ with respect to their phenomenal character also differ with respect to their content. A prominent strategy from critics of tracking representationalism is to target its externalist commitment with pairs of experiences of the same distal scene that differ with respect to their phenomenal characters, but where neither experience is plausibly a misrepresentation; this constitutes a difference in phenomenal character, and hence in content, but if neither experience is a misrepresentation then it would seem that the difference-making content must not be external. More generally, the strategy is to demonstrate that phenomenal character outstrips the features of the world it represents.

For example, Macpherson (2006) contends that ambiguous figures fall within this class of counterexamples. Consider the following figure:

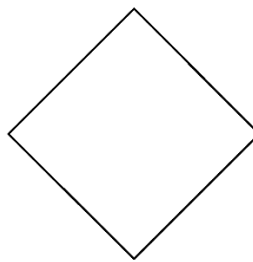


Figure 2. Square/regular diamond

This figure is ambiguous; perceivers can switch between seeing this figure as a regular diamond and seeing it as a square but cannot see it as both at once. No element of the figure resolves whether it is one or the other; indeed, it is plausible that being a square and being a regular diamond are one and the same property, but at a minimum squareness and regular-

diamond-ness are necessarily coextensive. On tracking representationalism, necessarily coextensive properties ought to be phenomenally indistinguishable, for an experience could neither covary with nor be caused by exactly one of the relevant properties. We should expect, then, that experience could never represent one of these properties at the exclusion of the other. Alas, there is a difference between the square-look and the regular-diamond-look. It goes without saying that neither the square-look nor the regular-diamond-look is an illusion; the figure instantiates both properties. So, the tracking representationalist owes an explanation for the phenomenally distinct experiences of this variety of ambiguous figure.

The tracking representationalist reply to this sort of case is to suggest a plausible content that distinguishes them. For example, to the above, Tye (2006) suggests that when the figure looks square, it looks to be at an incline, and therefore looks tilted. By contrast, when the figure looks like a regular diamond, it looks “upright,” which is to say, not tilted. So, there is a difference in content: the square-look of the figure represents it as being tilted, whereas the diamond-look does not.

A different worry for the externalist component of tracking representationalism comes from Levine (2003), who argues that the possibility of “phenomenal Frege cases” undermines externalism about phenomenal content in much the same way that Frege’s famous examples pose a problem for purely denotive conceptions of linguistic meaning. The problem raised by Frege cases is that sentences like ‘Hesperus is Phosphorus’ are importantly different than sentences like ‘Hesperus is Hesperus’ – the former but not the latter is nontrivial, requiring some investigation to determine its truth, and so it would seem that the cognitive significance of identity claims outstrips the identity of the referents on either side of the identity operator; after all, if all that mattered to the meaning of identity claims is the identity of the referents of these terms, then ‘Hesperus is Phosphorus’ is no

different than ‘Hesperus is Hesperus’ since ‘Hesperus’ and ‘Phosphorus’ refer to the same celestial body.

Levine argues that an entirely externalist account of phenomenal content falls prey to the same sort of difficulty since there are possible situations in which a subject might discover that the referents of two distinct phenomenal states are identical. He conceives of a species of creature whose eyes have non-overlapping visual fields, like a fish. This species has evolved so that one eye is color-inverted with respect to the other; what looks red to one eye looks green to the other. The fish-headed creatures are fixed to tracks, so that nothing seen by a fish-head’s right eye is ever seen by its left eye. When these fish-headed creatures develop a means of investigating their world, they determine that tomatoes are not red on the left side of the world and green on the right side, but rather that tomatoes *look* red to the left eye and *look* green to the right eye. Hence, the fish-headed creatures discover something nontrivial – something like ‘the content of red over here *is* the content of green over there’ – suggesting that the content of phenomenal red (or green) cannot be exhausted by the relevant external property alone.

Levine is correct that if such a case is possible, there is a problem for purely externalist accounts of phenomenal content like tracking representationalism, which cannot abide a substantive distinction between a phenomenal character’s content and its mode of presentation. However, it does not seem to me that the fish-headed creatures under discussion are possible by tracking representationalism’s lights. If phenomenal character is determined by its content, its content is whatever the phenomenal state tracks, and if a state’s tracking its content is ontologically prior to its realizing any phenomenal character, then it is simply impossible for each of a creature’s eyes to produce inverted color experiences in optimal conditions. Let us suppose, for simplicity, that the right eyes of fish-

headed creatures are like our own, and hence that right-eye red experiences possess the content ‘reflectance *R*’, right-eye green experiences possess the content ‘reflectance *G*’ etc. The fish’s left eye, then, is inverted with respect to its right, and thereby produces experiences inverted relative to our own; left-eye red experiences have as their content ‘reflectance *G*’, and so on. On tracking representationalism, the reason our red experiences (and the red right-eye experiences of the fish-headed creatures) are red is that they track reflectance *R*; it is by virtue of the fact that the brain state underlying red experiences was tracking reflectance *R* that when that brain state began to realize phenomenal states, the states it produced were phenomenally red. Had it not been the case that the brain state tracked reflectance *R* – if it tracked reflectance *G*, say – then the phenomenal states it produced, once it began to produce them, would not have been red, but green. How, then, are we to imagine that the left eyes of the fish-headed creatures produce inverted experiences? A brain state that realizes a green phenomenal state must track reflectance *G* in optimal conditions, so either the fish-headed creatures’ left-eye green experiences track reflectance *G*, in which case there is no left-eye inversion and no Frege case, or the left eye is not operating optimally, in which case it is false that the fish’s red experiences and green experiences have the same content, so still there is no Frege case.

According to Levine, the fish-headed creatures are operating in optimal conditions in virtue of the fact that they have evolved this way, and are living in the same conditions in which they evolved. The issue here is that a species cannot evolve this way without undergoing some sort of change that constitutes a violation of optimal conditions. Because the causal covariation of contents with mere representations are ontologically prior to phenomenal character, it cannot be the case that the left side evolved from the first to be inverted relative to the right side. Now, it is perhaps possible that somewhere in the course

of evolution the wires got crossed for the left eye such that the brain states underlying red experiences are brought about by reflectance G , etc., but this seems to be a violation of optimal functioning; the visual system only operates as intended if the relevant representations are appropriately hooked up to their appropriate causes. If it is nonetheless insisted that the fish-headed creatures are operating optimally, then it would seem that the brain state that realizes the right eye's red experiences and the left eye's green experiences causally covaries with the same contents as the state that realizes the right eye's green experiences and the left eye's red experiences. So, those two states represent the same content and hence tracking representationalism predicts that there would be no phenomenal difference between the two sides (and, moreover, that fish-headed creatures experience neither green nor red). In any event, color-inverted fish-headed creatures are not possible on a tracking representationalist framework.

However, there are other objections to wholesale externalism about phenomenal content that do lead me to believe that it is untenable. In Chapter 2 I discuss Pautz's Mild and Severe case, on which two relevantly similar creatures experience different amounts of pain in response to the same kind of painful stimulus, and I argue that Cutter and Tye's reply to this case fails. Later, in Chapter 4, I discuss Block's argument that experiences of visual contrast depend in part on the allocation of visual attention, and so cannot be fully accounted for in terms of external content. Though I do not accept that attention influences contrast-content, I agree that Block presents a pair of phenomenally distinct experiences that cannot be accounted for in terms of external content.

For now, though, I will set aside objections to externalism and move on to a pair of objections to the tracking accounts that are meant to supply the links between phenomenal characters and their external contents. Causal covariation and functional indication each have

a different bogeyman to contend with: causal covariation seems to allow the possibility for “inverted” color experiences with the same contents, whereas functional indication must apparently deny that Swampman has experiences.

Block (1996) asks us to imagine a traveler who relocates to Inverted Earth, a planet very much like Earth except that everything there features colors that are inverted relative to those of Earth: the sky on Inverted Earth is yellow, the grass is red, etc. To ease the transition, the traveler has inverting lenses implanted on his eyes, neutralizing the inversion of his new landscape. He lives on Inverted Earth for a while – long enough for the content of his color concepts to align with their new causes on this alien world – and looks up at the Inverted Earth sky. The traveler has a clear memory of what the sky looked like on Earth and notes that the sky on Inverted Earth looks *just the same* as the sky on Earth looked to him in the past. The experiences are phenomenally identical, but the content of the traveler’s experience on Earth was blue, while the content of the traveler’s experience on Inverted Earth is yellow. It seems possible, then, for identical experiences even within the same individual to have distinct contents – a possibility that tracking representationalism cannot abide.

One reply, favored by Tye (2000), is that no shift in content occurs no matter how long the traveler stays on Inverted Earth in virtue of the fact that his visual system was designed to operate on Earth. However, bringing in teleological considerations opens Tye up to the Swampman objection already faced by Dretske’s functional indication theory of tracking.

Swampman is a creature that coalesces into existence due not to natural selection, but to a freak set of circumstances involving lightning and swamp gas. Miraculously, Swampman is an exact microphysical duplicate of Donald Davidson. Teleological views of

mental content hold that experiences have their contents in virtue of the selection history of the sensory systems that produce them, but Swampman's sensory systems do not have a selection history. Suppose that Swampman directs his gaze toward a tomato in his swamp. If Donald Davidson were in Swampman's place, Davidson would have a reddish experience when he fixes his gaze on the tomato. Intuitively, the same should be true of Swampman – they are, after all, microphysical duplicates. However, without a selection history, Swampman cannot have any experience at all, for none of his systems have been through the requisite selection process by which contents are assigned.

It seems to me that Swampman is more devastating to functional indication than Inverted Earth is to causal covariation. Even Dretske (2000) accepts that functional indication has no way around the conclusion that Swampman lacks phenomenal character, going so far as to mount a spirited defense of that outcome. Nonetheless, it strikes me as so implausible as to be decisive against functional indication. Inverted Earth, on the other hand, leaves open several plausible avenues of reply on behalf of causal covariation, several of which are discussed in Tye (2000). So, in what follows, I take a causal covariation account of tracking as my starting point.

1.6 Conclusion

In this chapter I explained the components of tracking representationalism: reductive intentionalism and externalism. I discussed two views about how phenomenal characters “track” external properties – causal covariation and functional indication. Finally, I surveyed some objections to each of these elements.

As I noted in §1.5.2, there are some troubling objections to the externalism about phenomenal content that, to my mind, are decisive against wholesale tracking representationalism. One of these objections is the subject of the next chapter. However,

these objections do not warrant giving up the view altogether. In what follows, I argue in favor of a distinction between qualitative and *quantitative* character. Tracking representationalism remains a promising theory of qualitative character, understood not as equivalent to, but merely a species of phenomenal character, while quantitative character is to be understood in functional, non-external terms. The idea, roughly, is that quantitative character reflects attentional processing of qualitative representations. I draw on both introspective and empirical evidence in favor of treating certain aspects of somatic sensation (including pain), audition, and vision as quantitative, not qualitative, characters. With this distinction in mind, my overall project in this dissertation is to present an account of phenomenal character that is partly tracking representationalist, partly functionalist: the composite account of phenomenal content.

CHAPTER 2

EXTERNALISM AND PAIN

2.1 Introduction

Though tracking representationalism is intended to be a view about the nature of perception broadly, its central tenets were developed from insights grounded in visual experience. For example, the pretheoretical concept of transparency is visual: something is transparent just in case you can *see* through it. Granted, the ordinary meaning of ‘transparency’ is not the technical sense employed by intentionalists, but it is evident that the technical sense is informed in part by the ordinary one. After all, Harman’s (1990) observation that we seem to “see right through” to the objects of experience is among the most influential affirmations of the transparency intuition. It is not surprising, then, that the less a perceptual episode phenomenally resembles a visual experience, the more challenging it is to subsume it under tracking representationalism. Pains resemble visual experiences least of all.

The problem that pains pose for the tracking representationalist is in accounting for the distinctly unpleasant character of pain experiences – their negative affective dimension. Consider what it is like to be stung by an insect. This experience has a sensory-discriminative phenomenology that is plausibly representational; it represents, say, that there is a mechanical violation at a given location on the subject’s body. However, the sensory-discriminative aspect of a sting experience inadequately distinguishes it from a benign poking, as with a pencil or a crochet hook. The most distinctive and phenomenally salient feature of insect stings is that they are unpleasant – they *hurt*. The tracking representationalist must explain this unpleasantness – pain’s affective dimension – in terms of content. So, the

central question that pain experience raises for tracking representationalism is of a form that the view must ultimately answer for each phenomenal kind: what does painful affect represent?

An answer to this question must overcome two distinct but related challenges. One concern is that pain's affective dimension is not obviously transparent, and if pain is not transparent then it violates intentionalism. Another is that even if pain's affective dimension is suitably intentional, its content does not plausibly track anything external to the perceiver. In section §2.2 I present the case against the transparency of pain's affective dimension and conclude that it fails. However, pain's affective dimension presents a genuine problem for externalism. Pautz argues that pain intensity does not plausibly track any external quality; I present this argument and Cutter and Tye's rejoinder in §2.3. Then, after an examination of the notion of optimal conditions and the limited role they may play in the tracking of pain content in §2.4, I argue in §2.5 that Cutter and Tye's reply is self-defeating, for it is incompatible with reductive intentionalism. I conclude by teasing apart two distinct problems that Pautz's case raises for externalism. There is, of course, the problem of accounting for painful affect, and affective states in general, in terms of external content. But there is also an instance of a different problem: tracking representationalism must account for the *intensity* of certain phenomenal states across perceptual modalities.

2.2 The Affective Dimension of Pain

A defining feature of pain is its valuational aspect – pain feels *bad*. It is because pain feels bad that subjects typically do not enjoy it and desire that it cease. This felt badness is pain's affective dimension. Valuational aspects in other perceptual modalities may plausibly be explained in terms of attitudes that subjects bear toward their experiences. For example, it seems possible that you and I could be undergoing the same gustatory experience when we

eat chard even though you like it and I do not. We have different attitudes about chard; chard's bitter flavor is unappealing to me, whereas you find it agreeable. More generally, gustatory experiences that happen to be unpleasant do not seem *essentially* unpleasant; it is conceivable, even to me, that the taste of chard might be wholly enjoyable to others. This does not seem true of pain; if pain felt good or even affectively neutral then, intuitively, it would not be pain.

Whether pains are *essentially* unpleasant is a matter of some debate, for certain proclivities and conditions suggest that pains need not be negatively affective. For example, masochists enjoy painful stimulation, at least in some contexts, and people with pain asymbolia feel the sensory-discriminative without the negative affective dimension of pain. Taken at face value, these cases seem to undermine the claim that pains essentially feel bad; if masochists enjoy painful stimulation, and if asymbolics feel pain without unpleasantness, then the negative affect typically associated with pains must not be essential to them.

After a fashion, however, masochism can be taken to reinforce pain's essential unpleasantness. Suppose that pains need not be unpleasant, that the unpleasantness we typically associate with pain is nothing more than a pervasive but inessential dislike of the relevant sensation. The enjoyment of entirely neutral experiences is surely nothing so extraordinary that the general population should look upon it with shock and awe; if we could really think of pain's negative affect as inessential to it, then masochists would be no more interesting than people who like chard. Rather, it is *because* pains feel bad that masochism is interesting; pain feels bad and not only do masochists like it, their masochistic tendencies would be unsatisfied if the negative affect were not present. "Without the suffering," Pitcher quips, "the whole exercise is pointless," (1970, p. 485). So, though we may take valuational attitudes toward pain as we do with experiences in other modalities – a

pro-attitude from masochists, a con-attitude from the rest – the valuational aspect of pain need not be exhausted by these attitudes.¹⁷

Pain asymbolia presents a related challenge to the view that pains essentially feature a negative affective dimension: if pain asymbolics do not feel the affective dimension of pain, and if the affective dimension of pain is essential to pain experience, then, despite their claims to the contrary, pain asymbolics do not experience pain. I discuss pain asymbolia in greater detail in §5.2. The point I want to make for now is that if negative affect is accepted even as a *typical* aspect of a pain experience distinct from pain's *nociceptive* dimension, that is, the sensory-discriminative dimension delivered by so-called "pain receptors," then the question of whether pain is *essentially* unpleasant is equivalent to the question of whether pain's nociceptive dimension is sufficient for pain. Put another way, if we begin with the assumption that people with pain asymbolia feel the nociceptive but not the affective dimension of pain, then the question of whether these people feel pain is not very interesting – it is just a verbal debate about how to apply the term 'pain', i.e., whether 'pain' should be used equivalently with 'nociceptive experience' or should refer instead to experiences comprised of nociceptive and negative affective dimensions. For, even if there is some unique phenomenology to the nociceptive dimension of pain that sets it apart from other sensations, it could still be claimed that without negative affect, that sensation does not count as a pain.

So, with these considerations in mind, here is how I will use the term 'pain':

¹⁷ As we have seen, and as Pitcher (1970) discusses, masochism may just as easily be taken at face value in support of the claim that pain's negative affective dimension is inessential to it. This contrary view is found in, e.g., Everitt (1988). The present point is simply that masochism is not a compelling reason to *reject* the claim that pains are essentially unpleasant, and so appeals to masochism do not settle the matter of whether pain is essentially unpleasant. As Earle puts the point, "perhaps all we can say is that one cannot take pleasure in pain unless the pain is felt," (2008 p.105).

Pain: an experience comprised of a nociceptive dimension and a negative affective dimension.

On this definition, feeling bad is part-and-parcel of being a pain. This leaves open whether there is any proprietary phenomenology of nociception, a question to which I return in §5.2.

At any rate, what is crucial here is not that negative affect is essential to pain, but that the affective dimension of pain, when it occurs, is a genuine feature on the phenomenal landscape; there is *something it is like* to instantiate painful affect. This leaves open what kind of state painful affect is – whether it is, e.g., a representational state, a cognitive attitude, an emotional state, or a functional state. The only commitment here is that whatever kind of state underlies painful affect is a state that realizes phenomenal character.

Accordingly, since tracking representationalism is committed to the reduction of all phenomenal states to mere-representational states, the first challenge for the tracking representationalist to overcome with respect to painful affect is that of identifying its valuational phenomenology with some external content. Since tracking representationalism identifies felt qualities with objective analogs (e.g. a reddish experience represents *objective red*, a quality of surfaces bearing reflectance *R*, say), the most natural conclusion for the tracking representationalist to draw with respect to pain's unpleasantness is that it represents *objective badness*, as Tye (2005a) and Cutter and Tye (2011) do. One difficulty with this analysis is that, at least intuitively, badness cannot be an external quality; unlike surface reflectances with which we are acquainted by means of their reflected light interfacing with receptors on our retina, or objects releasing chemical compounds into the air that interface with chemical receptors to achieve olfaction, it is clearly not the case that badness is a quality of distal objects that enters into awareness by any process resembling the distal emission of *badness notes* interfacing with *badness detectors*. As such, a tracking representationalist analysis of painful affect may not avail itself of the standard story of how external qualities come to be

experienced contents. Even if it is granted that badness may be an objective quality, it will require some persuasion to sell that quality as an external one. I will return to this issue in §2.3.

A second worry for tracking representationalism is that the phenomenology of painful affect is not obviously transparent. As we saw in Chapter 1, transparency requires only that experienced properties seem to be properties of something other than experience itself. This ‘something’ need not be external to the perceiver— a quality that apparently belongs to an internal state of a subject could satisfy transparency. All that matters is that the relevant quality seems to be a quality not of experience, but of *anything* else. Block (2005) and Aydede and Fulkerson (2013) have each defended arguments to the conclusion that there are no other candidates other than experience itself for the apparent bearer of pain.

If pains are not qualities of experience, then they may be individuated with respect to something other than their phenomenal character. For the intentionalist, this means they may be individuated by the properties they represent, e.g., properties of tissue damage. Block puts forward two considerations against this, arguing that pains *must* be individuated with respect to their phenomenal character. For one thing, pains do not admit of an appearance/reality distinction. Appearance/reality distinctions are typical in other perceptual modalities. If I wear a navy blue dress to a black-and-white party, I may spend the evening shamefully explaining that the dress looked black at home; in poor lighting conditions, the dress *appears* black even though it is *actually* navy. The dress, not my experience of it, is the final authority with respect to the veridicality of my perception. Not so for pain. If I sincerely report pain, then there is pain, full stop. Moreover, any quality that a pain *seems* to have is a quality that the pain *actually* has. It does not matter whether and to what extent the integrity of my bodily tissue has been compromised; even a “pain hallucination,” e.g. a

phantom limb pain, counts as a *bona fide* pain. My experience, not my body, is the authority on painful matters. Importantly, this is due to pain's affective dimension, not its sensory-discriminative one. Suppose a pain asymbolic feels a nociceptive sensation – a sensation of extreme heat, say – in her phantom limb. Even if she insists, as asymbolics tend to, that the merely nociceptive sensation is a pain, I submit that the lack an affective dimension to her phantom sensation renders her experience a mere hallucination; without unpleasantness, the asymbolic amputee's experience is wholly mistaken.

Second and relatedly, pain is mind-dependent. If red is a certain surface reflectance property, then there can be redness even in a world without perceivers, but it is implausible that there may be pains without perceptions of pain. "There can be unseen red," notes Block, "but not unfelt achiness," (pp. 140-141). Since phenomenal character is both a requirement for and an authority with respect to the presence of pain, Block concludes that pains must be individuated by their phenomenal character rather than any objective quality. This suggests that pains are not transparent; if they were – if they represented tissue damage, say – then then the tissue damage facts would reveal all of the pain facts.

Aydede and Fulkerson formulate a similar objection that speaks specifically to the proposal that the affective dimension of pain represents badness. If painful affect represents the badness of tissue damage – that is, if the affective dimension of my insect-sting-experience "says" that the sting is *bad for me* – then my experience is veridical *iff* the sting is bad for me. It follows, per Aydede and Fulkerson, that if painful affect is caused by tissue damage that is *not* bad for its subject, then a false "perceptual judgement," a non-inferential "belief" delivered by perception, is tokened. It is important to bear in mind that perceptual experience does not reveal the nature of its contents to subjects; just as we do not experience objective redness *as* reflectance *R*, we likewise do not experience painful affect *as* badness.

So, just as I formed a false perceptual judgment that my dress is black (*not* that it is such-and-such reflectance; I have no beliefs, perceptual or otherwise, regarding the reflectance properties of my wardrobe), on tracking representationalism a subject may in principle form a *false* perceptual judgment that her tissue damage is painful. Aydede and Fulkerson suggest one such case: the removal of scar tissue to prevent pathological complications. This procedure is good (read: not *bad*) for the patient to undergo, but it nonetheless causes pain. The patient forms a perceptual judgment to the effect that the tissue damage involved in the procedure is painful. The view under consideration yields the implausible verdict that this judgment is false. The patient is mistaken; the removal is good for her, so her wound is not painful, after all. The upshot, according to Aydede and Fulkerson, is that painful affect is not experienced as a quality of an object – tissue damage – but rather a quality of experience. There is no other way to ensure that patients' perceptual judgements about their pains always count as veridical.

Nonetheless, tracking representationalists maintain that pains are transparent. Per Dretske,

What we are conscious of when we feel pain[s]...are not the internal representations of bodily states (the pains), but the bodily states that these representations (pains) represent. Though we can be – and most often are – aware that we are in pain, pains, like visual experiences, are awarenesses of objects, not objects of which we are aware. (1995, p. 103)

In this tradition, Tye (2005b) answers that the foregoing transparency-related objections largely rest on a confusion that arises from the idiosyncratic way that speakers use the term 'pain'. 'Pain' sometimes means a quality attributed to a body part and other times means the experience of pain itself. If I am aware of a pain in my leg (that is, if my experience attributes pain's representational content to a region of my leg), then I am aware that I am in pain, which is to say that I am aware that I am feeling or experiencing pain. This is no different

than the case in which a subject's being perceptually aware of a red surface brings about awareness that she is undergoing a reddish experience. The trouble, then, is that terms like 'painish' are not a part of our vocabulary, and so terms like 'pain experience' are ambiguous. Without disambiguation, we may slide easily but mistakenly from claims about objective pain – a quality of tissue damage – and experiences in which that quality is represented. Take, for example, the claim that the occurrence of a pain experience is sufficient for the occurrence of pain. This is true only if 'pain' is understood as 'pain experience', and hence amounts to nothing more than the trivial claim that the occurrence of a pain experience is sufficient for the occurrence of a pain experience. After all, since painful affect represents a quality of tissue damage, experienced pain is veridical just in case that quality is present in the relevant tissue and false otherwise; I might feel a pain in my leg in the absence of tissue damage there, and thereby misrepresent the state of my leg. I am not thereby mistaken that I am undergoing a pain experience.

Both Block's and Aydede and Fulkerson's objections turn on this ambiguity. Block is correct insofar as there can be no such thing as an unfelt pain *experience*, just as there can be no such thing as an unexperienced red experience. There may, however, be unfelt tissue damage that is bad for its subject, and *that* is the relevant corollary to unseen red, posing no difficulty for the tracking representationalist. Similarly, Aydede and Fulkerson's argument rests on the supposition that it is implausible for subjects to make false perceptual judgements about whether their tissue damage is painful. If 'painful' is taken to mean 'experienced as painful' then they are obviously correct, for the subject is surely an authority with respect to whether she is undergoing a painful experience. However, if 'painful' is taken to mean a noxious quality of tissue damage, then, indeed, the subject has made a false perceptual judgment; she represents her tissue damage as bad for her when it is not, and

thereby misrepresents. This is no more implausible than the claim that I make a false perceptual judgment when I experience my navy dress as black. Neither interpretation presents any problem for the tracking representationalist.

However, a *prima facie* difficulty for this reply is that it is not clear that we really do use the term ‘pain’ to describe a quality of damaged tissue. If we did, then speakers might use the term ‘pain’ to describe tissue damage detected only by other perceptual modalities, e.g. someone else’s wounds or one’s own surgical incisions seen but, due to the interference of local anesthetics, somatically unfelt. Suppose my friend shows me a fresh puncture wound from a rusty nail on the sole of his foot. I can see tissue damage and little flecks of rust around the entry wound. So, I see some tissue damage that is bad for its subject. Granted, I do not experience the wound in the same way that my friend does; I am aware of the wound only by seeing it, whereas my friend is aware of it across several modalities. I also am not directly aware of the wound’s badness in the way that my friend is, for my first-order visual experience of it does not feature representations of high-level properties like *being a puncture wound* and *being rust* that seem essential to my appraisal of the wound as bad for my friend. These considerations do not matter; what is relevant here is not the format of my friend’s and my perceptual episodes, but the way speakers apply terms like ‘pain’ and ‘painful’. What matters is that I believe both that I am looking at a rusty puncture wound, and that such wounds are especially bad for their subjects due to their propensity for causing tetanus. There are lots of terms that I might use to describe what I see, e.g. ‘dangerous’. I might even remark that it *looks* painful. Nonetheless, to describe someone else’s wound as painful is a violation of the way speakers use the word ‘pain’. Similarly for the anesthetic case: even if I can see that I am badly wounded, it is a linguistic mistake to claim that the wound is painful unless I can feel the pain.

Here Tye agrees, answering that the objective sense of ‘pain’ is used only in the context in which it is being represented by the experiential sense of ‘pain’. Hence, per intuition, there is not objective pain in a world without perceivers since objective pain may only arise alongside subjective pain. This reply may be viewed with suspicion, for it does commit Tye to some manner of an “appearance-first” view about pain. It is certainly unusual that the correct application of a term for a sensation’s content should require that the subject is undergoing that sensation. However, it seems to me consistent with the way we apply valuational terms in other domains, e.g., aesthetic judgments. My sincere utterance of “the Gauguin is beautiful” requires that I have an aesthetically pleasing experience of the relevant Gauguin. Hence, if I thought the Gauguin was hideous, to say that it is beautiful would imply something false about my experience. Similarly, we do not say that items we have never seen are beautiful; even if I have it on good authority from reliable people that the Gauguin is beautiful, it would be disingenuous for me to claim as much if I have never seen it. More generally, correct application of the term ‘beautiful’ in ordinary language requires that the speaker experiences the relevant item as such. Objectivism about aesthetic properties is nonetheless unthreatened (at least on this front); an aesthetic realist may maintain that even if the claim “the Gauguin is hideous” accurately reports on the utterer’s experience, it is nonetheless false in the sense that Gauguin’s paintings are objectively beautiful. Similarly for pains: I cannot sincerely claim that some bit of tissue damage is painful unless I experience it *as* painful – that’s just not the way we use the term ‘pain’ – but that does not mean that pain is a merely subjective property of tissue damage. So, when it comes to value, we often use apparently objective language to make merely subjective claims, but this does not mean that value is thereby subjective. Just as there may be objective beauty even if typical application of the term ‘beautiful’ presupposes an aesthetically pleasing

subjective experience, so too may there be objective pain even if we do not use the term ‘painful’ to describe anyone’s tissue damage but our own.

So, even if contents of pain experiences – “objective pains” – are extant only in the context that they are being represented as such, the representational intuition is preserved; experience “says” that an objective pain – damaged tissue – is painful even if its being painful is a prerequisite for its counting as an objective pain. Furthermore, Tye stresses that pains are experienced as being located somewhere on the body. Pain is thereby attributive; it applies pain’s phenomenal predicate, as it were, to a bodily region. This way of thinking about pain lends plausibility to the idea that pain experience is transparent; the quality experienced, painfulness, is attributed to something other than experience, the body.

2.3 Pain Intensity

According to tracking representationalism, the qualitative character of an experience is exhausted by its content, and the content of an experience is the external quality or qualities that the relevant perceptual system tracks. Plausibly, pain experiences track features of tissue damage – location, type, etc. As we have seen, tracking representationalists may hold in addition that pain’s affective dimension represents that the tissue damage is bad for its subject.

Against the externalist commitment of tracking representationalism, Pautz (2015) offers the case of Mild and Severe, members of similar but distinct species that evolved in different environments. The principal difference between these environments is that some feature of the environment in which Severe’s species evolved makes minor tissue damage much more dangerous than in the environment in which Mild’s species evolved, such as an abundant type of airborne bacterium that gives rise to a high risk of open wound infection in members of Severe’s species. As a result, Severe’s environment exerts selective pressure on

Severe's species to attend urgently to minor tissue damage, whereas Mild's environment exerts no such pressure on Mild's species. This pressure is answered in Severe's species by the selection of a heightened firing rate in his SSII cortex when mild tissue damage is detected, which results in Severe attending to minor tissue damage with more urgency than Mild.

The trouble that Mild and Severe pose for tracking representationalism is that it seems like Mild and Severe could undergo the same type of tissue damage – a small cut across the top of the left hand, say – in their respective environments and yet have phenomenally different experiences; the pain that Severe experiences is plausibly more intense than Mild's. After all, somatosensory firing rate is strongly correlated with felt pain intensity, and the urgency with which Severe attends to his wound also suggests that his pain is more intense than Mild's. Nonetheless, on the view of content under consideration, their experiences have the same content; they are undergoing the same type and location of tissue damage, and the wound is bad for each of them; felt intensity is unaccounted for. If Mild and Severe have different experiences of the same type of tissue damage, then at least one experience is a misrepresentation or the tracking representationalist account of pain content fails. Since Mild and Severe are each operating in their respective optimal conditions, and since misrepresentation occurs only when optimal conditions do not obtain, it follows that the account of content fails.

Cutter and Tye reply to this worry by refining the representationalist analysis of pain content. On this new analysis, the content of a pain experience is that there is a bodily disturbance of a certain type at a certain location, and the disturbance is bad for the subject *to a certain degree*. Badness is conceived as “aptness-to-harm,” a quality that comes in degrees insofar as some kinds of tissue damage are more apt to harm their subjects than others. So,

differences in degree of intensity are accounted for in terms of differences in degree of badness. In virtue of their commitment to causal covariation, Cutter and Tye must say that a bodily disturbance's being apt to harm a subject is what causes the subject to token a pain state. Indeed, they claim that the tokened pain state is an instance of a functional property "defined (very roughly) by its forward-looking causal role of bringing about [some degree of] avoidance behavior" which is tokened *because* the relevant bodily disturbance is apt to harm the subject to a corresponding degree (p. 100). Hence,

Members of Severe's species were designed by natural selection to token states that bring about "severe" avoidance behavior when they undergo disturbance *d* because *d* is highly dangerous for members of Severe's species — that is, because it is very much apt to harm them. The same goes, *mutatis mutandis*, for Mild's species. (pp. 100-101)

On this account, the difference between Mild's and Severe's experience is explained by the fact that the same type and location of tissue damage is *more* apt to harm Severe than Mild. Cutter and Tye admit that the "badness" of a disturbance does not supervene on local qualities; since "harm" is defined over teleological systems, the degree to which a disturbance is apt to harm a subject is determined, at least in part, by non-local qualities that obtain in virtue of the subject's being a teleological system. It follows, then, that the content of pain supervenes, at least in part, on non-local qualities.

2.4 Optimal Conditions and Content

It is reasonable to think that the intensity of a pain is a function of the painful stimulus's prospective noxiousness; Cutter and Tye's account may be broadly correct. However, they are overly cavalier with their appeal to non-local qualities as a supervenience base for pain intensity. They are surely right that the objective corollary of aptness-to-harm is not a local quality, but it is not obvious that non-local qualities may be causally efficacious in the way required by causal covariation. In the next section I will argue that Cutter and

Tye's account entails that content relevant to pain intensity is supplied not by causal covariation, but by the optimal conditions for pain representation. This is a problem: it cannot be the case that the optimal conditions for representation of a quality include the presence of that quality, lest the notion of tracking be trivialized. To establish this, I first need to say some things about optimal conditions and the role they play in a tracking theory of content.

Recall that the appeal of tracking theories is their amenability to a naturalized theory of mind. Representational contents are identified with external qualities because external qualities are ordinary physical states with ordinary causal powers, and the reduction of mental representation to something as fundamental as mere causal processes is a coveted materialist dream. Since effects carry information about their causes, a first pass at a reduction of the representational to the causal holds that representational states are to be understood as informational states; a representation represents its content by virtue of carrying information about – that is, being caused by – that content. However, it is immediately clear that representational states are not *merely* informational states, for it is constitutive of representations that they may *misrepresent*. If the content of a representation is identified with whatever caused the representation to be tokened, then representations are always veridical – every representational token has a cause, after all.

To borrow Fodor's favorite example, if a cow-on-a-dark-night causes a "horse" representation to be tokened, then on the view under consideration the cause-*cum*-content of the "horse" token is, implausibly, *cow-on-a-dark-night*. Surely "horse" representations are about horses, even when they are caused by something else. It will not do to fill out representational contents with disjunctions of all of their possible causes, e.g., for the content of "horse" tokens to be *horse-or-cow-on-dark-night*. For, though this preserves the idea

that “horse” representations are about horses, these disjunctive contents eliminate the possibility of misrepresentation; if “horse” tokens are about horses-*or*-cows-on-dark-nights, then I am not mistaken when I token “horse” in the presence of a cow-on-a-dark-night. Fodor calls this the disjunction problem. He writes that theories which attempt to reduce representational states to causal states

have trouble distinguishing the conditions for representation from the conditions for truth. This trouble is intrinsic; the conditions that causal theories impose on representation are such that when they are satisfied, misrepresentation cannot, by that very fact, occur. (1992, p. 34)

The challenge to causal theories of content, then, is to provide an account of the unique kind of cause among all possible causes of tokens of a representational type that counts as that representation’s content – why “horse” tokens are about horses and *not* cows-on-dark-nights.

Fodor’s preferred solution to the disjunction problem is to include an asymmetric dependency condition in his theory of content. Among possible kinds of causes of a representation, its content is the one such that nothing else would cause tokens of that representation if that one did not; the reason “horse” means *horse* and not *cow-on-a-dark-night* (even though cows-on-dark-nights cause “horse” tokens) is that cows-on-dark-nights would not cause “horse” tokens but for the fact that horses do. In Fodor’s words,

“Cow” means *cow* because but that “cow” tokens carry information about cows, they wouldn’t carry information about anything,” (p. 91).

The capacity for non-content causes of a representation to cause tokens of that representation asymmetrically depends on that representation’s content-causes.

As it applies to tracking accounts of phenomenal character, the disjunction problem is to explain why the content of a qualitative character is exactly one of all the possible causes of that character’s tokens, e.g., why the content of phenomenal red is reflectance *R*

rather than reflectance- W (*hite*)-in-red-lighting-conditions. Asymmetric dependency is not enough to solve the disjunction problem for tracking accounts. For, it is not true that non-reflectance- R -caused-red-tokens asymmetrically depend on R -caused-red-tokens in a phylogenetically determined representational system like the visual system. Unlike concepts, we need not acquire the capacity to token qualitative characters. Perceptual systems are plug-and-play; the user need not calibrate her red experiences to reflectance R before she may token phenomenal red. Accordingly, within a single subject, none of the possible causes of a phenomenal representation can be held aloft as the unique content of that representation by virtue of explaining the capacity to token that representation, for that capacity is wholly inherited rather than gleaned from ontogenetic processes.

For example, suppose that someone with a normal human visual system spends her entire life in red lighting conditions surrounded only by white objects. It cannot be the case that the content of her red experiences, and by extension their phenomenal character, asymmetrically depends on the content of her R -caused red experiences because her red experiences are *never* caused by reflectance R ; there are no R -caused red tokens on which her W -caused red tokens might depend for their content. The fundamental issue here is not that, as a matter of historical record, she has never in fact enjoyed any R -caused red tokens to fix the content of phenomenal red. The problem, rather, is that both R 's and W 's cause red tokens in virtue of the same property, the reflection of red light from their surfaces, and so it is impossible to sever the link between W 's-in-red-light and red tokens without also severing the link between R 's and red tokens. Given that the very same property mediates the tokening of red experiences of either origin, there is no way to support the claim that the content of a red experience in a subject who only ever has W -caused red experiences is nonetheless R at the exclusion of W -in-red-light; there is no asymmetry in the relations that

make red things look red in white light and those that make white things look red in red light. So, if the tracking representationalist insists that the content of a color is something like a surface spectral reflectance, asymmetric dependence does not address the disjunction problem.

Fodor (1992) considers a similar objection to his view from Baker (1989), who asks us to

[s]uppose that, although there are many ordinary cats around, a certain person, S, learns a particular Mentalese symbol solely from artifacts (say, Putnam's robot-cats) that impinge on sensory surfaces in exactly the same way as cats. Now (for the first time) S sees a real cat... (p.167)

Baker argues that none of the possible options for the content of the ensuing real-cat-caused cat-token are available to Fodor. The content cannot be 'cat', for, in this scenario, it would seem that cat-caused tokens asymmetrically depend on robot-cat-caused tokens. But neither does it seem plausible that the content is 'robot-cat', and hence a misrepresentation, for cats *would* have caused cat-tokens had there been any around. "In the case at hand," she notes, "the correlation is between tokens of a certain type and (cats or robot-cats). It is simply an accident that the actual causes of S's early representations were all robot-cats," (p. 169). However, if the content of the representation is cat-or-robot-cat, then it would seem that asymmetric dependency does not solve the disjunction problem, after all.

Fodor nonetheless replies that the content of the cat-caused representation (and of the robot-caused representation, for that matter), is 'cat-or-robot-cat'. In defense of this position, he says that

[o]ne can perfectly consistently hold, on the one hand, that "cat" means *robot or cat* when it's accidental that you learned it just from robot-cats; while denying, on the other hand, that it would mean *cat or robot* if you had learned it in a world where all you could have learned it from were robot-cats (e.g., because there aren't any cats around.) (p. 104, emphasis in original).

So, the reason the robot-cat example does not invite the disjunction problem is that it involves an extraordinary circumstance for but a single type of representation, and hence the extraordinary content is to be expected. “It is OK for some predicates to be disjunctive,” he says, “as long as not all of them are,” (p. 104).

This reply will not save an asymmetric dependency view about phenomenal representations, for *all* phenomenal representations – or at least enough to pose a serious problem – are subject to scenarios akin to the one Baker describes. What was said above about white-surfaces-in-red-light obtains *mutatis mutandis* for any of the colors, auditory pitches traveling in mediums of varying density, etc. We live in a world where experiences are very often caused by states other than those the representationalist would count as their contents and, in each case, there is no asymmetry in the dependence relations that obtain between at least some of a phenomenal state type’s causes and its tokens. So, asymmetric dependency cannot solve the disjunction problem for tracking views of phenomenal content.

The tracking representationalist approach to the disjunction problem is to appeal not to the causes of representational tokens relevant to ontogenetic processes, but those relevant to phylogenetic ones. On this approach, the kind of cause that counts as the content of a representation is the one that causes tokens of that representation in “optimal conditions” – the conditions in which the perceptual system was designed by natural selection to operate.¹⁸ The idea is that since the development of representational systems in organisms is at least partly explained by selective pressure from the organism’s environment, conditions that obtained in that environment are the ones in which the system can be expected to get things right; the representational system to which they apply would not have been selected if it did

¹⁸ This is Tye’s preferred term; Dretske calls them “ideal conditions.”

not deliver accurate representations in those conditions (Dretske, 1995, pp. 49-51). So, for example, the optimal conditions for representing the colors of surfaces plausibly involve daylight illumination. Presumably, daylight lighting conditions are the conditions in which human vision has evolved, so daylight is the illumination condition in which our visual system gets things right. In other lighting conditions – under red light, say – things can go amiss; a white object appears to be red under red light because our visual system wrongly “assumes” a daylight illumination condition.

The teleological approach to optimal conditions is committed to the idea that the evolutionary processes relevant to the development of a representational system are aimed at the production of accurate representations in the environment in which the system is embedded, and hence that the function of a representational system is the production of veridical representations. This idea is famously challenged by Millikan (1989), a proponent of a teleological account of mental content who argues that the function of a representational system has to do with the circumstances in which its representations are consumed by other systems – the *effects* that the representations are selected for bringing about – and hence that even if a representational system *does* produce veridical representations, this cannot be its function. If Millikan is correct – if it cannot be the case that a representational system’s function is the production of veridical representations – then the teleological account of optimal conditions merely pushes back the disjunction problem for tracking representationalism, for teleological views of mental content have their own difficulties resolving it.¹⁹ I am sympathetic to this line of criticism, but it is beyond the scope of this

¹⁹ Fodor (1992), e.g., argues that because biological functions are indeterminate, functions cannot determine the content of the representations that guide them. Frogs snap at ambient black dots that they see, but this does not settle whether the snapping mechanism is selected for securing *flies* or *ambient black dots*, and hence cannot resolve the content of the representations that frogs employ to guide their snapping. It could be that the frog’s representation means ‘fly’, since flies are “what the frog is after” when it snaps at ambient black dots. However, the content could just as easily be ‘ambient black dot’ because, in the conditions in which the frog evolved,

chapter to pursue it further; I will not argue against this aspect of the tracking representationalist view.

I will, however, outline an alternative account of optimal conditions that may be appealing to those who are skeptical of the teleological approach. This account is motivated by the idea that the optimal conditions for representation depend not on the evolutionary history of the representational system, but whether the states the system tokens are maximally informative. Accordingly, optimal conditions for representation are to be understood as those conditions that result in the system-relative maximum amount of information being delivered to the relevant perceptual system. Information is a reduction in the space of possibilities.²⁰ Hence, representations tokened in optimal conditions reduce the space of possibilities more than representations tokened in non-optimal conditions, and thereby carry more information than phenomenally identical analogs. I will explain this proposal with respect to the relationship between color vision and daylight, but it is meant to apply to other perceptual modalities as well.

I reckon that what makes daylight optimal for visual perception is *how much* information it allows to be delivered to the retina. Empirical investigation has revealed the

ambient black dots tend to be flies, so ambient black dots in the frog's normal environment have equal claim to being "what the frog is after." Whether the snapping mechanism was selected for securing flies or ambient black dots is indeterminate. Given the indeterminacy of biological functions, appealing to them is unlikely to yield a solution to the disjunction problem.

²⁰ To borrow an example of Dretske's, imagine that the boss asks her employees to elect someone for a duty, and to inform her of their decision by writing the name of whomever is elected on a piece of paper. Suppose the boss receives a piece of paper that reads 'Bob'. How much information this piece of paper carries depends in part on how many different names could have been on it; if there are only two employees, Bob and Zoey, then the piece of paper only carries one bit of information because it reduces the space of possibilities from two to one, but if there are four employees – Bob, Zoey, Simone, and Beatrice – it carries two bits of information because it has reduced the space of possibilities from four to one. Crucially, the amount of information carried by the 'Bob' token also depends on how many Bobs there are in the office: if all of the employees are named Bob then it carries no information, for the boss doesn't know any more about who has been elected than before she was passed the paper; if two out of four are Bob then it carries only one bit of information since it has only cut the space of possibilities in half, etc. (Dretske 1981, p. 4-5)

sort of information to which vision is sensitive. The retina contains rods and cones, proteins that are selectively responsive to a variety of wavelengths of light. The retina does not require the function of carrying information about reflectance properties in order to do so, for these are brute causal processes. Each cone in the retina responds to some wavelengths but not others, with or without a job description. Daylight is the condition in which all wavelengths of visible light are bouncing around, so daylight illumination allows for a surface to reflect every wavelength that it is capable of reflecting – that is, its surface spectral reflectance property. Hence, color representations tokened in daylight are maximally informative relative to normal human vision; very nearly all of the states to which the visual system is sensitive may be tokened in a daylight illumination condition, so the tokening of any one of those states constitutes a system-relative maximum reduction in the space of possibilities.²¹ Correspondently, color experiences tokened in daylight eliminate the possibility that the failure of some-or-other cones to fire is due to the non-presence of corresponding wavelengths of light since all of those wavelengths are present and available for reflection in daylight. So, an experience as of a red cube is more informative when it is caused by a red cube in daylight than when it is caused by a white cube in red light because the non-firing of short-wavelength cones in the former case carries the information that no short wavelengths are being reflected from the cube, whereas in the latter case the non-firing

²¹ A note about “very nearly” – there are some states of the visual system that may not be tokened in any lighting condition without some additional intervention. For example, consider “hypergreen,” a highly saturated shade of green that may only be experienced by first fatiguing one’s “red” cones by staring at a saturated magenta field and then looking upon a saturated green field. There is no wavelength of light that activates “green” cones at the exclusion of at least one of the other types, which is why “red” cones must be fatigued to experience hypergreen. So, neither daylight illumination nor any other illumination condition allows for hypergreen representations to be tokened, though hypergreen representations are tokenable by a normal human visual system. This is why optimal conditions are not conditions in which *any* possible representational state of the visual system might be tokened: there are no such conditions. It is enough to be in the conditions that are *maximally* informative, that is, in which the highest number of possible states of a representational system are tokenable.

of short-wavelength cones does not tell between non-presence and non-reflection of short wavelengths of light.

Optimal conditions are relevant to veridicality on this view because misrepresentation cannot occur when the space of possible causes for a representational token is whittled down to one – that is, when the content of a representation is identical to the information it carries. Likewise, inoptimal conditions may *but need not* lead to misrepresentation. An object illuminated by a mere subset of visible light wavelengths may not be able to reflect every wavelength that it is disposed to reflect, and so misrepresentation may occur; a white object is disposed to reflect every wavelength in the spectrum of visible light, but under red light illumination only the longest wavelengths of visible light are available for reflection, hence the white object appears red in these lighting conditions. There are more possible causes for representations tokened in non-optimal conditions, and so they carry less information than representations tokened in optimal conditions; a red cube experience in inoptimal conditions might be caused by a red cube, but the more wavelengths are missing from the ambient light, the more possibilities there are in which the red cube experience is not caused by a red cube, and hence the less information the representation carries. This account of optimal conditions does the same work as the teleological one, but without the teleological baggage.

This account is not fully fleshed out. For one thing, veridical perception relies on the brain functioning properly, and it is far from obvious that a brain's functioning properly can be cashed out in terms of information quantity. For example, perceptual states downstream from the proximal stimulation but prior to the involvement of concepts, e.g. those that are modified by perceptual constancies, which seemingly override proximal information in service of sub-personal “assumptions” about the external world; constancies may bring

about misrepresentations even in broad daylight, and this does not seem to be a matter of how much information is available in the proximal stimulus. The information-theoretic analysis of optimal conditions is incomplete insofar as it is plausible only as an account of *external* optimal conditions. Nonetheless, I hope to have established that it may be worth exploring if the teleological burden of the usual analysis is found to be too great.

2.5 Tracking Badness

For now, let us assume that the brain states realizing pains of varying intensities are not relevantly different than those underlying other phenomenal characters. This is not Cutter and Tye's view, who insist that, unlike ordinary realizers of phenomenal character, the brain states underlying pains are functional states defined in part by the behavior they bring about. I will come back around to their view in a bit. First, it is worth examining why they must make this move. The problem, in brief, is that badness does not have the right kind of causal powers to enter into tracking relations as they are ordinarily conceived

Suppose that Severe is transported to Mild's environment. Subsequently, each of them is inflicted with some form of tissue damage, at the same location on each of their bodies. Since Mild and Severe are relevantly similar in all respects except for the way they process information about tissue damage and since they are now in the same environment, we may assume that the wound is equally bad for each of them. Nonetheless, Severe's internal machinery remains unchanged so, as above, Mild and Severe undergo phenomenally different experiences – Mild's experience is not as intense as Severe's. By tracking representationalism's lights, this means that at least one of them must be misrepresenting the badness of his wound, and the obvious candidate is Severe. After all, Mild's situation is the same as it has always been. If he was not misrepresenting before Severe's arrival, then he is not misrepresenting now.

Misrepresentation only occurs when optimal conditions fail to obtain, so Severe must not be operating in his optimal conditions. Since the only different condition in Mild and Severe's respective environments is the substantially higher volume of airborne bacteria in Severe's environment, it must be the case that rife airborne bacteria are included, under some-or-other description, in Severe's optimal conditions; no other feature can make the difference that explains why Severe misrepresents in Mild's environment because there are no other environmental differences.

It is implausible that rife bacteria are among the optimal conditions for pain representation. On the information-theoretic analysis, optimal conditions for a perceptual modality are those that allow for maximally informative representations. Environmental conditions may make an indirect contribution to phenomenal character, insofar as those conditions may lead to an inadequate flow of information from relevant distal states to sensory receptors, as when red illumination makes a difference to phenomenal character by preventing the production of information about short-wavelength surface emissions. However, when Severe gets a cut in circumstances where bacteria are less rife than usual, he misrepresents how dangerous the cut is to him, but not because the level of bacteria is having a deleterious effect on some informational process. Fiddling with the volume of airborne bacteria cannot make a phenomenal difference to Severe. Nociceptors, the nerve endings responsible for detecting damaged tissue, are not responsive to bacteria, and so the presence or absence of bacteria is entirely irrelevant to any of the causal relations that obtain between damaged tissue and nociceptor activation. The problem, more generally, is that when perceptions misrepresent, they deliver experiences in which things seem other than they would in optimal conditions, but this is not true of bacteria and Severe's pain experiences; physiologically similar incidents of tissue damage feel the same to Severe no

matter how many bacteria are around. We can take Severe to any environment we please and as long as we always inflict the same type of insult upon him, his experience will always be the same. Since the presence or absence of bacteria is irrelevant to the transmission of tissue damage information, I conclude that rife bacteria cannot be among the optimal conditions for pain representation on the information theoretic account.

Rife bacteria fare no better on the teleological analysis of optimal conditions. The teleological analysis does not require that optimal conditions must be informationally relevant to representation. However, if optimal conditions are not informationally relevant, then their only possible contribution to representation is as a circumstance to which representational contents are calibrated by evolutionary processes, and a calibrative process of this kind undermines reductive intentionalism.

Recall Cutter and Tye's analysis of causal covariation:

causal covariation: tokens of a state type S in an individual x represent that p if and only if under optimal conditions, x tokens S if and only if p and because p . (p. 100)

So, with respect to pain, Cutter and Tye hold that Severe's pain state represents that his tissue damage is *quite bad*, so to speak, in virtue of that state's being tokened if, only if, and because there is tissue damage that is, in rife-bacteria-conditions, *quite bad* for Severe. Since Severe's pain system has been calibrated by natural selection to accurately reflect the danger posed by rife bacteria, it cannot be denied that Severe's pain states covary with aptness-to-harm in rife bacteria conditions; that's just what calibration is. The problem is that these states are available for calibration in the first place. For one range of states to be calibrated to another, both ranges have to *exist*.

Let us grant that badness is an objective property, even if not a local physical one, and that the objective badness of tissue damage comes in degrees. Pain intensity likewise

comes in degrees. For some degree of badness to be matched via natural selection with a correspondent degree of pain intensity, it must be the case that pains of varying intensity are available to be matched. But, per tracking representationalism, phenomenal character arises out of representational content; states would not have phenomenal character but for the content they represent. So, if natural selection must intervene in the assignment of pain intensities to instances of tissue damage in order to achieve a correspondence between felt and objective badness, then there is a dilemma for the tracking representationalist: either pain intensity is not inherently contentful, or the content of pain intensity is not inherently tied to its causes. This dilemma emerges because these are the only reasons that a perceptual system might require calibration; either states of the system do not have content, or their contents are out of sync with their causes.

The first horn must be rejected outright. Recall from §1.2 that the recruitment of a state as a representation must be explained in terms of the state's causal-historical profile rather than its phenomenal one. A neural state cannot be selected for representing some-or-other content in virtue of the fact that the state realizes such-and-such phenomenal character, for that would violate the idea that phenomenal characters are inherently intentional. Phenomenal characters cannot be floating around in the head waiting to be recruited as representations at any point in an organism's selection history, lest there be mental paint.

Tracking representationalism is likewise incompatible with the second horn, which violates causal covariation. If it is possible for a representation's content to be out of sync with its causes in the way that necessitates calibration, then the representation's content must not be inherently tied to its causes. Paradigmatically, the phenomenal character of a representation must not ontologically precede its content, and thereby tracking

representationalism must reject the idea that phenomenal characters are ever calibrated to causes that best reflect their preexisting phenomenology.

This is why Cutter and Tye must claim instead that a brain state that causally covaries with some degree of badness and realizes pain of a correspondent intensity is “a functional state defined (very roughly) by its forward-looking causal role of bringing about [suitable] avoidance behavior.” On this view, badness may covary with pain intensity without the need for overt calibration of the former to the latter. Tissue states that are best avoided (read: states that are *bad* for members of the species) are selected as causes of functional states that bring about suitable avoidance behavior, which indirectly results in each of those functional states covarying with a collection of tissue states that are all bad to the same degree. Calibration need not be explained in terms of the phenomenal character of the realizer since the content and the realizer of the representation are calibrated to one-another by virtue of the realizer’s functional role. So, this elides the calibration difficulty.

It may be true that it is *because* a type of tissue damage is bad for members of a species that some correspondent avoidance-causing functional state (“F-state”) is selected as an outcome for insults of that type; if the insult were differently bad for members of the species, it is plausible that a different outcome may have been selected. So, in an important sense, badness explains why some type of tissue damage causes the F-states that it does. However, the problem that brought about the calibration difficulty in the first place is untouched: badness still does not have the right sort of causal profile to enter into tracking relations. In pursuit of this conclusion, I will demonstrate that Cutter & Tye’s account is inconsistent with a tracking account of content, for depending on how avoidance behavior is understood, either F-states have narrow content or they do not so much as covary, much less *causally* covary with badness.

A state has external content only if its content is at least partly determined by things outside the head. The content of my ‘water’ thoughts, for example, plausibly depends at least in part on the fact that the stuff in lakes and streams to which my thoughts refer is composed of H₂O. That’s the stuff that my water thoughts are about; if the stuff in lakes and streams were made instead of XYZ, then my ‘water’ thoughts would be about XYZ rather than H₂O, and hence their content would be different than it is in my H₂O-filled environment.²² Does the content of an F-state depend, at least partly, on the external world? I do not see how it could. For, if the state is defined by its role in bringing about a certain degree of avoidance behavior, then the only thing the state *could* represent is a correspondent degree of badness. Consider the F-state that Severe tokens when he undergoes his tissue insult, which is defined by its role in bringing about “severe” avoidance behavior. Recall that it is imperative that F-states have their causal roles prior to being promoted to representations, for this is supposed to explain how these states get calibrated with suitable causes. So, this F-state brought about “severe” avoidance behavior even before it was upgraded to a representation of badness.

If a certain F-state essentially causes “severe” avoidance behavior, then its content could only ever be “severe” badness. After all, the suitability of the avoidance behavior for certain tissue damage states is supposed to explain how the F-state gets calibrated to a specific degree of badness in the first place. Put another way, it would be maladaptive for mildly bad tissue damage to cause tokens of the “severe” F-state, so natural selection would never calibrate the severe F-state to mildly bad tissue damage, and hence the “severe” F-state

²² This well-worn example is found in Putnam (1975). Though Putnam was concerned with linguistic meaning, it is generally accepted that his argument also applies to the content of propositional attitudes like thoughts and beliefs.

could never come to represent mild badness. An F-state's being promoted to the status of representation depends on its being calibrated to states that are correspondently bad, but those are the only states to which it is possible to calibrate the F-state, and so the content of an F-state could never be other than badness correspondent to the severity of avoidance behavior that the F-state brings about. This means that F-states do not have external content; if an F-state is a representation (which depends on whether it has undergone the sort of calibration under discussion), then the content it has is *fully determined* by the severity of the avoidance behavior it brings about; the degree to which the states that trigger the F-state are bad is concordant with but ultimately irrelevant to the F-state's content.

It might be replied that F-states are not typed by the severity of the avoidance behavior they bring about. Instead, F-states are typed by the type of aversive bodily movements that they cause, such as withdrawal from an offending stimulus. So, the F-state that brings about a certain type of bodily movement might be calibrated to states that are bad to a high degree in one species, but only to a low degree in another, and hence the severity of the avoidance behavior the F-state brings about is neither essential to it nor a restriction on the sort of causes to which it can be calibrated. As such, F-states have external contents since the degree of badness that they represent is determined in part by the badness of the states to which it is calibrated, which cannot be read off from the type of avoidance behavior that an F-state brings about.

The problem now is that F-state contents are external, which is to say if they are not defined by the severity of the avoidance behavior that the F-state brings about, then there is no reason to hold that the states that cause a given F-state must all be bad to the same degree even within a single individual. If a certain type of bodily movement is adaptive in helping a creature avert the mild badness of one type of tissue damage and severe badness of

another, then there is no compelling reason that both types of tissue damage could not be among that F-state's causes. More generally, the properties of a type of aversive bodily movement do not constrain the severity of threats that it may be selected to evade. For example, the same type of swift withdrawal behavior might be equally adaptive whether one has touched a very hot stove or a prickly cactus, regardless of whether these insults are bad to the same degree. Moreover, it seems to me that it is more painful to touch a hot stove than to be pricked by a cactus. Plausibly, a burn is more apt to harm than a cactus needle, so this is consistent with the view that pain intensity represents badness but not with the view that badness representations are facilitated by the calibration of badness to F-states; if two tissue insults cause the same F-state, then they token the same representation of badness and hence should be painful to the same degree. So, if F-states are typed by the observable behaviors that they bring about, then it is false that F-states even covary with some specific degree of badness, much less *causally* covary.

Summing up, there is a question of whether to understand “avoidance behavior” as it pertains to F-states in terms of severity or type. If we understand the avoidance behavior that an F-state causes in terms of its severity, then F-states have narrow content; they cannot but represent a level of badness commiserate to the level of avoidance that they cause. If avoidance behavior is understood instead in terms of the type of bodily movements it involves, then it is implausible that F-states so much as covary with badness since it may be adaptive for tissue insults that are bad to varying degrees to cause the same type of avoidance behavior. Either way, the claim that F-states track badness is undermined, for it requires that F-states have wide content with which they causally covary.

The foregoing is symptomatic of the underlying problem that badness is not a quality that can be tracked. It is because badness does not have local causal powers that a different

covariation relation – between tissue damage and avoidance behavior, after suitable evolutionary calibration – must be employed to sustain the covariation link between pain intensity and badness, that there is no plausible avenue for F-states to bear distal content, and that whether optimal conditions for representation of badness obtain never locally influences the phenomenal character of pain experiences. The explanation for each problem is that there is no local causal process mediating the connection between badness and representations thereof.

Cutter and Tye go to some trouble to establish that the quality ostensibly represented by pains of varying intensities – badness – is an objective feature of the world. Perhaps this is so. They then argue, crucially, that not all objective features of the world that enter into causal relations are local physical properties:

[I]t's just not true that a property can only be causally relevant in producing an effect if the property supervenes on local physical properties. When John tells Jane that she looks like a cow, Jane slaps him. John's utterance causes Jane to slap him, and does so in virtue of its semantic properties. But the semantic properties of an utterance do not supervene on its local physical properties; rather, they depend (perhaps *inter alia*) on facts about how words are used in one's community. Mental properties, like having the desire to drink water, are causally relevant in producing behavior. But if we accept the standard arguments for mental externalism, (many) mental properties, including the property of having a desire to drink water, do not supervene on local physical properties. But it would be silly to say that my having a desire for water has never caused me to drink water. Or consider properties, like the property of being a lion, which depend not just on an object's local physical properties but also on its historical origins. A herd of gazelles runs away upon encountering a lion. Surely the fact that the object they encountered was a lion causally explains (at least in part) their fleeing the scene. (p. 101)

Perhaps this is true as well. However, it is not enough to establish that the properties relevant specifically to perceptual tracking relations need not be local physical properties. The examples discussed above are disanalogous with the case of badness causing pain, for even if the properties relevant to causal explanation in these examples do not supervene on

local physical properties, they are nonetheless sustained by perception. For example, though it is true that the semantic properties of John's utterance are not reducible to local physical properties, Jane's slapping him is caused at least in part by Jane's hearing John's utterance (not to mention having the right sort of previous experiences to understand its meaning). The desire to drink water is brought about by *feeling* thirsty. Gazelles run only from *perceived* lions. In each case, perceptual experience is the informational bedrock on which the higher-level explanations (partly) depend.

The problem, then, is that there is no deeper informational bedrock to sustain a causal relation between badness and pain. The badness of a wound cannot be read off from its local physical properties, and so there can be no informational relation between tissue damage states and pain states that is suitable for building into a tracking relation. It is *because* tissue damage does not carry information about badness that avoidance behavior-causing states must be calibrated to tissue damage states; no calibration would be necessary if information about badness could be read off from the local features of the wound. More generally, properties that enter into perceptual tracking relations *do* need to be local physical properties, for, as we have seen, the causal processes on which tracking relations are built must be informational before they are representational.

Fundamentally, though, Cutter and Tye's view is plausible. It is reasonable to think that the intensity of a pain is tied, in some way or another, to avoidance behavior, and that avoidance behavior is calibrated to tissue damage. The main problem here is one of taxonomy; since badness is not a quality that can be tracked, the most plausible version of the view is merely functionalist, not tracking representationalist. It is the project of this dissertation to defend just the sort of view that Cutter and Tye here advance, but explicitly as a hybrid of tracking representationalism and functionalism. The present point is simply that

Pautz's Mild and Severe case genuinely motivates this move. To that end, I want to raise a final concern with Cutter and Tye's account: even if it is accepted, it does not answer the challenge that Pautz advances.

Badness is put forward by Tye as the content of the negative affective dimension of pain. Cutter and Tye refine this view by claiming that the degree to which a pain is negatively affective represents the degree to which the relevant tissue damage is bad. If this is right, then experiences that are not negatively affective do not represent their objects as bad to any degree. My orange mug experience, for example, does not feature any negative affect; I do not represent the mug as being bad for me.

Now, consider A-Mild and A-Severe, members of the same species as Mild and Severe, respectively. The only relevant difference between Mild and A-Mild, and between Severe and A-Severe, is that A-Mild and A-Severe are pain asymbolics. As I mentioned in §2.2, pain asymbolics feel the sensory-discriminative dimension of pain, but not the negative-affective dimension, and correspondently do not engage in avoidance behavior when they undergo tissue damage. So, Cutter and Tye's view predicts that A-Mild and A-Severe have identical experiences when they undergo tissue damage of the same type and location, for each represents that there is a tissue disturbance of such-and-such kind, and neither represents that it is bad for them to any degree.

But A-Mild and A-Severe do not have identical experiences. The intensity of the sensory-discriminative dimension of pain is phenomenally distinct from the intensity of its negative-affective dimension. Indeed, though asymbolics lack a negative-affective dimension to their "pain" experiences, they nonetheless have experiences of varying intensities. It is doubtful that A-Mild and A-Severe's experiences are of the same intensity for precisely the reason outlined by Pautz in the original case: the firing rate in A-Severe's SSII cortex is

higher than in A-Mild's, owing to the evolutionary differences between their species. The SSII encodes not negative affective intensity, but the intensity of the sensory-discriminative aspect of pain. So, plausibly, A-Severe's experience is *more intense* than A-Mild's. Since neither A-Mild nor A-Severe represents their wound as being bad to any degree, this difference cannot be explained in terms of badness content; something else must explain the bare intensities of their experiences.

It might be replied that if the SSII does not encode negative affect intensity, then there is no evolutionary reason for the two species to diverge with respect to their SSII firing rate, and hence A-Mild and A-Severe cannot differ with respect to the intensities of their experiences. However, first of all, the intensity of the sensory-discriminative aspect of pain exerts a dominating influence of the intensity of negative affect; in normal perceivers, the two tend to be decoupled only by higher-order influences such as hypnotic suggestion, and even then only modest modulation of affect is achieved. So, even if it is not necessary, it remains *plausible* that natural selection would favor an increase in SSII firing rates as a means to facilitate more aggressive avoidance behavior in Severe's species. Second of all, this reply would salvage a tracking account only if the firing rate in SSII covaried with some objective feature of tissue damage, for only then could there be a reason that it must be held fixed between relevantly similar species. However, the observation that SSII firing rate covaries with pain intensity and not any objective feature of tissue damage is the very consideration that motivates Pautz's argument to begin with. There is no principled reason that A-Mild and A-Severe must share their SSII firing rate, and hence no reason that they must have the same experience in the face of the same type of tissue damage. So, Cutter and Tye's account

does not address the problem that Pautz's case poses; the magnitude of the sensory-discriminative dimension of pain cannot be accounted for in terms of badness.²³

Pautz (2015) offers several cases other than Mild and Severe in defense of the claim that, contra-tracking representationalism, some experiences are, as he says, "internally dependent." Of particular note is the case of Loud and Soft, who differ with respect to the level of activation in each of their auditory nerves, suggesting a difference in the level of loudness that each one of them experiences. As with pain intensity, Pautz argues that loudness depends at least in part on a subjects' internal arrangement. Like Mild & Severe, Loud and Soft raise a problem for accounting for a certain phenomenal intensity in terms of external content. What remains of this dissertation is focused predominantly on accounting for phenomenal intensities like these. I accept and elaborate on Pautz's conclusion that some phenomenal intensities cannot be explained in terms of external content, and hence reject wholesale tracking representationalism. However, I maintain that tracking relations have an important role to play in bringing about experiences of varying intensities. At the heart of my project is a functionalist analysis of the phenomenal intensities under scrutiny that may be combined with tracking representationalism about phenomenal qualities in pursuit of a naturalistically satisfying account of phenomenal character.

2.6 Conclusion

In this chapter I've presented an overview of the challenges that pain experience poses for tracking representationalism. On the one hand, there is insufficient reason to doubt the transparency of pain experience, and so intentionalism is spared. On the other,

²³ In the construction of this argument I have merely gestured at several pivotal empirical claims regarding pain asymbolia, the distinction between sensory-discriminative and affect intensity, and intensity encoding in the brain. These topics are discussed in detail in Chapter 5.

pain is a real problem for the externalist aspect of the view; Mild and Severe demonstrate that differences in the internal arrangements of perceptual systems may make significant phenomenal differences without any plausible appeal to misrepresentation. Though I briefly return to the problem of painful affect in §5.4, my concern in what remains of this dissertation is principally to account for phenomenal intensities that cannot be explained in terms of external contents. In the next chapter I introduce a functional analysis of these phenomenal intensities, the *quantitative character* of experience.

CHAPTER 3

QUANTITATIVE CHARACTER

3.1 Introduction

Though the terms ‘qualitative character’ and ‘phenomenal character’ are typically used interchangeably, the phenomenal is not exhausted by the qualitative; there is also *quantitative* character. Quantitative character is, roughly, the apparent intensity of an experience. For example, the difference between Mild and Severe’s experiences is a difference in quantitative character; they each experience the same painful representation of their tissue damage but differ with respect to the intensity of that experience.

I do not claim it follows from the mere fact that we might describe some aspects of phenomenal character as quantitative that the phenomenal is not exhausted by the qualitative. For, even if some aspects of experience feature intensity, it does not follow that these aspects are not subsumed by the experience’s qualitative character as it is typically understood. By way of analogy, it would be obviously mistaken to argue that the phenomenal is not exhausted by the qualitative on the grounds that some experiences have a *reddish* character, and therefore phenomenal characters are either qualitative or reddish. Being reddish is a way of being a qualitative character, and so the presence of reddishness does not preclude (and in fact entails) the presence of qualitative character. In principle, the apparently quantitative might be explainable in terms of the qualitative; experience alone does not reveal whether the intensity of a pain may be understood as an aspect of the experience’s qualitative character.

Neither do I claim that all manner of phenomenal intensities are instances of quantitative character. One color swatch might look *more blue* than another, and so an

experience of one features a higher “degree” of blueness than an experience of the other swatch. Nonetheless, apparent hue is a qualitative character; apparent degree of blueness does not feature the right kind of content, nor is it underscored by the right kind of functional state, to be a quantitative character. In §3.2 I describe how quantitative characters may be distinguished from qualitative characters both phenomenally and functionally.

Quantitative characters do not reduce to representational states. Instead, they reflect the salience of the representation to which they are attached. In §3.3 I examine empirical work on loudness, arguing that this evidence supports my claim that loudness is a quantitative character; it is implausible that loudness represents sound intensity, as is typically supposed, and more likely that loudness reflects the salience of a sound representation. The notion of salience is plucked directly and deliberately from the literature on attention. So, in §3.4 I discuss the role of salience in the attentional economy.

3.2 Identifying Quantitative Character

In this section I describe some notable phenomenal and functional properties of the phenomenal dimension I call quantitative character. The purpose of this section is not to argue that there are aspects of phenomenal character that are best understood as quantitative rather than qualitative; that is the objective of the remaining sections of this chapter. The goal of this section is simply to explain how to identify the states I target with the label “quantitative character” with more clarity.

I begin with a discussion of prothetic and metathetic sensory dimensions since quantitative characters bear significant similarities to prothetic dimensions of experience. Despite their apparent similarity, there are subtle but important ways in which quantitative character is distinct from prothetic qualitative character, both phenomenally and

functionally. I describe these differences and, in so doing, explain the core features of quantitative character.

3.2.1 What Quantitative Character Is Not

The distinction between qualitative and quantitative character resembles that of metathetic and prothetic sensory dimensions in psychophysics. According to Stevens (1957), metathetic sensory dimensions report on “what kind and where” and are “mediated by a physiological process that is substitutive.” On the other hand, discrimination across a prothetic sensory dimension reports on “how much” and is mediated by “an additive or prothetic process at the physiological level,” (p. 154). For example, hue is a metathetic sensory dimension, while brightness is a prothetic sensory dimension. We perceive progression along the dimension of hue as involving qualitative changes from blues through yellows, then greens, then reds. Progression along the dimension of brightness, however, feels like a series of degrees, not qualities; stimuli look *more* luminous as the continuum progresses. Note that it does not make sense to think of red as being *more hue-ful*, as it were, than blue.

Stevens held that at the physiological level, the process underlying prothetic dimensions of sensation is *additive*, which is to say that increases in the experienced dimension are evoked by increases in the total activity of the relevant sensory receptors. In contrast, he claimed that the physiological process underlying change in a metathetic dimension is substitutive, relying on a change not in total, but *type* of receptor activity – *which* receptors are activated, not how many. Empirical investigation has revealed this claim to be overly simplistic in the more than sixty years since Stevens introduced the distinction between metathetic and prothetic. For example, stimulation of photoreceptors in the retina results in their being hyperpolarized rather than depolarized, and resultantly causes a *decrease*

in their firing rate. Hence, it is inhibition rather than activation of photoreceptors that carries information about increases in light intensity (Kandel, 2013). Stevens was sensitive to the possibility that further study might undermine this claim, noting:

Whether all perceptual continua that behave in the prothetic manner are mediated by additive physiological processes is not certain, of course, but in at least some instances it seems evident that the existence of two basic kinds of physiological mechanisms is reflected in the behavior of the psychological scales and functions which we construct from subjective measurements in the sensory domain. (1960, p. 234)

The how much/what kind distinction and the additive/substitutive physiological process distinction were intended by Stevens as mere heuristics that only roughly identify prothetic and metathetic sensory dimensions, respectively.

The constitutive difference between prothetic and metathetic dimensions of experience, he maintains, is that apparent magnitudes of metathetic dimensions bear linear relations to magnitudes of the external continua they represent, whereas the magnitudes of prothetic continua are related to the magnitudes of their external continua by power functions.²⁴ For example, pitch is a metathetic dimension – differences in apparent pitch vary linearly with differences in the frequency of a sound wave. Contrastingly, the sensation of electric shock is a prothetic dimension – a doubling of electric current through the fingers results in a sensation roughly ten times as strong (Stevens, 1960).

As we will see, quantitative characters are akin to prothetic sensory dimensions in each of the three ways described above. Both are defined in part by their coming in degrees, both (typically) involve additive physiological processes, and neither is linearly related to the

²⁴ Hence, it is in principle discoverable that an apparently metathetic sensory dimension – one that bears the heuristic hallmarks described above – is actually prothetic, and vice versa. For example, Stevens was surprised to discover that apparent saturation does not bear a linear relationship to objective saturation, and thereby counts as a prothetic sensory dimension by his lights, (Panek & Stevens, 1966).

magnitude of any external content. In at least these respects, quantitative characters differ both phenomenally and functionally from metathetic sensory dimensions like hue and pitch.

Nonetheless, further differences indicate that quantitative characters are not prothetic dimensions of experience. In §3.2.2 I explain how quantitative dimensions of experience differ phenomenally from prothetic continua. In §3.2.3 I explain how they differ functionally.

In each section I appeal to loudness as an exemplar of quantitative character, a claim that I introduced in preceding sections but have not yet defended. In holding that loudness is a quantitative character and arguing for a distinction between the quantitative and the prothetic, I defy Stevens, who employs loudness as a paradigmatically prothetic continuum. Even today the consensus view is that loudness is a sensory dimension that represents sound intensity, or at minimum some complicated property essentially involving sound intensity. So, a secondary goal of the remainder of this section is to mount a defense of my position on loudness as a quantitative character of experience.²⁵

3.2.2 The Phenomenal Distinction

One way of characterizing the phenomenal difference between metathetic continua like pitch and hue and prothetic or quantitative dimensions of experience is that metathetic sensations from different perceptual modalities appear irreconcilably distinct from one-another. For example, a middle-C experience bears no intrinsic similarity to a red experience. In this way, metathetic continua appear to feature a *proprietary phenomenology* – a way of appearing that is wholly unique to and constitutive of the modality in which it arises. Red experiences are uniquely and constitutively visual, middle-C experiences are uniquely and

²⁵ However, my position on loudness is not fully defended until §3.3, where I argue that empirical work on the relationship between attention and loudness is best explained if loudness is a quantitative character.

constitutively auditory. By this I mean something more than what may be trivially ascertained from the fact that we *call* the colors ‘visual’ and the pitches ‘auditory’; the point is that it is inconceivable that any quality of a metathetic dimension in one modality could arise in any other modality, e.g. that a red experience could be seamlessly incorporated into the auditory landscape amid various pitches. More generally, each determinate value of a metathetic determinable is, by definition, distinct from each other determinate of that determinable, but also akin to each of those other determinates in a way that is not true of the values of the metathetic determinables in any other modality. Even if phenomenal characters were nothing more than mental paint, it is evident that not all of those paints may be mixed.

On the other hand, prothetic (and quantitative) continua are distinct from one-another only insofar as the qualities they comment on are distinct; loud middle-C and saturated red appear quite different because pitch and color are quite different, but the bare intensities, the “how much” of the experiences are otherwise phenomenally comparable. We may describe both as “very intense” without the need to explain further. So, unlike metathetic dimensions of experience, prothetic and quantitative dimensions do *not* feature proprietary phenomenal character.²⁶ In general, the values of both prothetic and quantitative dimensions fall on a one-dimensional quality space arranged from “none” to “maximum.”

If neither prothetic nor quantitative dimensions have proprietary phenomenal character and present as simply a range of intensities, then it stands to reason that they cannot be phenomenally distinguished in themselves. Indeed, determinate values of

²⁶ Indeed, it is an open question in neuroscience whether our brains feature a multisensory magnitude estimator; Baliki et al (2009) suggest that the insula may be a hub for “how much” representation. It would be beyond the pale to consider such a possibility if magnitudes across modalities were not phenomenally comparable.

prothetic and quantitative character both *appear* as a degree to which a represented item bears a certain feature. However, there is one way of phenomenally distinguishing the prothetic from the quantitative: the phenomenal consequence of their null values.

For a prothetic dimension of experience, we can imagine being aware of an apparent object featuring a null value on that dimension. For example, consider looking at an item coated in ultrablack carbon nanotube coating, a material that absorbs 99.995% of incoming light. This coating is the blackest material on Earth. It is as close to 0% on the scale of luminance as any visible surface may achieve. Nonetheless, an item coated in ultrablack carbon nanotube coating is perfectly visible; it can hardly be missed against a contrasting background. Even if the item in fact absorbed 100% of light, and was thereby 0% luminous, the item would still be clearly visible in most conditions. So, an item's being 0% luminous does not entail that we cannot be visibly aware of it.

This is not so for quantitative continua. If there is no degree to which a sound is loud, then the sound is *inaudible*, and we cannot be aware of inaudible sounds. Similarly, we cannot be aware of a pain that is painful to no degree, or of perfectly camouflaged items that do not “pop out” from their surroundings.²⁷ Reducing a quantitative dimension to nothing is tantamount to expelling its object from the phenomenal landscape of the relevant modality. Quantitative characters are a scale of the phenomenal prominence of the *whole represented item*, not just one of its qualities.

3.2.3 The Functional Distinction

The phenomenal difference described above arises in virtue of a difference in the sort of thing each kind of intensive continua quantifies. Determinate values of prothetic

²⁷ A *prima facie* objection to the point about pain intensity comes from the unusual disorder of pain asymbolia, which I discuss in detail in §5.2. I will discuss visual pop-out in the context of quantitative character in §4.3.

dimensions of experience represent magnitudes of some-or-other property. Quantitative characters do not; they are, in a sense to be elaborated, magnitudes of representations *themselves*. I will argue that quantitative character is determined by the degree to which a qualitative representation is salient.

Before saying more, I must explain what I mean by ‘salient’. Wu (2014) distinguishes between “phenomenal salience” and the sense of ‘salience’ employed in psychology.

Phenomenal salience is the claim that “the phenomenology of attention is the rendering of the attended object as phenomenally salient.” The psychological sense of salience “refers to a property of a stimulus that draws attention to it,” (p. 127). This distinction arises in the context of a discussion about whether there is a unique phenomenology of attention: if attention does not have a unique phenomenology, then the apparent phenomenal difference in, say, covert shifts in visual attention between one object and another must be explained in terms of something other than attentional differences. The term ‘phenomenal salience’ is just a placeholder for *that kind* of phenomenal difference. It is an open question whether phenomenal salience is a primitive phenomenal feature or is reducible to something else, e.g. a content difference.

Psychological salience, on the other hand, plays a vital role in empirical investigations of attention. Experiments on attention presuppose that when items grab attention, they do so by virtue of their properties, and hence that attention-grabbing stimuli have salient properties. That some properties are psychologically salient is a basic assumption that underlies the corpus of empirical work on attention. Psychological theories of attention make no demands on the nature of attentional phenomenology; it may be that attention has a proprietary phenomenology, but it may also be that attention affects the overall phenomenology of an experience only by altering experience content. Indeed, the

psychological conception of salience is compatible with there being no attentional phenomenology whatsoever. Hence, psychological salience is not beholden to any specific view about phenomenal salience.

Quantitative character is, in the end, an account of phenomenal salience. However, my approach to phenomenal salience is unusual. My goal is not to explain phenomenal salience, but rather to explain a certain class of phenomenal characters – quantitative characters – that are typically presumed to be perceptual. It is a consequence of my analysis that quantitative characters are instances of phenomenal salience; I do not assume from the outset that there is such a thing. To that point, I will never use the term ‘salience’ to refer to the phenomenal character of a state, unless explicitly noted. The sense of ‘salience’ that I employ is closely related to the psychological one, though differences between my use of ‘salience’ and its typical application in psychology will emerge as I go. For now it is enough to say that salience, as I intend the term, is the factor by which representations are granted access to attentional processing.

Returning now to the functional difference between prothetic and quantitative continua, a distinction emerges with respect to the explanation for the nonlinearity of the relationships between each kind of intensive character and correspondent physical magnitudes. Stevens claims that the relation between the magnitudes of physical continua and prothetic continua is nonlinear. This is also true of quantitative continua, but for a different reason than Stevens posits for prothetic continua. According to Stevens (1960), the power function relating a prothetic continuum to its domain reflects a transformation performed by sensory transducers. The value of the exponent describing the relationship between the intensity of an external feature and its correspondent apparent intensity varies from feature to feature. Some functions increase by a power less than one – they are

compressive – while others increase by a power greater than one – expansive. This, Stevens hypothesized, is due to sensory transducers being designed in such a way that the experiences they give rise to may adequately cover a wide range of physical intensities (in the case of compressive functions) or present small but biologically significant changes in a narrower domain as more pronounced (in the case of expansive functions).

Contrastingly, the reason that quantitative characters are not linearly related to correspondent physical magnitudes is that quantitative characters do not represent external features at all; the phenomenal feel of quantitative character reflects the magnitude of an internal, functional state of the attention system. So, it is unsurprising that the determinate values of quantitative characters do not bear linear relations to physical magnitudes. The question relevant to quantitative characters and physical magnitudes is why they bear *any* functional relation to one-another.

The reason for this relation is that salience is mediated by sensory representations. When a distal stimulus is represented as salient, it is not because the stimulus instantiates *salience*, for salience is not a property of distal stimuli. Consider the sound of my name – ‘Kim’. When I overhear my name at a party, my attention is automatically pulled to the speech stream in which it occurs; for me, the ‘Kim’ sound is a highly salient stimulus. For most others, the ‘Kim’ sound is not so salient since most people are not called ‘Kim’, but they are sensitive to mentions of their names in a way that I am not. The sound of one’s name is not highly salient by virtue of its physical properties alone, but rather because one bears a particular relation to that sound. Representations of other kinds of distal stimuli enjoy more widespread salience in human attentional economies. Humans with normal hearing find high-intensity sounds (“loud” sounds, colloquially, but loudness should be distinguished from sound intensity for reasons I will soon address) to be highly salient. But,

as with ‘Kim’, there is nothing *objectively* salient about any given sound intensity level; a high-to-us sound intensity level – 90 decibels, say – is salient *to each of us*, but maybe not to a creature whose hearing is differently attuned to sound intensities.

Since salience is not a distal property, information about salience is not detectable by sense organs. Rather, sensory systems represent distal properties, and some of those representations are identified as featuring salient content. Salience is borne by *representations*. Because those representations are informational states of sensory systems, quantitative character ends up correlated with the objective magnitudes that give rise to those sensory representations.

Functional distinctions between prothetic and quantitative continua emerge from the fact that prothetic characters (and qualitative characters in general) are representations of distal qualities, whereas quantitative characters reflect the degree to which those representations are salient. As such, they have different supervenience bases (the former supervenes on distal content, but the latter supervenes on an internal functional property), involve different inputs (stimulations of sensory transducers versus representations of the content carried by those stimulations, respectively), and quantitative characters, unlike prothetic characters, are constitutively involved in the production of attention-related behavior.

3.3 Loudness

By Stevens’ (1960) lights, loudness is a prothetic sensory dimension: it reports on “how much” sound intensity, is underscored by an additive physiological process – *more* loudness is encoded by *more* auditory nerve stimulation – and a power law relation obtains between loudness and sound intensity. However, Stevens considered all intensive phenomena to be of a single kind and did not have in mind the further distinction between

prothetic and quantitative character. In this section I argue that loudness is a quantitative character, not a prothetic dimension of experience. Along the way I clarify some aspects of quantitative character that were glossed over in the previous section.

It is immediately apparent that loudness meets the phenomenal criterion for quantitative character. Sounds – auditory objects to which we might attend, e.g., a speech stream, the chirping of a bird, the hum of a buzz saw – must be represented as having some degree of loudness for them to feature in the auditory landscape. Granted, they must also be represented as having some qualitative features; a sound cannot be loud to a certain degree while featuring no qualitative character at all. The point here is not that objects can lack qualitative but not quantitative character, but rather that *any* qualitative character or collection of qualitative characters – prothetic dimensions included – must feature some degree of quantitative character in order to be represented as an object on the phenomenal landscape. A cluster of auditory qualities not represented as loud to some degree is not an audible sound.

With respect to the functional distinction between prothetic and quantitative dimensions, the question is whether loudness represents the intensity of a sound or reflects the degree to which sound representations are salient. In pursuit of the latter conclusion, I will briefly review the glut of evidence that loudness is a poor barometer of sound intensity. I will then present evidence that loudness is a fine barometer of salience.

3.3.1 Loudness and Sound Intensity

Before I begin, I need to introduce a bit more precision into the notions of sound intensity and loudness. There are three relevant senses of ‘sound intensity’. The first is *source intensity*, the intensity of the sound wave produced by a distal event. Sound waves lose intensity as they travel, so the intensity of a sound wave at its source is typically greater than

at the location at which it is perceived. The intensity of a sound wave as it interfaces with the sensory receptors of the ear is its *proximal intensity*. Proximal intensity is encoded by the auditory system in a manner that I am reluctant to call representational for reasons that will soon emerge, but at any rate this encoding results in a state of the auditory nerve that is indisputably responsive to intensive auditory stimulation. I will call the neural state that reflects proximal intensity, however indirectly, *encoded intensity*.

Three corresponding senses of loudness must also be distinguished: *source loudness*, *subjective loudness*, and *encoded loudness*. The distinction between source and proximal intensity gives rise to that of source and subjective loudness. Subjective loudness is how loud a sound is *to a subject*, its volume on her auditory field. Source loudness is the loudness of a sound event out in the world, and is distinct from source intensity; source intensity is an objective feature of a sound event, whereas assessments of source loudness are both subjective and subjunctive, viz., how loud a sound *would be* to a subject were she at the location of the sound event. For example, the subjective loudness of a siren on yonder mountain is softer than the siren's source loudness because the intensity of the sound wave that carries information from its source degrades as a function of distance; from the siren's location, though, the event would be painfully loud.²⁸

²⁸ Is it a sound's source loudness or its subjective loudness that speakers mean when they report that a sound is loud? It depends on contextual features of the sound. Subjects tend to understand the term 'loudness' as referring to source loudness in situations for which information about the source of the sound is available and subjective loudness otherwise. When loudness estimates are solicited from subjects without specifying whether a subjective or a source estimate should be provided, cues about the source of a sound affect whether subjects report subjective or source loudness; sounds that implicitly convey information about their source (a raised voice may be recognized as such independent of its subjective loudness, for example) and sounds that are accompanied by visual cues about the location of their source tend to elicit distance-invariant estimations of loudness more than sounds without such cues (such as pure tones delivered by headphones), suggesting that subjects are more inclined to provide reports of source loudness for the former and subjective loudness for the latter. Nonetheless, when explicitly asked to focus on the subjective loudness of a sound, subjects are able to do so; the subjective loudness of a sound is phenomenally available even if source loudness is often prioritized in loudness reports (Berthomieu et al., 2021).

Both subjective loudness and source loudness depend at least in part on encoded intensity. Nonetheless, encoded intensity is not a neural correlate of either source or subjective loudness. This is obvious with respect to source loudness; recovery of source loudness requires encoded intensity *and* some additional information about, e.g., the distance of the source of the sound from the subject.²⁹ So, source loudness (and source intensity) may be set aside. It is subjective loudness, not source loudness, that I claim reflects a sound representation's salience. Encoded loudness, as I will call it, is the neural correlate of subjective loudness. In what follows, unqualified uses of 'loudness' should be taken to mean *subjective* loudness.

Encoded intensity is distinct from encoded loudness. In service of this point, I provide a sketch of the process by which sound intensity is encoded and, in so doing, present the manner and extent to which encoded intensity departs from proximal intensity. I then describe various influences that transform encoded intensity into subjective loudness and describe the location and functional connectivity of encoded loudness as distinct from encoded intensity.

Sound perception begins with a vibration of the tympanic membrane by a sound wave. The tympanic membrane mechanically stimulates a series of small bones which themselves percuss on the entrance to the cochlea, a seashell-shaped organ lined with tiny hairs and filled with fluid that oscillates with vibrational input. Specific areas of the basilar

²⁹ Related to this is the phenomenon of loudness constancy; for at least some sounds, reports of source loudness remain constant – and accurate – even as distance from the source (and thereby proximal intensity) changes. The mechanism by which loudness constancy is achieved is not fully understood. One hypothesis is that source loudness is recovered from encoded intensity as a function of distance from the source, but this requires an accurate representation of source distance, which subjects systematically underestimate. Another possibility is that loudness constancy is achieved not as a function of distance information, but rather a function of information about reverberant sound energy which can be recovered from the proximal stimulation (Zahorik & Wightman, 2001).

membrane, a tonotopically organized rigid structure along the bottom of the cochlea, resonate according to the frequency of the input stimulation; the base of the cochlea resonates in response to the highest detectable frequencies, while the tip resonates with the lowest. Vibrations on the basilar membrane cause oscillations in the fluid of the cochlea that displace hairs in the vicinity of these vibrations. Displaced hairs transduce these mechanical stimulations into electrical ones; each hair in the cochlea synapses with a neuron that generates action potentials in response to displacement, which then projects through a dedicated pathway through the auditory nerve.

Pitch is the perceptual correlate of sound wave frequency. Per the above, information about frequency is encoded by *which* auditory neurons fire. In addition, auditory neurons tend to phase-lock with the oscillations that trigger them, which means that sequences of action potentials by an auditory neuron are generated at the same “part” of each cycle of the stimulus wave; if an action potential occurs at the peak of a wave’s cycle, then subsequent potentials will also occur at that peak. Since auditory neurons are selectively responsive to specific frequencies, this means that the frequency of neural impulses from an auditory neuron matches the frequency of the tone to which it responds. So, information about pitch is also temporally encoded by the firing rate of auditory neurons. This temporal encoding has important implications for loudness, for reasons that will emerge presently.

Loudness is typically held to represent sound intensity, a property of a sound wave closely related to its amplitude. There are no sound intensity receptors, which is to say receptors selectively responsive to sound wave amplitude; unlike pitch, the data relevant to sound intensity does not involve the direct transduction of any quality of a sound wave. Information roughly corresponding to sound intensity is instead recovered from total activity in the auditory nerve. That there is even an approximate correspondence between

sound intensity and encoded intensity is a byproduct of pitch encoding: more intense sound waves cause more auditory neurons sensitive to the sound wave's component frequencies to be engaged as well as more frequent impulses from individual auditory neurons, resulting in more impulses being projected through the auditory nerve.

The more auditory nerve activity a sound generates, the greater its encoded intensity. The reason that encoded intensity is a systematically incorrect guide to sound intensity is that there are asymmetries in the potential of both individual and collections of frequencies to activate auditory neurons. Because action potentials from auditory neurons phase-lock to the frequency to which they are responsive, low-frequency tones do not generate as many action potentials as high-frequency ones. Suppose that a sound wave, by virtue of its very high intensity level, generates an action potential in a certain auditory neuron with every wave cycle. If that sound is a low frequency (and that neuron is thereby selectively responsive to that frequency), then it produces only half the number of action potentials as a wave with double the frequency but the same intensity (and a corresponding auditory neuron) because the higher frequency tone has twice as many cycles in the same amount of time. In practice, individual neurons do not fire with every cycle of even very intense sounds, but collections of neurons that are all selective to a high frequency collectively fire more than collections of neurons selective to a lower frequency. Hence, higher frequency sounds are generally perceived as louder than lower frequency sounds when proximal intensity is held constant.³⁰

By this sketch of auditory sensation, it is tempting to surmise that complex tones – sounds that are comprised of more than one frequency – should be systematically louder

³⁰ See, e.g., Suzuki and Takeshima (2004). This trend reverses with very high frequency sounds for reasons that will take us too far afield to explain; for present purposes, it is enough to appreciate that encoded intensity, and thereby loudness, depends not only on proximal intensity but also, in part, on frequency.

than equal-intensity pure tones. After all, if loudness is a matter of how many frequency-responsive neurons are activated, then a sound that involves more frequencies ought to activate more neurons, and thereby produce louder sound experiences, than one with fewer component frequencies. Reality is a bit more complicated. Multiple frequencies within the same *critical band* – a range of audible frequencies about 1/3 of an octave in range, phenomenally speaking – activate some of the same neurons by virtue of vibrating the same area of the basilar membrane. For example, the frequency corresponding to middle-C activates some of the same neurons as the frequency corresponding to the adjacent C#; neurons responsive to both frequencies do not consistently phase-lock to either one.³¹ Information about auditory receptor activity within the same critical band is pooled together and projected through channels that are bandwidth-specific, not frequency specific, meaning that total auditory nerve activity is determined by action potentials within critical bands rather than by individual frequencies. To the original point, it *is* the case that wide-bandwidth sounds – sounds that activate a wide range of critical bands – are systematically louder than sounds featuring fewer critical bands when sound wave intensity is held constant. This is because auditory neuron activity grows non-linearly with intensity; a tenfold gain in intensity produces only about a doubling in neural activity within the relevant channel, so spreading intensity out across more critical bands produces more activity overall (McDermott, 2013). For example, a 30 dB sound is ten times as intense as a 20 dB sound. So, ten pure tones in distinct critical bands of 20 dB each, played simultaneously, generate a wave with the same intensity as one pure tone of 30 dB. Nonetheless, the ten-tone wave will sound much louder than the pure tone because the neural activity produced in the pure tone's frequency channel

³¹ This is why playing both keys together on the piano sound like a single rough and beat-y tone, rather than two distinct tones as with C and E.

is only double what it would have been at 20 dB, but the ten-tone wave features ten of that 20 dB amount of activity, which sums to a total amount of activity five times the amount of the 30 dB pure tone.³²

So, even at the level of encoded intensity there is a significant departure from proximal intensity; encoded intensity depends both on the frequency and bandwidth of the sound encoded. This is not a novel observation about sound intensity encoding; it is discussed in, e.g., O’Callaghan (2007) and Pautz (2015). While Pautz uses these facts as evidence against a tracking view of loudness, O’Callaghan instead posits that loudness represents the complicated property that encoded intensity in fact responds to – something that incorporates frequency, bandwidth, etc. But the discrepancy between loudness and proximal intensity is not exhausted by that of proximal and encoded intensity; loudness is also distinct from encoded intensity.

Evidence suggests that loudness may be subject to modulation by top-down influences. For example, Siegel and Stefanucci (2011) find that anxious subjects perceive tones to be louder than subjects in a neutral mood. It is not unusual for researchers to uncover evidence that negative emotional states exert some influence on perception, particularly with respect to “enhancing” sensation; for example, Siegel and Stefanucci note that researchers have discovered links between negative affect and, e.g., sensitivity to changes in spatial frequency, efficiency of visual search, and overestimation of vertical distances. It *is* unusual for emotional states to be found influencing an ostensibly primary sensory dimension; anxious subjects might overestimate heights and perform more efficient

³² These numbers are idealized for sake of demonstration. The amount of neural activity in a critical band is determined by myriad factors. For example, as I have already noted, the amount of neural activation caused by a tone depends in part on the tone’s frequency, so the lower-frequency critical bands contribute less neural activity than the mid-range ones.

visual searches, but this does not require that anxious subjects undergo fundamentally different experiences than emotionally neutral counterparts, i.e., that anxiety alters the appearance of hue, luminance, etc. Perhaps, unlike all the other primary sensory dimensions, loudness may be modulated by emotional state. Or, more elegantly, perhaps loudness is not a primary sensory dimension at all.

Loudness is also modulated by the context in which a sound arises. Induced loudness reduction (ILR) is an auditory phenomenon in which identical sounds – tones featuring the same frequency, intensity, and duration – are not perceived as being equally loud when one of them follows an “inducer” tone of the same frequency and duration but greater intensity; the tone following the inducer sounds less loud than the other tone by as much as half (Arieh & Marks, 2011). This effect cannot be attributed to a low-level perceptual process (e.g. receptor fatigue), for, among other things, the effect persists in individuals with cochlear implants whose auditory processing bypasses the cochlea (Wang et al., 2015). Identical stimuli that cause identical encoded intensity states may nonetheless sound loud to different degrees.

A recent study by Schmidt, Mauermann, and Kollmeier (2020) exploited ILR to investigate the location of loudness encoding in the brain. It is usually difficult to distinguish whether a brain state corresponds to encoded intensity or encoded loudness since the former strongly influences the latter, but because ILR effects involve identical encoded intensities, any brain region that differs in activation between contexts – that is, whether or not the target tone is preceded by an inducer tone – is a candidate for a loudness-encoding state. Schmidt *et al.* took EEG measurements of subjects during each context to determine where (and when) loudness is encoded during auditory processing. A state correlating with subjective loudness is not observed until late in auditory processing but nonetheless within

its bounds, in the auditory cortex. All things considered, this means that ILR is not an effect of a high-level judgment, and hence cannot be attributed to a decision bias; loudness encoding is genuinely distinct from intensity encoding, which occurs early in auditory processing. This finding is consistent with results from studies that observe the fMRI correlate of loudness in the auditory cortex. In one study by Röhl and Uppenkamp (2012), subjects were asked to evaluate the categorical loudness of pink noise stimuli of various intensities from within an MRI scanner. Activity in the ascending auditory pathway increases as a function of sound intensity, but a linear covariation with loudness is detected only in the auditory cortex. The researchers find no evidence that loudness is represented in the brain at any point in auditory processing prior to the auditory cortex which, it bears repeating, conducts *high-level* auditory processing.

An unexpected result of this fMRI study is significant. In their concluding remarks, Röhl and Uppenkamp observe that

a range of sound pressure levels of almost 30 dB was rated as similarly loud across the normal-hearing listeners. This range of individual differences in loudness sensation within the examined subject group is by far larger than would be expected for the results from other controlled psychoacoustic experiments...None of the variables we registered in our study (e.g., hearing thresholds, age, personality traits, musical ability, and experience) seemed to be able to explain a significant amount of the observed variance in loudness sensation...On the other hand, it is very unlikely that this variance is only a result of methodological issues of categorical loudness scaling, since these individual differences were shown to be linked to individual differences in neural activation of the [auditory cortex], as reflected by the BOLD signal in auditory fMRI. (p. 378)

So, there is huge variation across subjects in the intensity of sounds described as being similarly loud, but the extraordinary variability of subjects' loudness reports is substantiated by regularity in loudness ratings and brain activity corresponding to encoded loudness. In other words, sound intensity is a poor predictor of encoded loudness, but encoded loudness is a good predictor of subjective loudness. Thirty dB represents a *thousand-fold* difference in

intensity between the top and the bottom of the range. This degree of variability is inexplicable if loudness represents sound intensity, *especially* since subjects start out with more-or-less the same encoded intensity from the proximal stimulus.

This concludes my survey of evidence against an informational relationship between sound intensity and loudness. In brief, information about sound intensity is lost in the process of intensity encoding, encoded intensity does not fully determine loudness, and there are vast interpersonal differences in loudness experiences that are difficult to account for. None of this is consistent with loudness being a prothetic dimension of experience; indeed, the power function of loudness that Stevens identifies may be expected to hold only when all of these variable influences on loudness are held constant, and even then only as an average across subjects.

3.3.2 Loudness and Salience

Nonetheless, it must be respected that encoded intensity, and by extension sound intensity, is the principal driver of loudness. In the remainder of this section, I present evidence in support of the idea that the best way to account for the fact that loudness heavily depends on but does not represent encoded intensity is to identify loudness with the salience of a sound representation and encoded intensity as a feature that influences auditory salience. The first and simplest point in favor of this view is that experimental results, to the extent that we have them, suggest that loudness is highly correlated with salience.

The methodology for studying auditory salience is still under development. Compared to visual attention, which involves eye movements to the fixated location and hence can be studied via eye tracking, it is difficult to establish when an auditory stimulus successfully captures attention. Captures of auditory attention have not been demonstrated to involve any obvious physiological change that can be exploited in auditory attention

experiments. As a result, studies of auditory salience tend to rely on subjective reports of salience.

That said, one potential guide to auditory attentional capture is pupillary response; a handful of studies indicate that pupils dilate in response to deviant auditory stimuli.³³ In a series of three experiments designed to investigate this connection, Liao *et al.* (2015) recorded subjects' pupillary responses to various sounds and asked subjects to evaluate, among other features, the salience and loudness of each sound. The sounds had equal intensity in the first experiment, equal encoded intensity in the second experiment, and variable intensity in the third experiment. Across all three experiments, judgments of salience and loudness are found to be highly correlated with one-another, leading the researchers to conclude that “[a]lthough the aim of the study was to investigate the effects of subjective salience on pupillary responses, the results demonstrated that salience is indicative of, or is heavily influenced by, loudness,” (p. 423).

Another aspect of this study is worth remarking on. Pupillary response is found to covary with loudness/salience judgments in the first and third experiment. In the second experiment, pupillary response covaries with encoded intensity, but not with loudness/salience judgments. Notably, what I call “encoded intensity” is called “loudness” in Liao *et al.*'s (2015) study, a convention in the literature on auditory attention that surely arises from the implicit assumption that loudness represents sound intensity. Liao *et al.* claim to have “adjusted the sound pressure level of each sound so that all of the sounds would have the same loudness on the basis of the loudness model developed by Glasberg and Moore,” (p. 418). Because of the idiosyncratic way that early auditory processing encodes intensity,

³³ E.g. Wang and Munoz (2014), Liao *et al.* (2016), Huang and Elhilali (2017).

equal loudness of very different sounds must be achieved by making their objective intensities *unequal*. Glasberg and Moore's (2002) model reproduces the effects of early auditory encoding on sound waves and hence may be used to determine the expected *encoded intensity* of a sound, not the sound's loudness and, per the previous section, not its encoded loudness. Calling encoded intensity 'loudness' introduces some confusion into Liao *et al.*'s conclusions. For example, they claim that "[i]n Experiment 2, when the sounds were equally loud, the pupillary dilation responses were similar to each other and *did not correlate with salience or loudness*?" and yet that "the overall results [of all three experiments] suggest that the subjective judgment of salience is more or less equivalent to loudness, and that *the pupillary dilation response reflects both*," (p. 421, emphasis added). Pupillary dilation cannot both "reflect" and "not correlate" with salience/loudness. Indeed, in light of Experiment 2, the overall results suggest that pupillary dilation is a reflection not of loudness/salience, but of encoded intensity.

Encoded intensity is, of course, a principal driver of loudness/salience, but, as we have seen, encoded intensity is non-identical to encoded loudness. If pupillary response covaries with encoded intensity, then the results of all three experiments conform to expectations: pupillary response covaries with loudness/salience in conditions of varying encoded intensity (experiments 1 and 3) since encoded intensity is a primary driver of loudness/salience, but pupillary response does *not* covary with loudness/salience in conditions of equivalent encoded intensity (experiment 2) since, as with Schmidt *et al.*'s ILR experiment, it is under these conditions that distinctions between encoded intensity and loudness emerge. This interpretation is consistent with a later study by Huang and Elhilali (2017) which found that, though all salient events correlated with pupil dilation, only about 29% of pupil dilations correspond to salient events in the auditory landscape. However, an

analysis of all pupil dilations finds that they are “correlated significantly with increases in acoustic loudness,” where acoustic loudness refers again to the output of a function that models the computational behavior of early audition – encoded intensity, that is.

In §3.3.1 I presented evidence that loudness does not covary with intensity in a manner that suggests a representational relationship between the two; intensity is encoded by piggybacking on processes that subserve pitch encoding, and as such returns a value of encoded intensity that at best approximates sound intensity. Indeed, loudness does not even covary with *encoded* intensity, as is demonstrated by EEG and fMRI studies that identify loudness encoding at the high level of the auditory cortex. In the fMRI study, it is discovered that there is a high degree of correlation between categorical loudness ratings and encoded loudness; correspondence between categorical loudness and encoded intensity are much more variable. The EEG study finds that the ILR phenomenon is first reflected by electrical activity corresponding to activity in the auditory cortex. Liao *et al.*’s results confirm that loudness and salience covary even if the link they set out to demonstrate, between pupillary dilation and salience, is less direct. To my knowledge, no other study has directly investigated the relationship between subjective loudness and salience. In the remainder of this section I demonstrate that a parsimonious account of all these data points is available if loudness is a quantitative character. I begin with a discussion of feature integration theory, and how it has been adapted to model auditory salience.

Feature Integration Theory (“FIT”), Treisman and Gelade’s (1980) influential model of bottom-up visual attention, has inspired some highly effective computational models of visual attention.³⁴ On these models, visual attention takes its inputs from “feature maps,”

³⁴ See, e.g. Itti and Koch (2000), Itti (2005).

two-dimensional topographic maps of the visual field for various visual features like color, luminance, and orientation. Each of these maps encodes the intensity of a certain feature across the visual field. Information about locations on each feature map with the highest amount of contrast – that is, relatively large local differences in activation on a given feature map – is passed on for the construction of a master “saliency map” that encodes conspicuous locations. More contrast detected at a location across various feature maps results in a more conspicuous location on the saliency map. Attention then processes locations in order of their priority on the saliency map.³⁵

Recent interest in developing a computational model of auditory attention has resulted in several models based on saliency maps. The earliest of these, from Kayser *et al.* (2005), proposes that the features contributing to the auditory salience map include intensity, frequency contrast, and temporal contrast. To test this model, recordings of complex auditory scenes were evaluated for saliency on the presumption that saliency is determined by extraction and analysis of the features just noted. For each auditory scene, researchers extracted each of these features from waveforms in a manner that emulates the behavior of auditory neurons. The level of contrast apparent in the representation of each feature was analyzed and an aggregate assessment of saliency surmised. Next, participants were presented with pairs of these auditory scenes – one in each ear. They were prompted to indicate whether one scene featured a more salient sound event than the other and, if so, which one. The intensity filter by itself is correlated with participant responses, but not as strongly as the predictions of all three features together. This supports the hypothesis that

³⁵ This simplified description eschews interesting and important details regarding, e.g., whether and how top-down attention influences this process, how bottom-up inputs from various feature maps are aggregated, and whether visual attention is subserved by one or more than one saliency map. For further discussion, see e.g. Treisman and Sato (1990), Itti and Koch (2000), Burrows and Moore (2009), respectively.

encoded intensity is an important but non-exclusive contributor to auditory salience. If there is a saliency map for audition, then one of the feature maps on which it depends is surely drawn from encoded intensity.³⁶

During Kayser *et al.*'s trials, participants were also asked to indicate which feature of the sound judged as more salient drove their judgment: frequency structure, temporal structure, or intensity. The contribution of frequency contrast predicted by the saliency map model was significantly larger in auditory scenes for which frequency structure was reported as the basis of subjects' judgments, and the same is true, *mutatis mutandis*, for temporal contrast and structure. Put another way, sounds judged as more salient in virtue of their frequency or temporal structure have higher levels of frequency or temporal contrast, respectively, than sounds judged as salient by virtue of another feature. Not so for intensity; there is no significant difference in the intensity of stimuli reportedly selected based on their intensity than for stimuli selected on some other grounds.

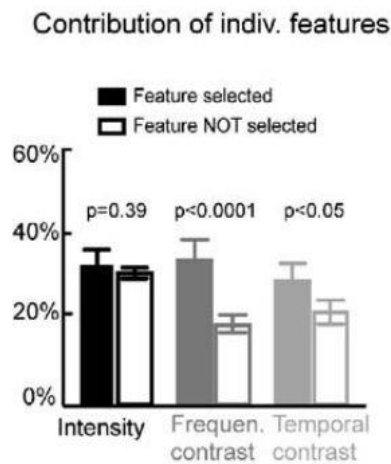


Figure 3. Contribution of individual features to saliency. *Note.* Per Kayser *et al.*, “Solid bars indicate the contribution of each feature to the

³⁶ Since Kayser *et al.*'s study, several saliency map models of auditory attention have demonstrated improved predictive power by incorporating additional feature maps. Even in these improved models, intensity (sometimes under the guise of ‘envelope’ – the “shape” of a waveform from which intensity information may be gleaned) – remains a dominant factor in salience prediction. See, e.g., Kaya (2012).

total saliency for trials on which the subject indicated a rely on that feature, and open bars indicate the contribution on all other trials. Bars show the mean and s.d. across subjects. P values refer to t tests.” Importantly, intensity was variable across trials. This figure appears in Kayser *et al.* (2005). Copyright Elsevier 2005. Reprinted with permission.

Kayser *et al.* suggest that this asymmetry is due to the fact that

any feature is dependent on intensity (zero intensity implies no other features exist). Thus, a feature like frequency or temporal contrast will always be somewhat confounded with intensity. (p. 1944)

In other words, they speculate that stimuli identified as having intensity as their most salient feature are, on average, no more intense than stimuli identified as having a different most-salient feature because detection of those other features requires that they have some level of intensity. So, a sound that is identified as having, say, temporal contrast as its most salient feature might also be rather intense, inflating the average intensity of sounds not identified as having intensity as their most salient feature.

This explanation is unsatisfactory. Though it is true that no intensity implies that that there are no other features of a sound (indeed, that there is no sound wave), this is also true of frequency and temporal structure. Frequency is as much a fundamental feature of any wave as intensity, and by virtue of having frequency a sound wave is necessarily temporally extended. This is true also with respect to phenomenal dimensions of sound: apparent pitch/timbre, temporal structure, and loudness are mutually entailing. To the point in the preceding paragraph, sounds identified as featuring intensity as their most salient feature might also have a high degree of temporal and/or frequency contrast, artificially raising the average contribution of those features in cases for which they were not selected as the most salient feature. So, the fact that intensity is confounded with frequency and temporal structure does not explain the asymmetry, for the same may be said of the other two features.

Summing up so far, auditory attention relies heavily on encoded intensity; a saliency model that relies only on intensity as encoded by the auditory system performs nearly as well as one that incorporates other features. Nevertheless, subjects perform no better than chance when reporting whether intensity is the primary driver of their assessments of salience despite a capacity to successfully do so with respect to other salient auditory features; the actual contribution of intensity to salience does not predict subjects' reports of what they believe drives their salience judgment.

One possible explanation for this asymmetry is a bias for choosing 'intensity' when subjects are not sure which feature of a sound is responsible for its salience. Kayser *et al.*'s method does not include an "unsure" option for subjects who do not know which feature drove their salience judgment. Perhaps subjects answered "frequency structure" when frequency contrast was especially apparent, "temporal structure" when temporal contrast was especially apparent, and "intensity" otherwise. If that's right, then "intensity" judgments would apply not only to sounds they felt were salient in virtue of their intensity, but also to those sounds for which no aspect of the sound was especially apparent. However, this explanation raises a different question: why would subjects asymmetrically choose 'intensity' when they are not sure?

It seems to me that either asymmetry may be explained in the same way. Perhaps subjects genuinely believe that intensity drives their judgements in all such reports, or perhaps some of those reports are disguised 'unsure' responses. In either case, subjects surely use loudness as a guide to intensity; no other feature of auditory experience is even a candidate for the job. Nothing other than loudness can explain why subjects report that the intensity of a sound drives its salience. This means that loudness, unlike frequency structure and temporal structure, is not a good guide to whether the feature it ostensibly represents

drives a sound's salience. As I have discussed, *some* processing beyond intensity encoding can affect loudness, but surely not so much that subjects should fail so spectacularly at identifying events that are salient in virtue of their intensity when they are evidently capable of doing so on behalf of other auditory features. Loudness, in some fundamental way, is *unlike* pitch or tempo.³⁷

Suppose, then, that loudness is not a representation of intensity, but rather a quantitative character, and hence reflects the salience of the sound representation to which it is attached. On this view, there is an available explanation for subjects' unreliability with respect to whether their auditory salience judgments are based on intensity. If, unlike pitch and temporal structure, we do not phenomenally represent sound intensity, then we should *expect* that subjects perform no better than chance at judging whether intensity is a salient feature of a sound. We cannot accurately report on qualities that we cannot perceive.

This cannot be the entire explanation, of course, for participants could also respond with 'temporal structure' or 'frequency structure'. The fact that subjects sometimes responded 'intensity' even though sound intensity is never perceived calls out for explanation. The reason that subjects sometimes say intensity made the difference is that they are using loudness as an indicator of sound intensity. If loudness is a quantitative character, then it reflects not only intensity-based-salience, but also the salience of other qualities of the sound. When the salience of a sound is due in part to features other than

³⁷ Another possible explanation is that the model is wrong with respect to encoded intensity's contribution to auditory salience. This seems unlikely. In order to be wrong in a way that delivers these results – that there is no difference in the influence of encoded intensity on salience between 'rely' and non-'rely' judgments – instead of expected results – that 'rely' judgments involve more influence of encoded intensity on salience than non-'rely' judgments – then the model would have to be dramatically wrong about how intensity-based-salience is determined. Given that their model on which intensity *alone* is able to predict which stimulus is judged as more salient nearly as well as the more complicated model, it would be surprising if they were deeply mistaken about determining salience from intensity.

intensity – temporal structure, frequency structure, or perhaps features that have not yet been identified as contributors to the auditory saliency map – then there will be a mismatch between a sound’s intensity and its loudness. Subjects report (correctly) that the louder of two sounds is more salient, but err in thinking that loudness indicates the sound’s intensity.

Similarly, if a subject is not sure which feature of a selected soundscape is principally contributing to the sound’s salience – if the pitch or the temporal structure is not especially notable – and if she is not keen to the distinction between loudness and intensity, then she is likely to report that the sound’s intensity drove her judgment since the prevailing feature of her sound experience is its loudness. When a subject reports that a sound’s intensity drove a salience assessment, she reports, in effect, that the most salient aspect of the sound is its salience. It is no wonder, then, that these assessments fail to meaningfully reflect the contribution of intensity alone.

Here, then, is my proposal. Encoded intensity does not represent proximal (or distal) intensity. However, in absence of a state that does a better job encoding intensity (and in virtue of the fact that nearby sound events tend to be more intense and are more likely to be behaviorally relevant than distant sound events) encoded intensity is highly useful for determining the amount of attentional processing that a sound representation receives. If auditory attention involves a saliency map, then there is a feature map corresponding to encoded intensity. Encoded intensity contrast exerts a dominating but not exhaustive influence on the auditory saliency map, which is why loudness, a reflection of the salience of a sound representation, tends to (only) approximately correlate with encoded intensity. Other factors that likely influence auditory salience are frequency contrast and temporal contrast, and the explanation for ILR phenomena is that the tone with its loudness reduced

is less salient by virtue of insufficiently contrasting with the inducer tone.³⁸ The saliency map for auditory attention encodes the degree to which various “locations” on the auditory landscape are salient, and the degree to which an auditory object is salient is the degree to which its “location” was encoded as salient.³⁹ In short, sounds are salient because they are intense (among other things), and loud because they are salient.

Summing up, the view that loudness is a quantitative character has the following advantages over the mainstream view, viz. that though loudness is a systematically *inaccurate* representation of intensity, it is nonetheless a feature representation – one that merely *contributes* to salience. First, the discrepancy between loudness and sound intensity is due not only to systematically inaccurate intensity encoding, but also to effects of downstream auditory processing; some sounds differ in loudness even though their intensities are equivalently encoded. In these cases, the best explanation for the processing discrepancy has to do with the relative salience of the sounds, i.e., that the target tone of the ILR

³⁸ The ILR study is interesting for another reason. The component of the auditory evoked potential (AEP) that correlates with loudness is the N1-P2 deflection; reductions in loudness correspond to decreasing N1-P2 amplitude. The N1 component of the N1-P2 complex is associated with change detection, including the occurrence of deviant and oddball stimuli (Pratt, 2011). The N1 potential begins around 100 ms after stimulus onset and is believed to be generated by feature traces antecedent to integrated representations of auditory objects. It is hypothesized that feature integration of auditory objects occurs between 150-200 ms after stimulus onset, which overlaps with the end of the N1 component and the beginning of the P2 (Näätänen & Winkler, 1999). In other words, AEP activity that corresponds to loudness also corresponds to the processing immediately before and throughout the generation of a feature-integrated percept. This is precisely where we should expect to see loudness-related activity on the view that loudness reflects salience. After all, the saliency map is the guide by which bottom-up attention directs its resources, and, on FIT, it is this directing of attention that binds features at the attended location. If there is a saliency map for auditory bottom-up attention, we should expect it to arise at the interface of feature traces and feature-integrated auditory objects, and it would seem that the N1-P2 complex is where we should expect to locate that sort of processing. This does not, of course, constitute evidence that loudness is a presentation of salience; there is much more to say about the N1-P2 complex than I have discussed here. I raise it only to suggest that current understanding of the N1-P2 complex is consistent with loudness reflecting salience.

³⁹ Näätänen and Winkler (1999) point out that one way in which feature-integrated auditory objects differ from feature-integrated visual objects is that the “medium” of object formation is space while the “medium” for auditory object formation is time. Hence, the analog of a saliency map for auditory attention is unlikely to be a topographic spatial representation, and so the notion of a “location” is here an analogy for whatever it is that “temporal maps” encode.

phenomenon is softer because it is qualitatively the same as the inducer tone – the lack of novelty diminishes its salience and hence its loudness. Second, there is tremendous interpersonal variability with respect to loudness. This is unusual with respect to feature representations, but typical of experiences that are differently modulated by attention. Third, though intensity is a strong predictor of auditory salience, subjects are not able to tell when intensity is responsible for their salience judgments as they are when some other audible feature is responsible. If loudness was a feature representation, then subjects ought to be able to identify whether loudness was the principal contributor to their salience judgments, given that they are capable of doing so with respect other auditory features. If, on the other hand, loudness is a reflection of salience, then using loudness as a barometer for encoded intensity is expected to be prone to error. To my knowledge, the view that loudness is a quantitative character is consistent with the current state of empirical work on loudness and auditory processing. So, I contend that the most parsimonious explanation for the foregoing considerations is that loudness is not a representation of a feature of sounds, but rather a reflection of the salience of sound representations.

3.4 Salience and the Attentional Economy

In this chapter I set out to introduce the notion of quantitative character, a species of phenomenal character that reflects the salience of the representation to which it is attached. I have said quite a bit about quantitative character – how it appears, how it can be distinguished from qualitative character – but relatively little about salience.

Salience has traditionally been understood as pertaining solely to bottom-up attention. Within the domain of bottom-up attention, salience is afforded variously to distal stimuli, stimulus features, representations of stimulus features, locations, and actions: a stimulus is salient when its features attract attention to it; a stimulus feature is salient when it

attracts attention; representations of a stimulus feature are salient when they enter into computational processes that allocate attention (e.g. feature maps that feed a saliency map); locations are salient when the saliency map directs attention to them; actions are salient when they are driven by the saliency map.⁴⁰ In typical use, ‘saliency’ broadly describes causal relations between attention and its inputs, so saliency need not be ascribed to one of these things at the exclusion of the others. Representations of salient features (which are typically caused by salient distal features, which are borne by salient distal objects) are causally responsible for the distribution of salient locations on the saliency map. The map, in turn, causes salient actions like eye saccades, which support access to attention for salient stimuli. Since each of these things plays a causal role in a stimulus’s getting noticed by attention, they each count as salient on the typical meaning. Hence, the typical meaning of ‘saliency’ is not very theoretically interesting. It picks out something like *being a causal antecedent of a bottom-up attentional process*. It does not describe any feature of attention’s operation, only its inputs and their causes, and even there is limited to stimulus-driven inputs since top-down causal influences on attention are, by definition, excluded from the class of salient items.

The sense of saliency to which I appeal applies to some of these causal antecedents. ‘Saliency’, as I use it, applies only to representations. Feature representations and regions of saliency maps are representations, and they are salient when they have an impact on attention. Ultimately, however, it is exclusively the saliency of feature-integrated object representations (henceforth “object-representations”) that immediately explains quantitative

⁴⁰ Ascription of saliency to stimuli and their features is pervasive in the attention literature. Ascription of saliency to feature representations and locations arises within the literature on computational models of bottom-up attention, e.g. Koch and Ullman (1987). Ascription of saliency to actions arises within literature that conceives of attention as selection for action, e.g. Kerzel and Schönhammer (2013), including views on which bottom-up attention subserves a “belief optimizing” function of perception by determining the best locations to conduct “experiments” aimed at reduction of uncertainty, i.e. by determining locations of eye saccades (Parr & Friston, 2019)

character. An object-representation is a representation of an object bearing features that arises from feature binding, the binding of distinct feature representations into a single unit. Representations of an object's features, as on feature maps, explain *why* an object-representation is salient; an object-representation is endowed with salience accrued by these feature representations. However, it is object-representations that enter the attentional system with that accrued salience and command attentional processing. Salience, then, is the currency of the attentional economy. Early perceptual processes *earn* the salience that object-representations *spend* on attentional processing. Some object-representations are brought about by highly salient feature representations, and so are afforded a large allowance in the attentional marketplace, all else being equal. Others are brought about by less salient feature representations and are thereby less salient object-representations.

Quantitative character is a phenomenal reflection of an object-representation's salience. By this I mean that the salience accrued by an object-representation is traded for a correspondent amount of attentional processing; the amount of attentional processing an object-representation receives is fully determined by the object-representation's salience. Since there is no danger of the value of the goods coming apart from the currency, so to speak, there is no harm in using the term 'salience' to describe both the amount of attentional processing and the amount used to afford that amount of attentional processing; they are the same amount. To be clear, though, it is the attentional processing itself, and hence a functional state of the attention system, that realizes quantitative character.

There is a high degree of interpersonal and intrapersonal variability with respect to the salience afforded to exactly similar object-representations; two identical stimuli need not command the same amount of attentional processing. The amount of salience afforded to an object-representation on the basis of its causal antecedents is determined by subjective and

dynamic “market forces,” as it were. These include species-wide differences, as we might attribute to Mild and Severe. For members of Severe’s species, feature-representations that indicate an insult to skin integrity accrue a higher amount of salience for their object-representations than they do for Mild’s species.⁴¹ There are also transient intrapersonal differences that can affect the attentional economy, such as a subject’s mood; the reason auditory objects sound louder to anxious subjects is that anxiety positively influences the rate-of-exchange for some auditory feature representations and the salience thereby afforded to the object-representation to which that feature representation contributes. Put another way, the same auditory stimulus sounds louder to an anxious subject because anxiety allows auditory objects to command more attentional processing.

To that point, it is worth noting that top-down processes may influence salience, and thereby influence quantitative character. Top-down factors may modulate the salience of object-representations by, e.g., altering salience-appraisal functions. For example, consider the cocktail party effect, in which one attends to a stream of speech amid competing speech streams. The attended stream receives preferential auditory processing; other streams are “tuned out” – not to the degree that we are completely unaware of them, of course, but at least to the degree that we are broadly unaware of their contents. As I am using ‘salience’, this can be described as a top-down influence on the relative salience of the attended stream compared to the unattended streams; selectively attending to the one stream increases the salience of representations of features of the selected stream and/or reduces the salience of features of other streams. Some distracting events – hearing one’s name in a competing stream, for example – might register as sufficiently salient to briefly pull one’s focus from the

⁴¹ This proposal is discussed in detail in §5.3.

selected stream, for selection of the one stream does not make it so salient that nothing else can get through. Nonetheless, the modulation of salience introduces *enough* of a processing difference to accommodate comprehension of the selected stream.

The degree to which an object-representation is salient is reflected in the phenomenal representation of that object as quantitative character. The stream one focuses on has a dominating influence on one's phenomenal landscape; it is more phenomenally prominent than the other streams that muddle together in the background of the soundscape. It might seem odd to call this phenomenal difference a difference in loudness, but this is only because we so often use the term 'loudness' to mean 'distal intensity' and shifting focus to one person's speech stream does not make it seem like the person has begun to speak louder. If loudness is instead understood as a subjective feature of experience, what else could it describe other than the phenomenal prominence of an auditory object? If we impose a spatial metaphor on the auditory landscape, we might describe phenomenal prominence as the arrangement of auditory objects such that the most dominant one is "in front" of all the others, that the most prominent sound "sticks out." But the auditory landscape is not spatial, and as such phenomenal prominence must be due to some other phenomenally available aspect of auditory experience. I can think of no other aspect of the auditory experience that could underscore phenomenal prominence other than loudness; sounds certainly do not seem to increase in pitch or change in temporal structure as they increase in phenomenal prominence. If we genuinely *feel* phenomenal prominence in audition, then it must be via loudness. This point is perhaps clearer with respect to distracting stimuli. If I didn't know any better, I might think that the person I overhear saying 'Kim' at a party has intentionally said my name louder than all other words in her

speech stream; it sounds so loud to me that I don't know how I managed to ignore the intruding speech stream in the first place.

3.5 Conclusion

The sort of salience that underlies quantitative character is compatible with any plausible empirical or computational model of attention. After all, quantitative character as I conceive of it is just a measure of the “size,” as it were, of the attentional processing response to an object-representation. The existence of such a construct requires only that attention processes object-representations, a minimal commitment that any model of attention is likely to satisfy.

In principle it could be empirically demonstrated that quantitative character fails to covary with attentional processing. However, given the relative infancy of research on attention and its neural implementation, it would seem that the ability to determine how much attentional processing an object-representation receives with any degree of precision is far-off. Correspondingly, I can only gesture broadly at attentional processing as the functional corollary of quantitative character, for I do not know how to best quantify attentional processing or indeed what kind of attentional processing might determine quantitative character. There are many open questions with respect to this account of quantitative character.

Nonetheless, it is difficult to imagine an analysis that makes better sense of the peculiar phenomenal characters that I call quantitative that does not appeal to salience. Quantitative characters are much like prosthetic dimensions, but differ in two significant ways. First, they seem to modulate the phenomenal intensity not of any particular feature, but of whole object representations, as evinced by the fact that their null values necessarily eliminate the objects to which they apply from the phenomenal landscape. Second, they

seem intrinsically bound up with attention. Object-representations with relatively high values of quantitative character are presented in a manner that makes them easy to notice and difficult to ignore; engaging with them is irresistible. This is not the case for qualitative characters; even at objectively high values, no quality of a metathetic or prothetic dimension essentially drives attention toward it. A straightforward explanation for this pair of features is that quantitative character is an output not of perception directly, but of attentional processing of perceptual representations.

I have sought to demonstrate that empirical evidence is consistent with loudness being a quantitative character, and rather baffling if loudness is a representation of a distal feature. In any event, it seems clear that loudness cannot be satisfactorily explained by a tracking account of qualitative character. So, a theory-motivated reason to hold that loudness is a quantitative character is to salvage a tracking account of qualitative character. To that end, in the next chapter I present the composite account of phenomenal character, a hybrid account of the phenomenal that endorses a tracking view of qualitative character and a functionalist view of quantitative character.

CHAPTER 4

THE COMPOSITE ACCOUNT OF PHENOMENAL CHARACTER

4.1 Introduction

In this chapter I develop the composite account of phenomenal character. The composite account is straightforward. It upholds tracking representationalism not for phenomenal character broadly, but *exclusively* for qualitative character. Quantitative character is explained not by content, but by the salience of the object-representation to which it adheres. Per the previous chapter, the salience of an object-representation determines how much attentional processing it receives, and quantitative character is realized by the state of the attention system that conducts that processing.

The composite account is a version of intentionalism, and so quantitative characters are taken to possess intentional contents, but they do not *reduce* to their contents. For, though quantitative characters reflect the salience of object-representations, this is not what they represent. Quantitative characters represent the salience of *the objects* of object-representations. I discuss the content of quantitative character in §4.2.

Because the composite account is only partly reductive, it accommodates challenges from the phenomenal effects of attention that tracking representationalism has difficulty countenancing. As a demonstration, I show how the composite account provides a solution to an attention-related objection to tracking representationalism about visual perception in §4.3.

In §4.4 I consider objections to the composite account. First, I discuss influential objections to functionalism and show that they do not extend to the functionalist component of the composite account. Next, I demonstrate that though quantitative characters do not track their contents, they nonetheless satisfy intentionalism in a way that is

consistent with the composite account's tracking representationalist component. Last, I argue that the composite account does not fall victim to alleged problems with "restricted" representationalism, versions of representationalism on which some but not all phenomenal characters reduce to their intentional contents.

4.2 Quantitative Content

According to the transparency intuition, phenomenal characters are always presented as features of something other than experience itself. Quantitative character is a species of phenomenal character, so, if the transparency intuition is correct, then quantitative character must be presented as a feature of something other than experience itself.

Quantitative character is explained by the salience of the object-representation to which it is attached, but this is not what it represents. If loudness represented a sound *representation's* salience, then loudness would seem to be a feature of sound representations, and hence, in defiance of the transparency intuition, a feature of experience itself. I think the transparency intuition is correct, even with respect to quantitative character. Loudness, for example, *seems* to be a feature of sounds. If a jackhammer is breaking up concrete outside my window, the loudness I experience feels like it comes from *out there*, where the construction crew is working. Whatever the reduction base of loudness, it does not seem to be a feature of my experience.

Another reason that quantitative character cannot represent the salience of the object-representation to which it is attached is that facts about quantitative character never deviate from the relevant facts about the attention system that gives rise to them, but it ought to be possible for representations to misrepresent. This is a real challenge, for it seems *correct* that salience attributions cannot be mistaken insofar as a subject cannot be wrong about, e.g., the intensity of her pain; on the view under consideration, pains are exactly as

intense as they subjectively feel in that the subjective intensity of a pain is entirely determined by the salience ascribed to the representation that gives rise to it. Similarly for loudness: a subject might be mistaken about the objective intensity of a sound wave that she hears, but not about how loud it is to her. So, an account of the content of quantitative character ought to somehow explain this intuition while nonetheless allowing the possibility of misrepresentation.

I think that while quantitative character reduces to the salience of the object-representation to which it is attached, quantitative character represents the salience of *the object* of its object-representation. Quantitative character directly reflects the salience of the qualitative representation to which it is attached; there is no possibility of quantitative character misrepresenting the salience of the representation to which it is attached because attentional processing, and hence quantitative character, is fully determined by that representation's salience. Nonetheless, the phenomenal content of quantitative representations is that the item represented by the object-representation is salient, e.g., that loudness represents the degree to which a distal sound is salient.

This view that quantitative character represents the salience of the object of an object-representation is straightforwardly compatible with the fact that quantitative characters seem to be attributed to the objects of object-representations. However, salience as I have defined it could never be a feature of distal objects; a distal object may have features that bring about salient representations in a subject, but the distal objects themselves do not and cannot instantiate salience. Clearly the object of an object-representation cannot be salient if salience is not a feature that distal objects can bear. So, if quantitative character represents the degree to which the object of an object representation is salient, and if distal

objects cannot be salient, then quantitative character *always* misrepresents. *Prima facie*, this is even worse than a view on which quantitative characters never misrepresent.

Nonetheless, my preferred approach to this problem is a projectivist one that embraces this consequence. When things go well, the object of an object-representation is a distal object. So, when quantitative character adheres to a qualitative representation of a distal object, it *mistakenly* represents that distal object as salient, for salience is not a property borne by distal objects. The denizens of the attentional economy are *representations*. These representations do not represent their objects *as* salient, for salience is not a local physical property and so it cannot be tracked by perceptual systems. Rather, representations *become* salient when they are afforded access to attention. Salience shows up in phenomenal experience because attention determines which representations show up in our phenomenal landscape, and the degree to which a representation shows up is determined by how much attentional processing it receives. Attentional phenomenology ends up transitively attributed to the objects of those representations due to the inherent intentionality of the perceptual representations they modulate, but quantitative character is not realized by a mere representational state as qualitative characters are.

In what way do distal objects appear to be salient, and how does attentional processing explain that phenomenology? Apparent salience resembles the sort of processing that attention conducts. Highly salient object-representations are given priority in the distribution of attentional resources, and as a result of that processing, more data is available about the objects they represent than about the objects of other, less salient object-representations. The phenomenal effect is similarly as of priority, as though the relevant object is a focal point around which other items in the landscape are arranged. The indifferent world does not privilege some object over others in this way, but the world as it

is presented to a perceiver ranks some objects as more important than others, bringing them to the forefront of awareness. This, I think, is the most general description of the phenomenology of quantitative character. Its instances vary slightly from modality to modality by virtue of the fact that each modality involves distinct kinds of phenomenal qualities, but in each case objects represented as salient seem to have a sort of gravity unmatched by their competitors on the distal landscape, mirroring the priority that salient object-representations enjoy in attentional processing.

At any rate, the projectivist approach, in brief, is to hold that quantitative character gets the degree of salience right, but attributes it to the wrong thing; quantitative character represents the object of experience as salient even though it is a representation *of* that object which is, in fact, salient. The reason I find the projectivist approach to quantitative character appealing is that it affords a plausible explanation for the intuition that quantitative characters are never mistaken while still allowing that they are representations. The degree of salience that quantitative character attributes to objects is *precisely* the degree of salience of *representations* of those objects, and the degree rather than the object of quantitative characters seems to be the heart of the intuition that they are never mistaken.

Summing up so far, when a mere representation is both salient and phenomenally represented, the resultant phenomenal state features both qualitative and quantitative character. The phenomenal state's qualitative character is determined by the external properties the underlying mere representational state tracks. Its quantitative character is determined by the salience afforded to the underlying mere object-representation and realized by the concordant attentional processing that it receives. Both kinds of character are ascribed to a (typically distal) object of experience; qualitative character represents the object's features, and quantitative characters represent the object's salience.

4.3 The Phenomenology of Visual Attention

Block (2010) argues that empirical results indicating an attentional influence on phenomenal character are incompatible with tracking representationalism. In this section I will present this argument before discussing how the composite account may evade it.

Carrasco *et al.* (2004) conducted an experiment involving deployment of covert attention to Gabor patches of varying contrasts. Subjects were asked to attend to a central fixation point on a screen, after which a location on the screen was cued – either a neutral cue, i.e., at the central fixation point, or a peripheral cue to the left or right of the fixation point – in a manner such that subjects could be expected to deploy covert attention to the locations of peripheral cues. Subsequently, subjects were presented with a pair of Gabor patches on either side of the central fixation point and reported on which patch appeared to be higher in contrast. The results indicate that a subject's covertly attending to, e.g., a 22% contrast Gabor patch makes it appear to feature the same level of contrast as a 28% contrast patch in the neutral cue context, in which covert attention is not deployed from the fixation point between the two patches. The same effect occurs when subjects are presented with only a single patch, so the apparent boost in contrast cannot be an artifact of a comparative judgment; the contrast difference emerges at the level of the percept. Carrasco *et al.* conclude that attention boosts apparent contrast.

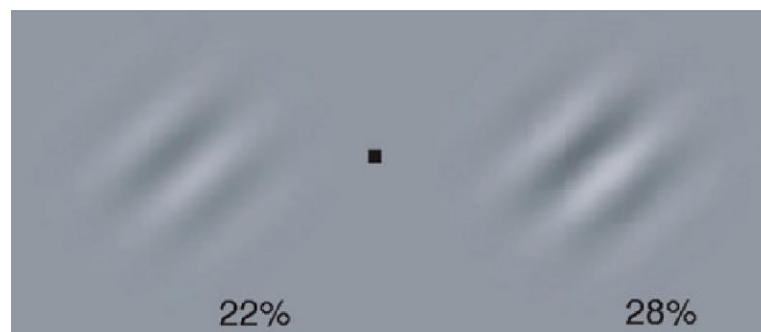


Figure 4. Gabor patches. *Note.* The Gabor patch on the left is lower in contrast than the patch on the right. It appears to be so for a subject who

attends to the black dot in the center. However, if the subject fixes her eyes on the black dot and, without moving her eyes, attends to the patch on the left, the left patch appears to feature the same level of contrast as the patch on the right. This figure appears in Block (2010). Copyright John Wiley and Sons 2010. Reprinted with permission

Block argues that that these and related results are incompatible with tracking representationalism. The extent to which tracking representationalists can countenance phenomenally distinct experiences of the same stimulus is limited; they must claim that either at least one of the experiences is illusory or that the experiences feature contents with different levels of vagueness/indeterminacy. Block argues convincingly that the relevant attentional effects cannot reasonably be attributed to illusion, leaving only the indeterminacy reply.

Tracking representationalists sometimes appeal to content indeterminacy to explain away phenomenal differences without obvious underlying differences in content – the difference between blurred vision and clearly seeing blurred items, for example. To Block's objection that for tracking representationalism there is an unaccountable phenomenal difference between seeing blurrily (as with watching a movie with one's glasses off) and seeing something blurry (as with viewing the film with one's glasses on, but the projector out of focus), Tye (2000, p. 80) agrees that there is a phenomenal difference, but one that is explainable by a difference in determinacy of content. Seeing blurrily, he suggests, involves indeterminately representing crisp content, whereas seeing something blurry involves determinately representing blurry content.

Block considers whether this strategy might accommodate the Gabor patch results. The challenge for the tracking representationalist is to explain why the 22%-contrast Gabor patch looks different in each condition – lower in contrast than the 28% patch when unattended, but the same level of contrast when covertly attended. If the content of these experiences features some indeterminacy – that is, if each experience represents not a precise

level of contrast (22%, 28%), but that the level of contrast falls within some *range* – and if the ranges represented by each experience are distinct but overlapping, then the experiences indeed feature distinct contents. Perhaps the unattended 22% patch is represented as falling within the 16-28% contrast range, whereas the attended 22% patch is represented as falling within the 22-34% range. Since distinct contents may give rise to distinct phenomenal characters, and since the content is veridical in each case, this seems, at first glance, to resolve the challenge.

Nonetheless, Block contends that this reply is unsatisfactory, for the distinct contrast appearances *look* like determinate features, not at all like blurry boundaries or boundaries seen blurrily. “If the phenomenology of perception flows from representational content,” he says, “then indeterminacy in content would have to be reflected in an indeterminacy of look,” (p. 52). But the phenomenology of attentional modulation cannot be characterized as being indeterminate in character. “Attention,” he observes, “makes attended items bigger, faster, more contrasty, more saturated... These effects do not depend on—and are not reflections of—any sort of fuzziness,” (p. 52).

The problem is not just that contrast is not phenomenally “fuzzy,” but also that attention’s boosting effects exceed just-noticeable-difference thresholds, which means that there is more than one way that contrast can appear within the relevant ranges. The just-noticeable-difference threshold for contrast is only 2%, so there are at least seven distinct ways that contrast in the 16-28% range can “look.” Since there is more than one way of “looking” associated with contrasts in the 16-28% range, the phenomenal character of an experience bearing the content ‘16-28% contrast’ cannot be fixed by representational content alone; something else must determine which of those ways ‘16-28% contrast’

content is presented. Block concludes that tracking representationalism cannot explain this attention-related difference in apparent contrast.

However, Schneider and Komlos (2008) argue that Carrasco *et al.*'s results are not, in fact, due to a difference in apparent contrast, but rather a decision bias. They repeat the same experiment, but instead of asking *which* patch has higher contrast (the “comparative paradigm”), they ask *whether* the patches are *equal* in contrast (the “equality paradigm”). The paradigms differ with respect to their measure of the point of subjective equality (“PSE”), the point at which the contrast level of two stimuli looks to be the same. PSE on the comparative paradigm is supposed to be reflected by cases in which 50% of people say one stimulus is higher in contrast, and 50% say the other is. The idea is that parity in response occurs only for pairs of stimuli that look the same to subjects; they are equally likely to pick either stimulus as the one higher in contrast. The problem with the comparative paradigm is that its measure of PSE is easily confounded with decision biases; in particular, a pro-attended-stimulus-bias – a bias on which, all else being equal, a subject picks the attended stimulus – is most likely to show itself in cases where subjects have a hard time deciding which stimulus looks to feature higher contrast. If people are more likely to pick the attended stimulus when they are uncertain, then response parity does not reflect PSE since some of those decisions skew toward the attended stimulus in virtue of a decision bias rather than a genuine appearance difference.

The equality paradigm determines PSE in a different way. Instead of being determined by the cases where people have the most difficulty determining which stimulus is higher in contrast, the equality paradigm determines PSE by the pairs of stimuli that are maximally likely to be judged as equal in contrast. This avoids the pro-attended-stimulus bias confound because subjects do not pick the attended stimulus at the exclusion of the

unattended one when they select “equal,” and it is these “equal” judgments that are used to determine PSE. If there really was a difference in apparent contrast between attended and unattended stimuli, the equality paradigm would capture it; it would find that, say, attended stimuli of 35% contrast are maximally likely to be judged as being the same contrast as unattended stimuli of 40% contrast. But this is not what Schneider and Komlos find; pairs of stimuli that are maximally likely to be judged as equal in contrast are those that actually *are* equal in contrast. They conclude that the effects of Carrasco's experiments are due to a pro-attended-stimulus bias when subjects are uncertain about which stimulus looks to be higher in contrast. Apparent contrast, they find, is unaltered by attention.

Carrasco and Schneider remain divided on whether the experimental data indicate a difference in apparent contrast or a biased decision mechanism. In a more recent study, Anton-Erxleben, Abrams, and Carrasco (2010) ostensibly demonstrate that the apparent contrast asymmetry may be recovered even on the equality paradigm, but Schneider (2011) replies that their results hinge on an error in their data analysis that, once corrected, swings the pendulum back toward an indication of a non-perceptual explanation. Even if we conclude only that the matter is not settled empirically, Schneider offers reasons to think that the burden of proof lies with Carrasco and colleagues to show that attention alters appearance. There exists “no other data or theoretical reason to think that it should,” he claims, but he identifies several *prima facie* reasons that count against it. For example, the notion that attention might alter apparent contrast is borne out of a theory of attention that is now obsolete due to its incompatibility with psychological and neuroscientific evidence, and it is not obvious that the phenomenal difference evident in Carrasco's experiments is distinguishable from visual “pop out,” which need not involve apparent contrast. “A more

reasonable position,” claims Schneider, “is that attention enhances the salience of a stimulus without affecting the veridical perception of its features,” (p. 7).

It is one thing to hold that attention does not affect perception of contrast (if indeed contrast is a perceptible feature), as Schneider does in the above quotation. It is another to claim that attended and unattended Gabor patch experiences do not admit of *any* phenomenal difference. Schneider and Komlos endorse even this stronger claim, concluding that “reported effects of attention upon appearance can be *entirely* explained by decision bias, and that attention does not alter appearance,” (p. 1, emphasis added). This is mistaken. That there is a phenomenal difference may be adduced by anyone by alternately attending to the centered dot and to the left patch in Figure 4. Decision biases are not phenomenal states, so it cannot be the case that reported effects of attention on appearance may be “entirely” explained by a decision bias. Schneider and Komlos show, at most, that the phenomenal difference in question is not a difference in apparent contrast.

So, even if the phenomenal difference apparent between the Gabor patches is not due to a difference in apparent content, it still presents a challenge to tracking representationalism unless that phenomenal difference can be chalked up to some other difference in perceptual content. What difference could that be? There are simply not very many features apparent on a Gabor patch and, at least intuitively, they do not seem to explain the phenomenal difference between the patches; apparent contrast was the most likely candidate for a feature altered by attention. Even if Block’s argument cannot gain purchase on tracking accounts of phenomenal character, it would seem that the exhaustion of options for explaining the relevant phenomenal difference in terms of content remains a problem for tracking representationalism.

Though he denies it in his (2008) with Komlos, Schneider comes around to the idea that there is a phenomenal difference between the pair of Gabor patch experiences. Beck and Schneider (2017) hold that perceptually attending has a proprietary phenomenal character over and above any of perception's deliverables. They call this phenomenal character "mental primer," c.f. mental paint. Mental primer is:

a qualitative feature of experiences that is caused by conscious attention and realizes functional salience but does not in itself represent or make one aware of anything... [It] prioritizes stimuli for action and cognition. (p. 489)

I am not sure how to comport the idea that a phenomenal state is a *realizer* for a functional one with a naturalistic view of the mind, but I suspect they mean only that there are myriad ways that a stimulus might be rendered functionally salient, and mental primer is but one of them. A stimulus is "functionally salient" when it is "treated as important by the perceiver's perceptual and/or cognitive systems," and functional salience is the output of the functional correlate to which they refer when they say that "mental primer has a functional correlate, but no correlate that would make direct realists or [representationalists] happy," (p. 489).

Functional salience includes but outstrips what I call 'salience'. Salience, as I use the term, is the currency by which access to attentional processing is bought by a stimulus representation. Beck and Schneider agree that attentional allocation is explained by the functional salience of stimuli:

Computational models...explain the allocation of attention by appeal to 'saliency maps' (Koch and Ullman, 1987; Itti and Koch, 2000). The most natural interpretation of such models is that the salience of a stimulus causally explains why it becomes attended. The stimulus thus has to be functionally salient before it's attended, and so before it's phenomenally salient. (p. 484)

However, on their view, attention is itself a way for a stimulus to have its functional salience enhanced:

[A]ttention is a mechanism for increasing functional salience, and that conscious attention increases functional salience by way of increasing phenomenal salience. Consciously attending to a patch with 22% contrast will increase its phenomenal and functional salience, and thereby prioritize the experience of the patch for further processing. (p. 484)

So, functional salience is a broader notion than the salience to which I appeal. Salience, as I use the term, is, on Beck and Schneider's view, but one kind of functional salience, the kind that explains the allocation of attention. Attention is itself defined by its role in allocating a different kind of functional salience, mental primer. All forms of functional salience subserve the selection of stimuli for action and cognition.

There are important ways in which my proposal about quantitative character resembles Beck and Schneider's about mental primer. It seems clear that Beck and Schneider are attempting to account for the same dimension of phenomenal experience with their account of mental primer as I am with my account of quantitative character; though Beck and Schneider are here concerned exclusively with this dimension's *visual* phenomenology, it is plausible that the account of mental primer could be extended to other modalities. Both proposals aspire to account for this phenomenal dimension in terms of attention, and both hold that attentional phenomenology cannot be accounted for in terms of tracking relations and posit that it is best explained in functional terms. Also, though I have not stressed this point, I agree that quantitative character is involved in the prioritization of stimuli for action and cognition.⁴²

However, these accounts differ in a critical way. Beck and Schneider insist that mental primer is inconsistent with representationalism because

mental primer does not alter what is perceived or represented, though it does alter the overall phenomenal character of an experience. Mentally primed

⁴² This will be emphasized in §5.3 when I discuss pain intensity.

stimuli are consciously experienced differently than unprimed stimuli, but do not appear to change their properties as a result of being primed. (p. 489)

In other words, mental primer is a dimension of the phenomenal landscape, but expressly *not* a representational one. In contrast, it is *essential* to my account of quantitative character that it has intentional content.

Beck and Schneider offer several reasons for doubting that mental primer is compatible with tracking representationalism. Since I agree that quantitative character does not track any quality, I will not be concerned with their arguments to the effect that a tracking account of mental primer is implausible. However, one of Beck and Schneider's arguments targets not tracking representationalism specifically, but intentionalism broadly: they claim that mental primer is not transparent. Needless to say, I disagree. I briefly addressed transparency with respect to quantitative character in §4.2 and will say more about it in §4.4.2. For now, I will take a different tack and demonstrate that, by their own lights, Beck and Schneider's mental primer *must* have intentional content.

Beck and Schneider use the term 'stimulus' in a manner that applies to both distal stimuli and representations thereof. When Beck and Schneider describe stimuli as being "primed," it may typically be surmised that they mean a representation. After all, as I have stressed, attention may operate only on mental representations. Indeed, since primer ostensibly alters appearance without altering representational content, it would seem that the "stimuli" to which primer is applied must be representations. However, it is fairly crucial on their view that distal stimuli may also be rendered as phenomenally salient; since mental primer (and functional salience more generally) facilitates selection for action, and since they surely mean 'action' in the typical, public, body-involving sense of action and not (or not *exclusively*) something like *mental* action, it must be the case that distal stimuli may be rendered as phenomenally salient. There is nothing wrong with this, of course; it may be that both

representations and distal stimuli are, in some sense, functionally salient. If experiences represent stimuli, then mental primer can plausibly render a distal stimulus as functionally salient *by* rendering a representation of it as salient, just as quantitative character presents the objects of its representations as salient.

It is strange, then, that Beck and Schneider insist that mental primer is not representational. Even if the functional state realizing mental primer is not itself an intentional state, the fact that it facilitates selection of distal stimuli for action by virtue of its phenomenal character *requires* that its phenomenal character adheres, even if only transitively, to those distal stimuli. For example, suppose there is a rock flying toward me which causes a representation to arise in my visual system that is sufficiently (functionally) salient to capture my attention. On Beck and Schneider's view, that attentional capture causes the phenomenal representation of the rock to be primed, and the phenomenal character of mental primer causes the representation with which it is associated – the representation of the rock – to accrue additional functional salience, which plays a role in explaining my taking aversive action. Since the phenomenal character of mental primer is supposed to explain the subsequent increase in the functional salience of the representation with which it is associated, since functional salience explains selection for action, and since a distal item – the rock – is selected for action, it seems that the phenomenal character of mental primer at least partly explains how distal items get selected for action. One easy explanation here is that mental primer “says” that the distal object of a certain perceptual state – *that rock* – is an actionable priority. However, this requires that mental primer has intentional content; it attributes the (subjective) quality of actionable priority to an item in the environment. Beck and Schneider deny this. “Stimuli *are* functionally and phenomenally salient,” they claim, “but perception does not *represent* functional or phenomenal salience,” (p. 487, emphasis in

original). So, this easy option is unavailable to them. Mental primer must make no comment about the items on the perceptual landscape.

How, then, can mental primer factor into behavioral explanations? For Beck and Schneider, attention's function is the manufacturing and distribution of mental primer; mental primer is not a side-effect of attentional processing (as quantitative character is conceived), but rather the *whole point* of the faculty of attention. What distinguishes mental primer from other mechanisms for modulating functional salience is that it does so via its phenomenal properties; the "look" of mental primer explains why a primed stimulus has its functional salience enhanced. But if this "look" does not say anything about that stimulus, and in particular if it does not comment on the relevance of the stimulus to the perceiver, then there is no easy explanation for the fact that it increases the stimulus's functional salience. In other words, the fact that mental primer increases the functional salience of the stimulus it primes cannot be essential to its phenomenal character, for, if it were, then it could only be because that character *means* that the stimulus is functionally salient, in violation of the claim that mental primer is not transparent. However, if mental primer does not essentially comment on the behavioral relevance of a stimulus (or even of a property, a region of space, etc., since for mental primer to not be transparent, it must not comment on *anything* other than experience itself), then mental primer cannot contribute to behavioral explanations; if primer does not say anything about a stimulus to which it adheres, then it cannot factor into the explanation for why a subject engages with that stimulus. Mental primer *must* comment on distal stimuli to facilitate the work the Beck and Schneider cut out for it.

My account of quantitative character differs from Beck and Schneider's account of mental primer in several other ways, but none as critical as the above. Nonetheless, it is

worth demonstrating that the composite account offers an analysis of Gabor patch experiences has comparable explanatory power to Beck and Schneider's mental primer account.

I will refer to attentional phenomenology in the visual domain as "pop-out." Vision scientists use the term 'pop-out' to describe at least two different phenomena in visual attention. The first is the tendency for a unique stimulus to stand out amid homogenous others, e.g. a red square amid green dots will "pop out" to a viewer. The second is a similar effect in visual search, during which targets bearing the searched feature "pop out" from those with unsearched features, as when scanning for red objects amid objects of varying colors. It seems to me that these phenomena feature similar phenomenology that is consistent with quantitative character; stimuli that "pop out" are more phenomenally prominent than those that do not. However, I do not think the phenomenology of visual attention is limited to these two cases. So, as I use the term, 'pop-out' includes but is not limited to the two kinds of phenomena described above. Like loudness, pop-out reflects the salience of the representation to which it is attached. Pop-out exhibits the emblematic scale of other quantitative characters: when a visually perceptible item is highly salient (as a red dot on a white background, say), it pops out more than other items, but when an item is not salient at all, it fades into the background, as with camouflaged moths.

The underlying functional organization of visual attention is consistent with pop-out being a species of quantitative character. Feature Integration Theory, as I discussed in §3.3.2, posits that visual attention is driven in part by a "saliency map" – a topographic representation of conspicuous locations in the visual field. The idea, very roughly, is that in the brain there are map-like representations of the visual field, each representing the distribution of a feature like luminance, color, or orientation. These maps are analyzed for

contrast, and locations with the highest overall contrast across these different feature maps are encoded on the saliency map as worthy targets for attention (Veale et al., 2017). For example, if the visual field consists of a white background and a bright red dot at location l , the saliency map model predicts that there is a high degree of activation in the neural representation of l on both the luminance and color maps due to the relatively high degree of luminance and color contrast there. This in turn causes a high degree of activation on the saliency map. In the absence of competing stimuli, this attracts attention to the corresponding location on the visual field and hence to the red dot. Just as with loudness in the auditory domain, salience assessments are drawn from features of mere representations – patterns of activation on feature maps. In fact, the principal difference between the visual and auditory cases is that in the visual case, the mechanism by which salience is ascribed on the basis of features of mere representations – the saliency map – is already part-and-parcel of the prevailing theory of visual attention.

The composite account is compatible with an explanation on which the difference between the attended and unattended Gabor patches is a difference in quantitative character. The Gabor patch effect under scrutiny arises due to the deployment of covert attention. Covert visual attention is a form of top-down attention. I have already presented how the notion of ‘salience’ to which I appeal is susceptible to both bottom-up and top-down influences. Both kinds of process serve as gatekeepers to attentional processing, and hence they both modulate salience. It need not be the case that top-down attention achieves this via the same saliency map constructed on the basis of feature maps; the composite account makes minimal demands of the cognitive architecture underlying attention, and is not undermined if attention integrates more than one saliency map, if other states intervene between saliency maps and conscious attention, etc. It is nonetheless *possible* that there is just

the one feature map for visual attention, and that covert attention modulates that saliency map. I will explain the composite account in terms of this relatively simple functional arrangement for heuristic purposes, though this should not be taken to be a commitment of the account. First, though, I offer a description of the phenomenal data that the composite account ought to explain.

What is it like to covertly visually attend to a stimulus, and how is it different than not attending to it? Even if the difference in appearance between the attended and unattended Gabor patch is not, in fact, a boost to apparent contrast, it certainly feels like the deployment of attention involves some sort of phenomenal boost. I find that the phenomenal effect of selective attention is akin to swapping from a wide-angle lens to a telephoto one. With my wide-angle lens, I may snap a photo of my coffee mug in front and to the left of my jade plant, with each item equally in-focus. This is like bottom-up attention – there are several apparent objects in my field of view that are presented as being more-or-less equivalently interesting. Not so with the telephoto lens, or with selective attention. Because the items are at different depths from me, I must choose which to focus on with the telephoto lens; focusing on one has a blurring effect on the other, diminishing its interest to me. If I focus on the coffee mug with the telephoto lens, the mug does not look substantially different than it does in the wide-angle photo. The jade plant, however, looks quite different – it is blurry, not even obviously a plant. The use of the telephoto lens severely restricts the plant's ability to be noticed in the resultant photo. Just so with selective attention. That the object of attention seems to pop out *more* is due at least in part to unattended items around it that pop out *less*. It is much harder to notice competing stimuli when one is focused on one in particular.

So, perhaps covert attention is a functional state that takes as input the location of the selected stimulus (the 22% Gabor patch, say) and produces as output a boost to the salience afforded to features occurring at that location on the saliency map. Resultantly, the object-representation that emerges at that location receives more attentional processing than if covert attention had not conferred a boost to the salience of features at the stimulus's location. At the same time, covert attention *suppresses* the salience of other features. In keeping with the phenomenal data, selective attention modulates the “exchange rate,” as it were, between features and salience by biasing the salience gain of some locations on the map; salience accrued by features at the location of the selected item is upwardly modulated, and salience afforded to features at other locations is diminished. This makes it more difficult for unselected stimuli (that is, stimuli at other locations) to exceed the threshold of salience necessary to grab attention. Some stimuli at unattended locations that would have been highlighted under the egalitarian lens of bottom-up attention end up ignored due to of the skewed distribution of salience gain effected by top-down attention. The result is a substantial relative enhancement of the salience of the attended stimulus. In the case of the Gabor patches, the phenomenal difference is not, or at least not only, that the salience of the attended patch is increased, but that the salience of the unattended patch is diminished – it does not pop out as much as it did under the wide angle of bottom-up attention. The phenomenal difference between the selectively attended and unattended Gabor patch (and between selectively attended and unattended stimuli in general) is thus a difference in quantitative character. Per Schneider and Komlos, I take it that the alleged difference in apparent contrast in Carrasco's trials is due to a decision bias.

This proposal, rough and speculative as it is, is broadly consistent with the current state of empirical investigation into attention. Neuroimaging studies support the claim that

top-down attention involves suppression of activity related to processing of unselected stimuli, and that this suppression arises “during spatially directed attention rather than sensory-driven processes,” (Pinsk et al., 2004, p. 627). I do not want to lean too hard into the way things may shake out in the sciences, though – for my purposes, the specifics of the above proposal do not matter nearly as much as the tenability of a view on which the phenomenal effects of top-down and bottom-up attention can both be explained in terms of quantitative character, and there is reason to be optimistic about the prospects of such a view. After all, the idea that top-down and bottom-up attention are distinct processes, and in particular that top-down attention is separable from the stimulus-driven processes of perception and bottom-up attention, has largely been abandoned in favor of a view on which they are two sides of a “push-pull” mechanism that competes for attentional processing resources (Treue, 2003). If that is correct, then salience is surely the currency with which each side conducts its bidding.

4.4 Objections to the Composite Account

4.4.1 Functionalism and the Composite Account

Against functionalism, Block (1978) argues that functional analyses of mental states cannot explain the phenomenal dimension of mental life. It seems possible that functionally identical minds might experience different phenomenal characters while in the same functional state, or that functional duplicates of minds might lack phenomenal character entirely. In this section, I will show that the composite account is not any more vulnerable to these lines of criticism than tracking representationalism alone, and so the functional component of the composite account is not a liability to the view.

According to functionalism, mental states are identical to functional states – states characterized by the role they play within the system of which they are a part. If mental

states are identical to functional states, then any system realizing the same functional arrangement as some mind thereby realizes the same mental states as that mind. Block argues that there are plausible functional duplicates of minds that implausibly realize mental states – especially phenomenal states. He describes homunculi-headed robots – “Blockheads” – which realize the same functional arrangement as a brain, but instead of neurons, the system is comprised of people. Each constituent of the Blockhead keeps watch on a device of some sort – a bulletin board, a phone – and responds with some specified output, such as a button press or a phone call, when he receives the right sort of input from the device he monitors. The idea here is that each person in the system is functionally equivalent to some neuron in a functioning human brain, and that all of the relevant brain’s neurons are so represented. If mental states are functional states and human brains realize mental states, then, by virtue of having the same functional states, Blockheads realize mental states – the same ones as the mind of which it is a duplicate. However, it is implausible that Blockheads have phenomenal states. The people that comprise Blockheads do, but not the system as a whole; Blockheads have absent qualia. So, the argument goes, phenomenal states cannot be identical to functional states.

Block points out that functionalism encounters a related problem with inverted qualia. It seems possible that two individuals could have minds that are exactly similar with respect to their functional arrangement and yet inverted with respect to their color experiences. For example, if one of a pair of twins is fitted at birth with “inverting lenses” which invert the spectrum of hues that he experiences relative to his twin, it seems possible that the twins could nonetheless grow up to be functional duplicates; one twin’s experiencing red while the other experiences green does not seem to be the sort of thing that can be captured by a functional analysis of phenomenal character.

I raise these influential examples not to engage with them directly, but rather to show that they do not pose any special problem for the functionalist element of the composite account. Tracking representationalism is a view specifically about phenomenal mental states according to which they possess their contents by virtue of standing in an intentional relation to them. Since intentional relations are conceived by the tracking representationalist as a special kind of causal relation (causal covariation, functional indication), tracking representationalism is broadly in the spirit of functionalism. Nonetheless, the distinction between intentional and merely causal relations is not a purported explanation for why there is phenomenal consciousness or why some intentional states are phenomenally represented while others are not; to this question, tracking representationalists tend toward a functionalist explanation.⁴³ Rather, it is meant to explain what *determines* phenomenal character – why an experience is red rather than green, say. Tracking representationalism purports to have an answer to the above problems for functional analyses of phenomenal character: two states being functionally identical does not guarantee that they are representationally identical, so the phenomenal differences between us, inverts, and Blockheads are attributable to representational differences. Many do not find this strategy satisfactory, as we saw Chapter 1 with the discussion of Swampman and Block’s variation on

⁴³ Tye (2000) suggests that whether a state realizes phenomenal character is a matter of its being “poised,” that is, “arising at the interface of the nonconceptual and conceptual domains, and [standing] ready and available to make a direct impact on beliefs and/or desires,” a criterion which he notes is “essentially a functional role one,” (p. 62). Dretske (1993) seems to endorse something similar, though he is more obscure. “What makes an internal state or process conscious,” he says, “is the role it plays in making one [conscious]...An experience of x is conscious not because one is aware of the experience, or aware that one is having it, but because, being a certain sort of representation, it makes one aware of the properties (of x) and objects (x itself) of which it is a (sensory) representation,” (p. 280). Though Dretske is intentionally vague on the details here, it seems clear enough that he expects occurrences of phenomenality to be explicable in terms of their functional role in the mental economy. Lycan’s (1997) view on this subject is likewise functionalist; while he agrees that phenomenal representation is a partly representational, partly functional affair, he holds that a subject must be aware of the phenomenal character of her experience in order to have an experience, where awareness is understood in functional terms.

the color inversion problem for tracking representationalism. However, for sake of argument, let us assume that tracking representationalism has an adequate solution to these problems. The present goal is to examine whether the functional account of quantitative character undermines tracking representationalism's tack on these issues.

The tracking representationalist strategy, as far as it goes, extends to the functional account of quantitative character. As I have stressed, quantitative character has no proprietary phenomenal character, and so cannot arise in the absence of qualitative character. If a Blockhead lacks the necessary representational properties to realize a qualitative character, it will thereby fail to realize any associated quantitative character even though quantitative character is functionally determined. Just as turning the volume knob on a speaker has no effect if the speaker is not hooked up to an appropriate input, so too does loudness fail to emerge in the absence of phenomenal auditory qualities. Failure to experience qualitative character guarantees failure to experience quantitative character.

This is not yet enough to defend the functional account of quantitative character. It must be established that functional identity of states underlying quantitative character yields phenomenal identity thereof. Suppose that my brain is duplicated and modified such that all of the neural states that bring about quantitative characters are replaced with tiny men pressing microscopic buttons (or people with cell phones, or radio signals, etc.) in a way that is functionally identical to the neural states they replaced, and that this brain is placed in a duplicate body, or at least a body equipped with suitably similar sense organs. When *I* perceive a sound, my auditory nerve enters into a certain state while transmitting information about that sound, and the firing rate of that transmission is detected by neurons and ultimately passed to my attention system, which uses information about firing rate to construct a saliency map and ultimately afford that sound representation access to attentional

processing. When *my duplicate* perceives the same sound, her auditory nerve enters into that same kind of state while transmitting information about that sound, and the firing rate of that transmission is detected by tiny men who use buttons to convey that information to the appropriate populations of further tiny men who are responsible for feature detection, saliency map creation, and attentional processing itself. Unlike the Blockhead, for which it seems highly unlikely that there are any phenomenal states, it seems to me that my partial duplicate likely has the same experience as me. It does not matter what sort of thing does the straightforwardly computational work that merely modulates the relative prominence of phenomenal representations since the puzzling part, the qualitative character, is by hypothesis already accounted for. That said, it also seems that consciousness might persist in already-conscious individuals for whom any sufficiently small part of her brain is replaced with a functional duplicate. This is true even if the part replaced is one that ostensibly brings about qualitative characters; I find it plausible that I might continue to have sound experiences even if my entire auditory system was replaced with a bizarre functional duplicate while the rest of my brain is kept intact. The point here is not to scrutinize the intentionalist position, but rather to suggest that it is not obvious that the above partial duplication case pumps an intuition about quantitative characters rather than invites uncertainty about how much of the brain's work can be outsourced without a fundamental change in phenomenal experience. *All of it* seems like too much, *a little* seems fine, but the intuitive boundary between these is vague. So, in the end, it is not clear whether the composite account is shielded from the absent qualia objection because the relevant functional states must be tied to intentional states, or merely because by virtue of being a hybrid it enjoys invulnerability to wholesale functional duplication scenarios by fiat. But it is shielded, at any rate.

On the other hand, the possibility of phenomenal inversions of functional states may yet stir up trouble. Since it seems possible that a pair of functional duplicates could be spectrum inverted, could it not also be the case that individuals might be quantitatively inverted? Could I have a functional duplicate such that what is loud to me is soft to her? Note, of course, that the relevant inversion is not between loudness and salient *features* like sound intensity, for, as I have stressed, the salience afforded to a given feature may vary both inter- and intrasubjectively. Rather, the question is whether loudness and how much attentional processing its object-representation receives may be inverted with respect to one-another.

Is it possible for a sound experience's loudness to be inversely proportional to its salience? Might my duplicate have soft experiences of representations that command much bottom-up attention and loud experiences of representations that command little? I am inclined to think not. As I discussed in the previous chapter, there is an important asymmetry between quantitative and qualitative characters: whereas there is no inherent phenomenal sameness between qualitative characters from distinct perceptual modalities, the phenomenal appearances of quantitative characters are cross-modally related to one-another. The question of whether middle-C is more like red than green seems to involve a category mistake. Contrastingly, there is a clear sense in which a mild ache is more like a soft sound than a loud one, for it is introspectively obvious which end of a quantitative dimension is the intense one. An intense experience occupies more phenomenal "space," so to speak, than a slight one. Put another way, as quantitative characters diminish in intensity, the representations to which they are attached move closer to being unexperienced, toward not being present on the phenomenal landscape at all. Non-presence on the phenomenal landscape is the vantage point by which we orient our quantitative intensity judgments in

each modality; quantitative characters are incremental increases from silence, painlessness, invisibility, and experiences are intense when they are suitably far from phenomenal nothingness.

Considering this, it is difficult to see how quantitative inversion could be possible, for it would require that the most salient representations teeter on the brink of our being unaware of them. This is puzzling for two reasons. First, there is a correspondence between an item's prominence in a subject's phenomenal landscape and explanations of her behavior. I recoil from a painful stimulus in part because the pain occupies a prominent position of my phenomenal landscape, and it would be very strange indeed if someone's explanation for yowling and grabbing her toe was that she hardly felt a thing when she stubbed it. This is not to say that our behavior is never influenced by stimuli of which we are scarcely aware, or that behavior is always influenced by the most prominent items on the phenomenal landscape. Rather, the point is that inverting the relationship between the priority with which a subject attends to items in her surroundings and their prominence on her phenomenal landscape makes a mystery out of something introspectively obvious: intense experiences are apt to cause behavior to a degree that weak ones are not. Second (and related), it is typically assumed that the brain's resources for processing perceptual data are scarce relative to the quantity of information deliverable by perception, and that part of the function of attention is to allocate those limited resources. Since salience is tied to how many of these resources a representation commands, an inversion of quantitative character relative to salience would require that attention's most resource-intensive deliverances would be all but obliterated from phenomenal consciousness. Given the connection between the phenomenal landscape and behavior, and on the assumption that bottom-up attention favors those representations

that are expected to be behaviorally relevant, it would seem to undermine the function of attention for the most salient stimuli to be the least phenomenally prominent.

So, the functional account of quantitative character, and by extension the composite account, largely elides the problems of absent and inverted qualia. With respect to absent qualia, the phenomenality of the quantitative turns on the phenomenality of the qualitative; the composite account neither helps nor hinders the endeavor of explaining why some states are phenomenally conscious. As for inverted qualia, the functional account of quantitative character arguably fares even better than the tracking account of qualitative character.⁴⁴

4.4.2 Intentionalism and the Composite Account

In §4.2 I briefly argued that quantitative characters are transparent. As I noted in the previous section, Beck and Schneider argue that attentional phenomenology is *not* transparent, that “to perceive a stimulus as attended is to perceive it in terms of its effects on one’s own mental states...and the same can be said for the proposal that perception represents stimuli as relationally salient,” (p. 487).

On the quantitative character analysis of attentional phenomenology, the content of quantitative character is the salience of a relevant stimulus. Salience, I have insisted, is not a distal state. However, this does not entail those stimuli are thereby experienced as effects on

⁴⁴ As I discussed in Chapter 1, Block (1996) argues that tracking accounts fare no better than functional accounts with respect to inverted qualia. If I am fitted with “inverting lenses” and sent to spend a lifetime on “inverted Earth” (which is to say, if the lenses make green things look red, but I am sent to a place where items I think of as red are actually green, say) then, after some time, it would seem that my color experiences begin to causally covary with distal properties inverted with respect to those with which they covaried here on Earth; I have a red experience when I look at an inverted tomato even though it is caused by the tomato’s “green” reflectance. This leads to a problem: my memories of Earthly tomatoes are allegedly phenomenally the same as my current experiences of inverted tomatoes, and yet, by tracking representationalism’s lights, the experiences have distinct contents. Tye (2000), for one, has offered rejoinders to this and related complaints that, to my mind, are at minimum more satisfying than anything a functionalist could say about the inverted qualia problem. But, at any rate, the present point is that such a defense need not even be mounted on behalf of the functional account of quantitative character because inverted quantitative characters are not possible on any reasonable view of the relationship between phenomenality and attention.

one's own mental states. I have repeatedly stressed that phenomenally, quantitative characters feel like properties of external objects. Loudness feels like no less of an objective property than pitch.

However, establishing that quantitative characters are transparent is inadequate for their being consistent with intentionalism. For intentionalism to be satisfied, phenomenal character must be *necessarily* intentional. Because quantitative character does not reduce to an intentional state, a defense of its inherent intentionality is in order.

Recall that the case for intentionalism is an abductive argument from the transparency intuition and a broader representational intuition to the conclusion that experience is inherently intentional; experiences are transparent because they cannot be otherwise. What explains the inherent intentionality of experience? Why must experiences be transparent? There are two ways of replying, corresponding to the phenomenal intentionalist and tracking representationalist positions.

Phenomenal consciousness is the explanatory bedrock for phenomenal intentionalists. On their view it is a brute fact that phenomenal experience *just is* intentional, and so experience must be transparent. This reply is unavailable to tracking representationalists, for it would undercut their commitment to reductionism. If experience is nothing more than a species of representation, then it cannot be the case that experience *just is* intentional, for reduction of phenomenal experience to physical realizers precludes the possibility of brute facts at the level of experience.

For the tracking representationalist, experiences are intentional because they are realized by, as I called them in Chapter 1, *mere* representations – physical states delivered by causal-informational processes. The intentionality of phenomenal states is inherited from the physical states that realize them, and so experience is transparent because of its underlying

nature as a contentful physical state. If quantitative characters are not realized by contentful physical states but are nonetheless transparent, then it seems that the composite account undermines the only explanation available to the tracking representationalist for the transparency of experience. If this is correct, and since the composite account is partly tracking representationalist, this renders the composite account self-defeating.

To see that quantitative character is necessarily intentional it is important to bear in mind that quantitative character has no proprietary phenomenology; as I discussed in §3.2.2, the phenomenology of the quantitative is a bare intensity, and instances of it depend in part on qualitative characters with which it is imbued. Jackhammering sounds loud only to the extent that the audible features of jackhammering sound loud -- there is no loudness simpliciter. Moreover, loudness is distinct from, e.g., pain intensity only insofar as one is about sounds and the other is about pains. So, the phenomenology of quantitative character is inextricable from the qualities by which it is made manifest. In this way, attentional phenomenology is like a magnifying glass – if a magnifying glass is held over some text, the text appears larger, but the glass has no apparent effect if it is directed at a uniform void. This does not mean the magnifying glass is not working, but rather that it is not pointed at the right sort of thing for us to experience its effects. We see the effects of the magnifying glass *by* seeing the text.

Represented qualities, per the tracking component of the composite account, are necessarily intentional. Since we cannot experience quantitative character apart from qualitative character, and since qualitative character necessarily appears to be attributed to something other than experience itself, so too does quantitative character necessarily appear to be attributed to something other than experience itself. Quantitative characters cannot *but* attribute salience to the objects of object-representations because we only ever experience

quantitative characters when they are imposed on qualitative ones which themselves point at their objects. Even though quantitative characters are not realized by mere representations, mere representations are constituents of their tokens.

This is enough for quantitative characters to be necessarily intentional. Though attention is not an intentional process, its operation is phenomenally conscious in the form of quantitative character when and only when it is applied to a phenomenally conscious qualitative representation. Phenomenally conscious qualitative representations are necessarily intentional. So, quantitative character arises when and only when attention processes a phenomenally conscious, inherently intentional state. Since quantitative character cannot arise in absence of such a state, and since quantitative character always seems to be applied to the object that phenomenally conscious, inherently intentional state, it follows that it is impossible for quantitative character to be a non-intentional state.

Summing up, there is no special concern regarding the transparency of quantitative experiences, but the tracking representationalist explanation for transparency is threatened unless the apparent intentionality of quantitative character experiences may be inherited from their realizers. I have argued that they are: because qualitative characters are necessary for the occurrence of quantitative characters, the intentionality of the quantitative is ensured by the intentionality of the object-representations to which they adhere.

4.4.3 Restricted representationalism

Tracking representationalists universally accept that the phenomenology of perceptual experience is explained by intentional content, but some deny that this extends to other phenomenal states such as bodily sensations or moods. Kind (2007) argues against any form of “restricted” representationalism – versions of representationalism according to which some but not all phenomenal states are reducible to their intentional contents. Her

objection takes the form of a dilemma. For the first horn, she notes that it is incumbent upon the proponent of restricted representationalism to offer an explanation as to why some phenomenal characters can be accounted for in intentional terms while others cannot, lest the proposal be *ad hoc*. Crucially, this explanation must appeal to phenomenal rather than intentional differences between these experience types since whether there are such intentional differences is the matter under scrutiny. Kind doubts that such an explanation is available, but if there is, the restricted representationalist must face the second horn: if there is a legitimate distinction between representational and non-representational phenomenal character, then phenomenal character is not essentially representational. If that is right, then tracking representationalism does not explain phenomenal character at all; if some phenomenal character is not representational, then phenomenal character does not – *cannot* – consist in having a certain kind of representational content. Succinctly, if restricted representationalism is not *ad hoc* in the phenomenal characters for which it offers an analysis, then it is self-undermining.

The composite account is a form of restricted representationalism on which qualitative characters reduce to their representational contents while quantitative characters *possess*, but do not reduce to, their contents. Which horn of Kind's dilemma threatens the composite account hinges on whether a principled distinction between qualitative and quantitative characters can be drawn. In the previous chapter I argued that it can – qualitative characters are distinguished from quantitative both phenomenally and in terms of their functional organization. Granted, there is a sense in which the functional distinction to which I appeal is based on intentional differences. I claim that the causal processes underlying qualitative and quantitative characters give rise to mere representations in the case of the former but not the latter. This is an intentional distinction on reductive

representationalism, and it does not strike me as circular to draw it. However, when Kind says that it would be circular to draw the distinction based on intentional differences, I gather that what she means is that it cannot be drawn on the basis of transparency – which phenomenal characters seem like features of something other than experience itself, and which do not. My claim is not akin to the claim that what makes, say, perceptual experiences representational and moods non-representational is that the former but not the latter is transparent. But, at any rate, a principled phenomenal distinction between the representational and the non-representational is all that Kind insists upon, and I have provided that as well. So, it is the second horn that challenges the composite account.

The second horn challenges the tenability of a representationalist explanation for phenomenality if not all phenomenal characters are representations. “Restricted representationalism may tell us something important about perceptual experiences,” says Kind, “but it doesn’t tell us what makes these states phenomenal states,” (p. 415). Kind’s conception of restricted representationalism is of a view that denies that states like moods and bodily states can be fully accounted for in terms of tracking; she does not have in mind quantitative characters. On a first approximation the composite account *bolsters* Kind’s argument for the second horn, for even perceptual experiences cannot be fully accounted for in terms of tracking if quantitative characters do not reduce to representational states.

Nonetheless, I think it is a mistake to conflate the irreducibility of some phenomenal characters to mere representational states with the wholesale explanatory failure of tracking representationalism. First, if the composite view is correct, then phenomenal states that so reduce remain *necessary* for the occurrence of phenomenal character. On the composite account, mere representations explain both the phenomenology of qualitative character and the possibility of quantitative character. The raw materials of the phenomenal landscape are

qualities realized by mere representations. Qualitative characters are mined by sensory systems from the objective dimensions they represent, and so minds are furnished with representations that subjectively appear to us the way their contents objectively are. The whole of phenomenal consciousness is built, at least in part, out of this initial endowment of colors, pitches, and the other qualitative characters. Even as qualitative representations are transformed into object-representations and undergo attentional modulation, those raw qualitative materials persist; we experience attentional phenomenology by experiencing attention's effect on qualitative representations. While it is true that some phenomenal characters are not fully explained by their external content, the functional states that explain the remainder depend essentially on qualitative representations. There would be no quantitative character but for qualitative character. So, it is false that if some phenomenal character is not explained by its content, then phenomenal character does not consist in having a certain kind of representational content, for the dimensions of phenomenal character that are not entirely realized by mere representation nonetheless have them as constituents. Even if tracking representationalism does not fully account for phenomenal experience, it may be broadly explanatorily successful if all phenomenal character consists at least *in part* in tracked external contents.

However, if quantitative characters, which are irreducible to mere representations, are not amenable to a materialist treatment, then tracking representationalism fails to explain phenomenal consciousness. Recall that the appeal of tracking representationalism hinges on representation being a materialistically tractable relation; the apparent problems with externalism about phenomenal content are sufficiently troubling that there is no reason to be a tracking representationalist if representation does not give rise to a materialistically satisfying account of phenomenal character. So, the composite account is undermined if the

functionalist component of the view is not similarly materialistically tractable; if tracking representationalism is an incomplete account of phenomenal experience, and if such an account may only be completed with the addition of a materialistically inadmissible component, then the tracking aspect of the view cannot be motivated. Whatever else is needed to fully explain phenomenal character must be no less materialistically satisfying than representation.

But quantitative character *is* amenable to materialism. Quantitative characters reduce to attentional processing determined by the salience of the object-representation to which they are attached. The weight given to a feature is locally determined and depends on many factors, but is nonetheless a computational process, as is attentional processing. This reduction base is nothing of which the materialist ought to be wary. Moreover, the phenomenology of quantitative character is plausibly captured by an underlying computational state. Phenomenally, quantitative characters are just magnitudes. *More* attentional processing of an object-representation feels like *more* phenomenal presence of the object-representation being processed. In §4.4.1 I discussed how functionalist treatments of qualitative character struggle to provide a compelling reason that the functional goings-on should result in the qualitative ones; redness does not seem like something that a functional state can deliver. Intensities are different; it is plausible that the magnitude of a computational response might bring about a corresponding phenomenal magnitude because *they are both magnitudes*. The puzzle lies not with how the object-representations come to have different degrees of prominence on the phenomenal landscape, but rather with how there came to be a phenomenal landscape in the first place. If tracking representationalism can provide a compelling materialist answer to that question, then there should be no special problem for materialism with the account of quantitative character.

4.5 Conclusion

In this chapter I have presented the composite view of phenomenal character, which accepts a tracking representationalist analysis for qualitative characters but a functionalist analysis for quantitative characters. The composite account is not a variety of tracking representationalism by virtue of its denial that phenomenal character is entirely reducible to content.

On the other hand, the composite account does not abandon the spirit of tracking representationalism and preserves much of its appeal. The composite account is intentionalist, for even though quantitative characters reduce to an internal functional state, they nonetheless necessarily represent the salience of (typically distal) objects. The functional states to which quantitative characters reduce are materialistically acceptable, and the phenomenology of the quantitative is amenable to a functionalist treatment.

The composite account as a whole is materialistically acceptable only if qualitative characters are reducible to representational contents, for the functional account of quantitative character relies crucially on the idea that representations underlying qualitative character undergo attentional processing. If qualitative character is not realized by the representations processed by attention, then there is no reason that attention's operation should necessarily have an effect on phenomenal character. The tracking representationalist analysis of qualitative character is essential to the plausibility of the quantitative account here provided.

In return, the analysis of quantitative character offers explanations for phenomena that elude hardline tracking representationalism. It is imminently plausible that some aspects of phenomenal experience do not depend entirely on external content. I have discussed loudness and pop-out, and in the next chapter I will discuss pain. The tracking

representationalist's commitment to the blanket reducibility of these and other puzzling experiences to external content renders the view unappealing. By the addition of a functionalist component, tracking representationalism's virtues are preserved (except, perhaps, its elegance) and its theoretical reach extended. In short, the two components of the composite account are mutually dependent. The tracking representationalist component makes the composite account naturalistically attractive while the functionalist component allows it to account for experiences of partly endogenous origin.

CHAPTER 5

PAIN AND THE COMPOSITE ACCOUNT

5.1 Introduction

The objective of this chapter is to revisit the problem of pain. Pain is typically understood as involving both a sensory-discriminative and an affective component. The sensory-discriminative component involves representation of tissue damage – its apparent type, location, etc. – and is achieved via nociception, the sensory system by which tissue damage is detected. The affective component is the felt unpleasantness that typically accompanies nociceptive episodes and intuitively makes pains *painful*. These aspects tend to co-occur, but the view that they are nonetheless independent from one-another is influential. Indeed, unitary conceptions of pain have fallen out of favor both empirically and philosophically. The International Association for the Study of Pain provides the definition of pain that prevails among researchers and medical practitioners: “an unpleasant sensory *and emotional* experience associated with, or resembling that associated with, actual or potential tissue damage,” (Raja et al., 2020, p. 1977, emphasis added); they stress that “*pain and nociception are different phenomena*,” (p. 1977, emphasis added). There is also widespread doubt among philosophers that an account of pain built only on detection and representation of tissue damage can fully explain the phenomenology of pain, as I discussed in Chapter 2.

Be that as it may, it seems to me that the case for the independence of pain’s myriad aspects has been overstated. Even though pain is not identical to nociception, I will argue that its other aspects – which include, at minimum, pain intensity and negative affect – essentially involve phenomenal tissue damage representations in the same way that auditory

experience essentially involves pitch. To that end, I will argue that pain intensity is best understood not as a qualitative aspect of pain experience, but as quantitative character – the salience of a tissue damage representation – and that this account is a good fit with functional accounts of the affective dimension of pain.

5.2 Nociception and Representation

It may be supposed that the contents of nociceptive experiences differ from those of innocuous somatic sensations insofar as nociception causally covaries with *noxious* stimulation, whereas somatic sensation is not differentially sensitive to noxiousness. However, as we have seen, it is doubtful that noxiousness has the right sort of causal powers to explain nociceptor firings; nociceptors do not feature “noxiousness” detectors, so even if it turns out that nociceptor stimulators *are* noxious, they cannot trigger nociceptors *qua* noxiousness. So, the phenomenal character of the sensory-discriminative aspect of pain cannot be distinguished from other somatic sensations by virtue of representing noxiousness. If noxiousness will not work, then what sort of content distinguishes these experiences?

One option is to infer from the widely held view that nociception *detects* actual or potential tissue damage that the content of nociceptive experience *is* actual or potential tissue damage. There are two reasons to doubt that this could be the tracked content of a nociceptive experience. To see them, we must look to the proximal causes of nociceptive stimulation.

Etiologically, a pain experience begins as a stimulation of nociceptors, free nerve endings sensitive to noxious levels of thermal, chemical, and mechanical stimuli. Sensory receptors, of which nociceptors are a type, have cell membranes peppered with ion channels – channels whose opening and closing alters the flow of ions between each side of the

membrane. When these ion channels are inactive, the flow of positive and negative charge through them is balanced, maintaining the receptor's resting negative charge. When ion channels are implored to open or close, the flow of ion traffic is altered such that positive ions – cations – accumulate in the cell body. The cell depolarizes – its charge changes from negative to positive – when a sufficient number of cations accumulate, which triggers mechanisms that rapidly reset the cell to its negative resting state. This rapid reset generates an action potential – a nerve impulse.

If the sensory-discriminative aspect of pain tracks its content, and if that content is delivered by nociception, then the proximal causes of nociceptor firings ought to give us some clue as to the content of the sensory-discriminative aspect of pain. The contents of perceptual states need not be their proximal causes, of course, but the content ascribed to a perceptual state must plausibly be mediated by the proximal causes of the sensory receptors that ultimately cause those states; just as color experiences may represent the reflectances of distal surfaces only if there is a causal story to tell about the relationship between reflectances and patterns of retinal stimulation, the contents of nociception must be among the causes of nociceptor activity. Moreover, the contents of nociception cannot be especially *distal* from their proximal causes; pains are represented as being in the subject's body, and free nerve endings are located near the boundary of the body and the rest of the world. There is simply no room for nociception's contents to extend much beyond its proximal causes.

Since nociceptor firings are brought about by changes in nociceptor membrane permeability, and since membrane permeability is determined by the opening and closing of ion channels, the proximal causes of nociceptive perceptions are those that cause ion channels to open or close in ways that lead to depolarization. The ion channels principally

responsible for altering the flow of ion traffic in nociceptors are transient receptor potential (TRP) channels. TRPs are a family of cation channels found throughout the nervous system. At least seven types of TRP channels are found in nociceptors, each one responsive to a distinct and diverse set of stimuli. For example, TRPV1 is activated by temperatures above 43°C, several chemicals released by inflammatory processes and damaged tissue, spider venom toxins, slightly acidic extracellular conditions, and capsaicin (the ingredient that makes hot peppers *hot*), while TRPA1 is activated by temperatures below 17°C, several more chemicals released by inflammatory processes and damaged tissue, mechanical force, and garlic (Dai, 2016; Mickle et al., 2015).

Returning now to the view that the content of nociceptive experience is actual or potential tissue damage, the first problem is that, like noxiousness, *potential* tissue damage (or *potential* anything else) does not have the right sort of causal power to enter into tracking relations. When researchers claim that nociceptors detect potential tissue damage, what they mean is that they react to *actual* stimuli that *may* cause tissue damage if certain conditions are met. The temperature at which heat triggers TRPV1 nociceptors (43°C) is below the temperature at which heat damages tissue (44°C) – but it’s pretty close, at any rate. However, even at that higher temperature, it takes stimuli upwards of an hour of exposure to cause damage to skin. Nociception reacts not to this *potential* outcome, but to the *actual* temperature of 43°C. A tracking view faces an uphill battle in accounting for the myriad potentially damaging stimuli to which nociceptors are sensitive; doing so would seem to require that the content of a nociceptive experience is a long disjunction including tissue damage along with lots of exogenous stimuli that are expressly *not* tissue damage.

The second problem is that some TRP agonists do not even have the potential to cause tissue damage. It is immediately obvious that some of these TRP agonists are, or are

likely to be, noxious to creatures like us: a bite from a venomous spider can permanently harm or even kill a person, excessive temperature can burn skin, and injured tissue invites further harm if it is not appropriately favored. If pain begins with nociception, and if pain functions to detect and deter us from bodily harm, then it is fitting for nociceptors to be sensitive to these stimuli. However, capsaicin, garlic, and temperatures of 17°C do not pose any special threat to us, so it is not immediately obvious why they should cause pain; they cause neither actual nor potential tissue damage.⁴⁵ To be sure, the mechanisms underlying nociception support the conclusion that nociceptors are sensitive to tissue damage. The problem is that there they are also sensitive to items that are decidedly *not* tissue damage, and in at least some cases – the ones that have significant potential to cause harm – this is plausibly by design. So, the content that explains nociceptive phenomenology cannot include noxiousness or potential damage, since those are not qualities that can be tracked. At the same time, the category of tissue damage is too narrow to cover the range of nociceptive stimulators.

Since tissue damage, potential tissue damage, and noxiousness cannot be among the contents of nociceptive experience, it is not clear that there is an available analysis of nociceptive content that distinguishes it from the content of innocuous somatic sensation. After all, innocuous somatic receptors are likewise sensitive to thermal, mechanical, and chemical stimuli, regardless of whether they are noxious: there are non-nociceptive thermoreceptors for detection of temperature, mechanoreceptors for innocuous touch, and

⁴⁵ A caveat: capsaicin is a potent neurotoxin that destroys nociceptors. Since nociceptors play an important role in threat detection, their destruction plausibly constitutes significant harm to the organism. Nonetheless, it is a mistake to infer that nociceptors are sensitive to capsaicin in virtue of this potential harm, for sensitivity to capsaicin is what *causes* the harm. When capsaicin destroys a nociceptor, it is because capsaicin lets in too many ions when it binds to TRPV1 (Caterina et al., 1997). If TRPV1 were not sensitive to capsaicin, this would not occur, so it cannot be the case that sensitivity to capsaicin is meant to help avert this effect.

pruriceptors, which mediate itch, are sensitive to some of the same endogenous chemicals that trigger nociceptors. Moreover, nociceptors innervate the same bodily regions as cutaneous somatic receptors, and neither kind of sensation plausibly represents anything more distal than the surface of skin. Given the overlap in both mediators and plausible representational domains of nociception and innocuous touch, it is hard to imagine that there could be a constitutive difference in their representational contents, and if there is no constitutive difference in the content of nociception and somatic sensation broadly, then there can be no tracking representationalist account that distinguishes one from the other.⁴⁶ So, a tracking view of nociceptive experience cannot support a phenomenology of nociception that is distinct from that of somatic sensation.

Does nociception possess a phenomenology distinct from that of somatic sensation? I am inclined to think not. Pain, of course, is radically phenomenally distinct from innocuous touch, but nociception is not pain. The representational domain of somatic sensation, broadly construed, is presumably something like *tissue events*, with experiences thereof reporting on the type and location of such events. Tickles, pokes, and thermal sensations are distinct kinds of somatic sensations, not distinct sense modalities, and each represents a different kind of event in cutaneous tissue. Just so, I think, for nociceptive sensations; there is nothing common to the content of nociceptive experiences that essentially sets them apart

⁴⁶ Granted, there is a notable way in which nociception can be distinguished from other somatosensory processes which was alluded to earlier in this section: the adequate stimulus for nociceptors is higher than that of other somatic receptors. The temperature required to excite a somatic thermoreceptor, for example, is lower than 44°C, corresponding to the felt difference between innocuous warmth and painful heat. However, at the risk of belaboring this point, I stress that a difference in thresholds for activation cannot make a content difference that supports a broad and essential phenomenal difference between nociceptive and non-nociceptive representations. It is acceptable on a tracking view for a 44° representation to feel warmer than a 40° representation -- 44° is warmer, after all -- but not for 44° to feel warmer *and* proprietarily nociceptive. There is no difference in the stimulus that could support that latter sort of content difference other than being noxious, potentially dangerous, etc., and those are not trackable content differences. The fact that nociceptor does not fire below 44° is as irrelevant as the fact that non-nociceptive thermoreceptors do not fire below their thresholds.

from other somatic sensations. Indeed, nociceptive experiences seem to share a common element with innocuous experiences of the same type; the phenomenal difference between warmth and burning, or between a light touch and an intense jab, seems to be a matter of degree rather than kind (provided, of course, that burning and jabbing experiences are divorced from their affective aspects). The fact that tracking views cannot account for a proprietary phenomenology of nociception is acceptable if nociception is not in possession of a proprietary phenomenology.

It might be objected that reports from people with pain asymbolia indicate that nociception does indeed possess a distinct phenomenology from innocuous somatic sensation. Unlike patients with congenital insensitivity to pain (who have a defect in a gene that expresses a sodium ion channel essential in depolarizing a nociceptor, resulting in complete absence of nociceptive impulses), asymbolics have experiences when they undergo nociceptive stimulation (McDermott et al., 2019). They experience the sensory-discriminative aspect of pain, but not the troubling affective aspect, and fail to exhibit withdrawal behaviors in response to painful stimulation. “I feel it indeed,” remarked one patient when pricked on her left hand, “it hurts a bit, but it doesn’t bother me; this is nothing,” (Grahek, 2007, p. 45). In some cases, asymbolics seek out nociceptive experiences, willingly offering body parts to be painfully stimulated during testing and laughing in response to such stimulation. Despite these unusual behaviors, there is no apparent defect in asymbolics’ ability to distinguish nociceptive stimulations from innocuous ones; they “adequately recognize painful stimuli and distinguish sharp from dull,” (Grahek, 2007, p. 44).

Grahek (2007) influentially describes the character of asymbolics’ nociceptive experiences as “pain without painfulness,” where *pain* is the sensory-discriminative dimension and *painfulness* is the affective dimension of a pain experience (p. 51). On the view

I am proposing, asymbolic experiences only count as pains on a highly reductive understanding of what a pain is; they are merely somatic sensations without painfulness, and do not possess a proprietary *pain-ish* phenomenology. Call this view the *nociception-inclusive view of somatic sensation* – “NIVS.” There are two reasons not to reject NIVS based on the accounts of asymbolics. First, contrary to appearances, none of the evidence from asymbolics requires that nociceptive experiences are importantly phenomenally different from innocuous sensations. Second, empirical results suggest that the nociceptive sensations felt by asymbolics are subsumed by somatic sensation.

If asymbolics can differentially distinguish nociceptive stimulations from innocuous ones even without the negative affective dimension of pain, then nociceptive stimulations must be phenomenally distinct from other somatic sensations. However, it would be a mistake to infer from the fact that asymbolics successfully distinguish these sensations that there must be a *proprietary* phenomenal dimension to nociception that essentially differentiates it from innocuous touch. Successfully distinguishing nociceptive from non-nociceptive stimuli does not require that each has a modality-specific phenomenology; asymbolics might distinguish nociceptive from non-nociceptive experiences by differences in intra-modal qualities. Thermal sensations are distinct from sensations of pressure, but both are nonetheless somatic. Moreover, the number of phenomenally distinct somatic sensations far outstrips the number of somatic receptor types that we possess; somatic sensations, like sensations in any perceptual domain, tend to be produced from the stimulation of more than one kind of receptor. If nociceptive experiences are subsumed by somatic ones, then nociceptive experiences are simply those somatic sensations that typically arise from the activation of nociceptors, just as reddish experiences are those color sensations that typically arise from the activation of long-wavelength cones. Grahek’s catalog of observations of

patients with asymbolia emphasizes that asymbolics can distinguish *sharp* from *dull* nociceptive experiences, but all this shows is that the contents of these kinds of somatic experiences are carried at least in part by nociceptive afferents. The ability to distinguish the dullness or sharpness of a tissue event requires only that a subject has ordinary discriminatory capacities within the modality of somatic sensation; there is no reason that dullness and sharpness must be in a quality space apart from that of tickles, itches, and gentle touches. The fact that asymbolics can make these discriminations does not imply the falsity of NIVS.

However, that nociceptive sensations *may* be distinguished from non-nociceptive ones based on intramodal qualities does not entail that distinguishing them does not *in fact* involve a proprietarily nociceptive quality. To this point, and against NIVS, it might be pointed out that asymbolics not only distinguish dull from sharp nociceptive sensations, but also differentially call them *pains* and describe them as *hurting*. If asymbolics experience nociceptive perceptions *as* pains – if there remains some characteristic of nociceptive experiences uncaptured by attributes like *dullness* and *sharpness* that renders them categorically distinct from other somatic sensations even in the absence of painful affect – then NIVS is in trouble; for, just as red experiences must be visual experience, so too may it be that dull and sharp experiences must be *pains*, not merely somatic sensations.

Neuroscientific findings cast doubt on this possibility. To see this, it is important to bear in mind the prevailing view in the empirical sciences about the nature of pain in the brain. The neural substrate of pain is highly distributed throughout the brain; there is not a dedicated brain module for pain (or even, more restrictively, nociception) as there is for other sensory modalities. Instead, the dominant view among pain researchers is that pain is underwritten by the “Pain Matrix,” a widespread processing network involving many

different brain regions whose collective activity is held to be the neural signature for pain. The principal motivation for the Pain Matrix view is that the brain regions associated with pain processing are not differentially sensitive to painful stimulation; many constituents of the Pain Matrix also process non-painful stimulation. For example, the somatosensory cortices encode the sensory-discriminative aspect of pain, but also of somatic sensation in general, and limbic structures process both emotion in general and the emotional aspect of pain specifically. As such, investigations into the neural corollaries of pain experience tend to target the discovery of substrates for the different aspects of pain experience, with the background assumption that pain emerges from the integration of information processed in these non-pain-specific regions.

Though it remains the dominant view, the popularity of the Pain Matrix view is waning; recent evidence suggests that activity in the Pain Matrix as a whole is strongly correlated not with nociceptive activity, but rather a combination of somatosensory and salience processing, suggesting that even collective activity in the Pain Matrix is not pain-specific in any interesting sense.⁴⁷ In light of this development, Oertel *et al.* (2011) sought to identify which brain region encodes “the qualitative change from nonpainful to painful perception at the pain thresholds” by filtering out regions of the Pain Matrix that are activated by innocuous stimulation or encode stimulus intensity (p. 883). fMRI data were obtained from subjects who were presented with a battery of somatic stimuli, some of which were above the pain threshold. Brain activity arising from above-the-threshold stimulations was compared to activity from below-the-threshold stimulations, and regions that showed similar patterns of activation during both painful and non-painful stimulations were ruled

⁴⁷ See, e.g., Baliki *et al.* (2009), Iannetti and Mouraux (2010), and Moraux *et al.* (2011).

out as neural correlates for the qualitative change from non-painful to painful. Remaining regions were ruled out if their activation was graded with the intensity of the stimulus, suggesting that the region is involved in processing stimulus intensity and/or salience rather than the qualitative shift under investigation. Oertel *et al.* identify only four regions of the Pain Matrix that appear to be both nociception-specific *and* uninvolved in intensity encoding: the posterior insula, the postcentral gyrus, the precentral gyrus, and the ipsilateral putamen. Of these, Oertel *et al.* argue that activity in the posterior insula is the only candidate for underlying the qualitative shift from non-painful to painful sensation.⁴⁸

If there is a propriatorily nociceptive quality to pain, then its neural substrate ought to be revealed by Oertel *et al.*'s results. For, if the quality is propriatorily nociceptive, then it is differentially tokened during stimulations above the pain threshold, and since it is a quality, it must be distinguished from regions engaged in the processing of stimulus intensity and/or salience. So, per the above, if there is a propriatorily nociceptive quality to pain, then it is represented in the posterior insula. However, Oertel *et al.*'s experiment cannot reveal whether the qualitative shift in question is nociceptive or affective in nature. In the experiment, subjects distinguish painful from non-painful experiences in the same commonsense way that you or I would, and introspection does not reveal whether the characteristic quality of pain is perceptual, affective, or some combination thereof. If there is an affective quality only, then there is no problem for NIVS, which does not comment on

⁴⁸ The gyri are ruled out because their engagement was likely a consequence of the experimental design, on which subjects push a button to indicate painful stimuli; the gyri are motor areas, activity recorded in them was in the region that encodes hand movement, and no activity in the gyri was observed when subjects were not instructed to push a button. The ipsilateral putamen are likewise motor areas, involved in defensive and withdrawal actions, so it is believed that their activation is also due to a painful stimulation's propensity to elicit withdrawal behavior rather than pain's qualitative character.

the nature of affective phenomenology. So, let us assume for a moment that the posterior insula encodes a nociception-specific quality, with or without an affective one.

If there is a nociception-specific qualitative shift at the threshold of non-painful and painful sensation, and if that quality is encoded in the posterior insula, then it is highly improbable that asymbolics experience this quality, for pain asymbolia is caused by damage to the posterior insula. In a landmark study, Berthier *et al.* (1988) gathered fMRI data from six subjects with pain asymbolia and found the posterior insula to be the only brain structure damaged in each case. In a literature review of previous studies on pain asymbolia, they found corroborating evidence of damage to the posterior insula in previously observed subjects. Since pain asymbolia is caused by damage specifically to this small and highly specific region, and since some asymbolics tend to have widespread damage to their posterior insulae, we should expect that if a proprietarily nociceptive quality were encoded there, then at least some asymbolics would not undergo experiences featuring that quality. So, if asymbolics were distinguishing pains from non-pains on the basis of the proprietarily nociceptive quality, and since the neural substrate of that quality must be in the posterior insula if it is anywhere, we should expect that at least some asymbolics would be unable to distinguish pains from non-pains. This appears not to be the case, so asymbolics must not be relying on a proprietarily nociceptive quality when they distinguish pains from non-pains.

So, the fact that asymbolics describe their experiences as pains does not support the conclusion that there is a proprietarily nociceptive quality in pain experience, and so does not constitute a challenge to NIVS. As for why they describe their experiences as pains, perhaps asymbolics are mistaken about the kind of experiences to which normal perceivers refer when they use terms like ‘pain’ and ‘hurting’. In the words of one patient, “It hurts indeed, but I do not know what that really is,” (Grahek, 2007, p. 45).

Nonetheless, a question remains. Asymbolics do not feel pain, but some characteristic of their nociceptive experiences must govern the application of their pain-related language and explain how they are able to distinguish nociceptive from non-nociceptive stimulation. This success requires that they are keen to *some* phenomenal characteristic that differentiates the nociceptive from the non-nociceptive. Here the point about their intact capacity to distinguish sharpness and dullness comes up short, for it does not explain why asymbolics know from experience that sharpness and dullness are akin to one another and apart from the rest of somatic sensation, or why asymbolics find nociceptive sensations to be amusing in a way that cannot be said of innocuous ones. If the contents of nociceptive experiences are not constitutively different from the contents of other somatic sensations, why do asymbolics treat them differently? In the next section I suggest an answer: nociceptive and innocuous sensations differ with respect to their quantitative character.

5.3 Nociceptive Intensity as Quantitative Character

One phenomenal difference between innocuous and nociceptive somatic sensations is a difference in felt intensity; nociceptive sensations are *more intense* than innocuous ones. I claim that nociceptive intensity is a quantitative character. Nociceptive intensity is the degree to which a representation of a nociceptive stimulation commands attention, and it represents the degree to which the object of that representation – a tissue insult – commands attention.

For one thing, a sharp jab is more intense than a light touch and hot asphalt beneath one's feet is more intense than warm grass, even independent of any affective considerations. However, this is not the sense of intensity that directly underlies quantitative character. Pressure and temperature are plausibly prothetic dimensions of somatic sensation. Each dimension may be dialed down to a null value without annihilation of the percept from

the phenomenal landscape. For example, it seems to me that when the ambient temperature is around 75°F I can feel the temperature on my skin; I do not lack thermal sensation just because the room is a comfortable temperature. However, I would not describe the temperature as intense. My thermal experience is neutral even when I attend to it, and so, at least *prima facie*, a lack of intensity does not predict evisceration of somatic sensation from the phenomenal landscape. Moreover, thermal stimulation in this case is not associated with any degree of pressure, and yet the sensation persists. So, even if the difference between sensations of, say, *warmth* and *burning* is in this sense a matter of degree, that difference is not a difference in quantitative character.⁴⁹

However, differences along these prothetic dimensions may *give rise* to differences in quantitative character. Salience, as I have discussed, is accrued based on relative contrast within an encoded sensory dimension. On a hot day, the temperature of my skin contrasts less with the temperature of grass than the temperature of asphalt, so the thermal feature of grass-on-feet stimulation affords less salience along the temperature dimension than the asphalt-on-feet stimulation. Since the thresholds for nociceptor activation are higher than the thresholds for other somatic receptors, the stimuli nociceptors encode are more intense along the prothetic dimension they encode than correspondent innocuous receptors and hence the features of nociceptive stimuli are innately more salient than features of innocuous somatic stimuli. It is possible that this contrast is further enhanced by nociceptive pathways at the subcortical level. Legrain *et al.* (2011) propose that

the ability to promote the processing of salient somatosensory inputs could already be implemented at the level of the spinal cord, through the mechanism of a spino-bulbo-spinal loop called *diffuse noxious inhibitory controls*...Indeed, studies have shown that if a nociceptive stimulus is applied

⁴⁹ However, it does seem to me to be a point in favor of the view that nociceptive sensations are a subclass of somatic ones, for they fall on the same prothetic continua.

at a specific body location, it enhances the responses of wide dynamic range (WDR) neurons at the segmental level of the dorsal horn receiving inputs from that body location and concurrently inhibits the responses of WDR neurons originating from all other body locations. It has been proposed that DNIC could constitute a mean by which the spinal transmission of somatosensory signals is modulated in order to enhance the contrast of potentially dangerous somatosensory inputs relative to the “*basic somesthetic activity*.” (p. 119, emphasis in original)

The idea here is that the DNIC selectively amplifies nociceptive signals and suppresses other signals, enhancing the salience of nociceptive stimulations by way of increasing their contrast with other somatic signals.

It could also be that nociceptive stimuli command salience simply by virtue of being nociceptive stimuli; perhaps nociceptive representations enjoy special access to attention and are endowed with an embarrassment of riches to spend on attentional processing because they arrive via nociceptive pathways. Questions about the functional organization of nociception are, of course, empirical – and notoriously difficult. There appears to be no brain region specific to nociception (though some areas of the pain matrix appear to have small populations of nociception-specific neurons), which makes it difficult to distinguish nociceptive processes from those of innocuous somatic sensation or pain, and, as we will see, pain is itself difficult to disentangle from salience processing and processes underlying arousal in the automatic nervous system (Lee et al. 2020). As such, I can offer no argument from brain imaging results that nociceptive representations enjoy preferential access to the resources of attention in excess of the innate boost to salience they receive by virtue of their featuring a higher degree of contrast, as described above. The functional imaging data are still too coarse-grained and our understanding of the brain regions involved too inchoate to offer evidence pertaining to such a view. But, in principal, it is possible that either or both subcortical and cortical mechanisms enhance the salience of nociceptive stimuli.

Recall that pain is distinct from nociception in that the former but not the latter features a negative affective component. In typical subjects, nociceptive experiences give rise to pains. This is because when things are working correctly, nociception triggers negative affect. Nonetheless, asymbolics may have nociceptive experiences but not pains since the nociceptive experiences of asymbolics do not give rise to negative affect. There is a corresponding distinction between nociceptive intensity and pain intensity. In the psychology literature it is standard to use the term ‘pain intensity’ to refer to the intensity of a painful *stimulus*. So, in normal subjects, what the psychologists call ‘pain intensity’ and what I call ‘nociceptive intensity’ are the same value; the intensity of a painful stimulation is just the intensity of a nociceptive stimulation that has an accompanying negative affective dimension, and hence is a pain. I prefer the term ‘nociceptive intensity’ to ‘pain intensity’ because it is explicitly perceptual, and it is useful to distinguish the perceptual from the affective when it comes to pain. For one thing, it is convenient to say that asymbolics experience nociception and nociceptive intensity, but they do not experience pain or pain intensity because their nociceptive experiences lack an affective dimension.

Note that though the notion of pain intensity requires that the experience it describes is a pain and, accordingly, that the experience has a negative affective dimension, pain intensity describes the intensity of the nociceptive dimension of the pain, and does not involve pain’s affective dimension. Pain intensity is not, and does not include, negative affect intensity. Now, just as nociception typically leads to negative affect, so too does pain intensity typically covary with negative affect intensity. However, experimental results indicate that affect intensity may be modulated independently of pain intensity, e.g. by

hypnotic suggestion.⁵⁰ So, pain intensity is a strong predictor of affect intensity, and affect arises downstream from pain intensity. Because pain intensity and nociceptive intensity describe the same value, psychological data on pain intensity are likewise data about nociceptive intensity.⁵¹

A wealth of data speaks to the relationship between nociceptive intensity and attention. Reducing attention to nociceptive stimuli by engaging in an attention-demanding task downwardly modulates the nociceptive intensity of a concurrent nociceptive stimulation.⁵² Even mild pain has an “interruptive” effect on attentional functioning, causing reduced performance on attention-demanding tasks that rely on attention span, attentional switching, or divided attention (Moore et al., 2012). The effect grows with increasing nociceptive intensity; high-intensity chronic pain has a profound deleterious effect on performance of attention-demanding tasks that cannot be explained by the affective state of the subject (Eccleston, 1995). Myriad other features modulate the interruptive effect of pain, including subjects’ emotional state and arousal level (Eccleston & Crombez, 1999). It may be observed, however, that the features that modulate attentional capture with respect to nociception also affect attentional capture across perceptual modalities. The principal difference between nociception and other perceptual states is not *that* nociceptive stimuli grab attention, but rather that the baseline ability for nociceptive stimuli to do so is much

⁵⁰ See, e.g., Valentini et al. (2013) and Rainville (1997). While both pain intensity and affect intensity may be modulated by hypnotic suggestion, modulations of pain intensity result in corresponding effects on affect intensity. In contrast, affect intensity may be modulated without affecting pain intensity.

⁵¹ This is not so for data pertaining to ‘pain’ rather than ‘nociception’ in psychology – ‘pain’ in the psychology literature often do not distinguish between pain’s nociceptive and affective component, and so one must proceed with caution when drawing inferences about nociception from studies involving pain. This is another reason I prefer the paired terms ‘nociception’ and ‘nociceptive intensity’ to ‘nociception’/‘pain’ and ‘pain intensity’ – it is confusing to use the term ‘pain intensity’ to describe the magnitude of only pain’s nociceptive component but often use the term ‘pain’ to describe the whole pain experience.

⁵² E.g. Bantick *et al.* (2002), but see also Eccleston and Crombez (1999) for an overview of similar studies.

greater than for other kinds of perceptual stimuli. “Pain,” Eccleston and Crombez adduce, “will emerge over other demands for attention,” (p. 363).

If salience is the amount of attentional processing a stimulus representation commands, and if attention is a limited cognitive resource, it stands to reason that the interruptive effect of pain is due to nociceptive representations being salient to such a high degree that other less salient representations have their access to attention revoked in order to free up resources for the nociceptive representation. This is consistent with my claim that nociceptive representations receive boosts to their salience simply by virtue of being nociceptive. No other perceptual modality commands attention to the extent that nociception does, so it seems unlikely that nociceptive representations rely entirely on the contrast of their features to accrue salience. Attention is heavily biased toward nociceptive stimuli, presumably because the tissue damage that nociception so often represents is more likely to be immediately behaviorally relevant than objects represented in other modalities. If nociceptive intensity reflects the salience of a nociceptive representation, then the aforementioned diverse influences on the interruptive effect of pain can be understood as influences on attentional processing; less intense nociceptive experiences occupy fewer attentional resources and hence are less interruptive.

Neuroscientific findings are likewise consistent with the view that nociceptive intensity is quantitative character. In a pair of papers that appear to have been developed simultaneously, both Iannetti and Mouraux (2010) and Legrain *et al.* (2011) survey evidence in favor of the “Pain Matrix” view about the neural basis of pain (discussed in the previous section) and independently arrive at the conclusion that the so-called “pain” matrix is in fact a network that subserves salience processing. Time and again it has been demonstrated that the magnitude of activity elicited by nociceptive stimuli in core structures of the pain matrix

– somatosensory cortices I and II (SI, SII), insula, and anterior cingulate cortex (ACC) – generally covary with nociceptive intensity. Traditionally, this covariation has been taken to indicate that intensity encoding is one of the principal functions of the pain matrix, but both sets of authors find this conclusion dubious.

First, it turns out that activations in insula, ACC, and most of SII that arise during nociceptive stimulation are spatially indistinguishable from those that occur during innocuous tactile, auditory, and visual stimulation. Activity in SI and part of SII during innocuous and nociceptive stimulation is identical, so the encoding there is likewise not nociception-specific. Since these brain areas are similarly activated across perceptual modalities, it is likely that they perform a more general function than nociceptive intensity encoding (Iannetti & Mouraux, 2010).

Second, in recent years a number of studies have revealed that the magnitude of response in these regions can be decoupled from nociceptive intensity by altering factors relevant to salience, e.g. stimulus novelty, predictability, and whether the nociceptive stimulus is preceded by an innocuous tactile one at the same location. Each of these factors reduces response magnitude in the pain matrix, but not nociceptive intensity. To this point Legrain *et al.* remark that “brain activity observed in response to nociceptive stimuli appears to be at least partially related to mechanisms underlying the stimulus-driven orientation of attention towards the nociceptive stimulus,” (p. 116).

It might be supposed that these results tell against my view about quantitative character. After all, if the salience of a nociceptive stimulus may be altered independently of felt nociceptive intensity, then felt nociceptive intensity cannot be explained by salience. However, the above results do not show that the salience *qua* amount of attentional processing commanded by a representation is altered in any significant way. Take, for

example, the nociceptive stimulation that follows an innocuous tactile one and causes a reduced response magnitude in the relevant structures of the pain matrix. Nociceptive stimulations that arise after innocuous tactile ones do not contrast as much with the antecedent state of the body as nociceptive stimulations that arise in the absence of any preceding stimulation. Plausibly, this sort of contrast is encoded as a salient feature of a somatic event, and so the former stimulation is less salient on that dimension. However, if nociceptive stimulations receive a boost to their salience in virtue of their being nociceptive, then it could be that the additional salience accrued by the solitary nociceptive stimulation pales in comparison to the great boon of salience that all nociceptive stimuli receive such that the slight difference in salience between the two stimuli is phenomenally undetectable. It could also be that contrast with previous tactile events is encoded but ultimately ignored in final assessments of the salience of nociceptive stimuli. The point here is that these results do not undermine the quantitative character view of nociceptive intensity. At worst, they entail that *if* the salience of a nociceptive representation is *fully* reflected by the activity recorded in these brain regions, then the quantitative character view of nociceptive intensity is false. Whether salience is fully reflected in these brain regions is unknown. Until more is known about how salience is assessed and how attentional resources are distributed, the account of quantitative character that I have put forward is not especially vulnerable to the sort of empirical discoveries described above.

At any rate, the foregoing is meant to suggest that the best candidates for neural corollaries of nociceptive intensity actually reflect salience processing. As Legrain *et al.* note,

The well-known relationship usually observed between the magnitude of the brain responses evoked by nociceptive stimuli and stimulus intensity or perceived intensity could also be related to the fact that when nociceptive stimuli are presented using graded intensities, stimuli that are more intense are obviously also more salient. An intense stimulus is the one that produces

the largest response, and also the one that is more contrasted relative to the surrounding and preceding sensory input. (p. 118)

In other words, because stimulus intensity and the salience that representations accrue based on their intensity tend to covary, it is understandable that we might mistake a brain region processing salience for one encoding intensity. Iannetti and Mouraux agree, asserting that the hypothesis that the “pain” matrix is in fact a salience network explains the fact that “the magnitude of the brain responses elicited by nociceptive stimuli correlates strongly with the intensity of the stimulus and/or with the intensity of pain perception,” (p. 8). That the best candidates for neural corollaries of pain intensity are better understood as structures underlying salience processing benefits the view that nociceptive intensity is a quantitative character. A simple explanation for the facts that, first, no brain area seems to differentially encode nociceptive intensity, and second, that regions processing salience generally covary strongly with nociceptive intensity is that nociceptive intensity is a quantitative character – it *just is* the salience of a nociceptive representation.

This seems especially apt in light of the widespread view that a crucial function of pain is to alert us to potentially damaging stimuli. Reflecting on this point, Legrain *et al.* suggest that

a salience detection system would reflect mechanisms by which the brain detect and orient attention to any event in the sensory environment that may have a significant impact on the organism...its activity underlies a crucial function for all sensory systems, including the nociceptive system, providing the ability to detect and to orient selectively attention to significant sensory events, in particular those that could represent a potential threat. (p. 119)

So, the mechanisms underlying salience play a role in orienting subjects to behaviorally relevant sensory events. In principle this might be done in a way that does not make a phenomenal difference, but, per the above, it is observed that nociceptive intensity – which is certainly phenomenal – strongly covaries with activity in the areas that seem to be

performing salience assessments. Moreover, introspectively, it sure seems like the intensity of a pain is an important factor in causing orientation behavior. So, there is evidence that brain activity that roughly covaries with nociceptive intensity is in fact performing salience assessments – assessments of how much attention the nociceptive stimulus should receive. There is a background assumption that attention functions at least in part to orient us toward behaviorally relevant events in our environment. Finally, there is an intuition that nociceptive intensity causally influences orientation toward the nociceptive stimulus. The view that nociceptive intensity is the salience of a nociceptive representation neatly explains all three of these items; if nociceptive intensity reflects the salience of a nociceptive representation, then the fact that it feels like nociceptive intensity plays a causal role in orienting us toward nociceptive stimulations is explained by the fact that representations of the stimulation command many attentional resources, resulting in aggressive orientation to the objects of nociceptive representations.

This is superior to the view that nociceptive intensity is a representation of a stimulus feature in two ways. First of all, as I have stressed, attempts to locate a neural substrate for such a representation have been unsuccessful, so there is no clear mechanism by which representation of the intensity of a nociceptive stimulation is even possible. Second, the view under consideration does not supply a clear route by which attention may achieve its orienting function. If nociceptive intensity represents a feature of a nociceptive stimulation, nociceptive intensity may explain, at least in part, why representations of the stimulus are “interesting” to the attentional system – why they are granted access to attentional processing. However, it does not explain how *we*, as subjects, come to be aware of what attention finds interesting, or how attention compels us to orient ourselves toward its interests for further investigation. After all, unconscious attention is possible, and

compulsion is not a typical side-effect of property representation. I will stop short of claiming that the *only* way attention could compel us is by entering into phenomenal awareness; I am attracted to this idea, but defending it here is well beyond the scope of my project. Instead, I will claim only that if the salience of a phenomenal representation is itself phenomenally available, then the question of how we are made aware of attention's interests is not so mysterious. Quantitative character is a beacon on the phenomenal landscape to which we are drawn. The more intense the beacon, the harder it is to resist investigating. The beacons that highlight nociceptive stimuli are virtually irresistible; we are deeply compelled to find out what they indicate. This is attention performing its orienting function; the beacons compel us to orient to them. How these beacons *compel* is a separate question, of course, but one that we will have made some headway on by identifying the source of the compulsion.

Another advantage of the quantitative character view of nociceptive intensity is that it can explain what asymbolics experience as distinctive about nociception without treating nociception as a separate perceptual modality from somatic sensation. Asymbolics' attention systems are intact, and so nociceptive experiences may command a tremendous amount of attention even among that population. Their nociceptive experiences are highly intense, just like those of a normal perceiver. Since unlike experiences in other modalities nociceptive representations command so much attention as to be "interruptive," it is not at all surprising on the composite account that asymbolics distinguish nociceptive experiences from others, and even delight in them – nociceptive representations command a peculiar amount of attention! Because their nociceptive experiences are phenomenally prominent without feeling bad, the nociceptive experiences of asymbolics simply feel unusual to them. The matter in which they feel unusual is part, but not all, of what makes pain experiences distinctive to

normal perceivers, and so asymbolics are able to distinguish nociceptive experiences from non-nociceptive ones.

On the composite account, Mild and Severe's (and A-Mild and A-Severe's) experiences differ in content. Unlike tracking relations, it is plausible that the functions that assign salience to representations may be calibrated by selection processes. This works in more-or-less the way that Cutter and Tye envision; tissue damage is more behaviorally relevant for members of Severe's species than Mild's, and so natural selection has favored members of Severe's species whose cognitive ecosystems assign more salience to representations of tissue damage. Severe's internal functional arrangement is such that his nociceptive representations tend to accrue much more salience than Mild's do in his cognitive ecosystem. Hence, Severe's more intense pain reflects the high degree of salience that his nociceptive representation commands, and represents that his nociceptive stimulus is salient to a very high degree. Mild's less intense pain reflects its lower degree of salience and represents that his nociceptive stimulus is salient to that lower degree.

5.4 Negative Affect and the Composite Account

The content difference described above does not fully account for the phenomenal difference that obtains between Mild and Severe. Severe's pain feels not only more intense than Mild's, but also *worse*. Pains are unpleasant, and that unpleasantness is a felt quality.

Negative affect – and affect, more generally – is a vexing aspect of phenomenal consciousness. It is not a qualitative character, for there is no distal quality that negative affect plausibly tracks. Neither is negative affect a quantitative character, for, first, negative affect does not feel like phenomenal prominence, and second, as I mentioned in the previous section, negative affect is dissociable from nociceptive intensity (Rainville, 1997; Valentini, 2013). I do not have anything novel to say about negative affect, and I especially

cannot offer an account of it. However, a theory about phenomenal consciousness that precludes the possibility of negative affect is a non-starter. In this section I will demonstrate that the composite account is broadly compatible with functionalist treatments of negative affect.

Aydede and Fulkerson's (2018) psychofunctionalist treatment of negative affect is one example of such an account. By their reckoning, empirical evidence points toward the reduction of negative affect to a functional role that is "inherently motivational in a broad sense," (p. 35). This role involves biasing us toward taking aversive action against a represented stimulus and priming the motor system to take such action, in addition to other processes related to higher cognitive functions like learning and decision-making. Aydede and Fulkerson call this complex of processes 'm-processing', and hold that the negative affect "*just is* the m-processing of incoming sensory signals." They describe the experience of negative affect as a "phenomenally salient experiential desire" that the object of a sensory representation ceases – a "phen-desire," for short (p. 36, emphasis removed).

I agree that the functional role of negative affect probably has something to do with motivating aversive action, but, to repeat, my intention is not to defend any particular functionalist view about negative affect. So, let us assume that Aydede and Fulkerson's view is correct. I will now show how to square it up with the composite account.

The composite account is already committed to a functionalist treatment of quantitative character. The question with respect to a functionalist account of negative affect is not whether its functionalism can be accommodated, but whether there is any important respect in which negative affect is unlike quantitative character that undermines any of the core tenets of the composite account.

Any phenomenal character undermines the composite account if the character is not inherently intentional, for the chief virtue of the composite account is that it preserves intentionalism. Phenomenal characters that reduce to mere representations are inherently intentional. Phenomenal characters that reduce to functional states are inherently intentional only if they are transparent, and if they partly consist in phenomenal character that reduces to a mere representational state.

I have already argued in §2.2 that pain is transparent. In §4.4.2 I argued that quantitative character is transparent, and in the previous section I argued that nociceptive intensity, an aspect of pain, is a quantitative character. Is the negative affective dimension of pain likewise transparent? I think so. Negative affect seems to be “about” a tissue event. My experience is unpleasant only to the extent that it presents me with an apparent nociceptive event on my body that itself feels unpleasant. Now, at the functional level, it is a representation of a nociceptive event that is encoded as being negatively valenced, but, as with quantitative character, the fact that the representation being so encoded is an inherently intentional phenomenally conscious representation makes it feel like it is the object of that representation that bears the unpleasantness.

If negative affect is intentional, then it has content. The content of quantitative character is a projection of the functional role that realizes quantitative character onto the object of the representation that is processed according to that functional role. The same is true for negative affect. Aydede and Fulkerson claim that negative affect reduces to the m-processing of sensory signals. M-processing relays representations to, e.g., control systems that mediate aversive behavior. So, the negative affect dimension of pain, which reduces to that processing, represents that the nociceptive stimulus responsible for those sensory signals as something that is to be avoided. This is akin to the projectivist treatment I

proposed for quantitative character; the general picture is that the kind of processing a mere representation endures is projected onto the object of the phenomenal representation it realizes. Negative affect comes in degrees; some experiences feel worse than others, as Severe's pain feels worse than Mild's. Let us call the magnitude of m-processing that a nociceptive representation receives the degree to which that representation is *motivationally* salient. Motivational salience is reflected by the intensity of the "phen-desire" that m-processing realizes. So, negative affect intensity is explained by the degree to which a nociceptive stimulation is motivationally salient, and is experienced as a feature of the tissue event to which it is applied even if, in fact, it is a feature of the representation thereof.

As discussed in the previous section, negative affect intensity is usually predicted by nociceptive intensity. So, in a typical case, nociceptive intensity determines motivational salience, and hence the magnitude of m-processing that a nociceptive representation receives. But, as with the kind of salience relevant to phenomenal character, motivational salience can be influenced by other features, e.g. hypnotic suggestion. And, as with quantitative characters and attentional processing, the intensity of negative affect is determined by the magnitude of m-processing that a representation receives, all influences considered.

The last consideration, then, is whether negative affect is constituted in part by phenomenal character that reduces to a mere representational state, that is, whether negative affect lacks a proprietary phenomenology. This gives me pause, for the unpleasantness of negative affect seems phenomenally distinct in a way that bare intensities do not. It seems quite clear that intensities, like quantitative characters, must be experienced as intensities *of* something else, that one cannot experience a bare intensity. If I try to imagine an intensity applied to nothing at all, then I succeed only in imagining a number – and surely we do not

experience pure numbers. My intuition is not so strong in the case of negative affect.

Nonetheless, in support of the composite view, I do not think I can experience or imagine “pure” negative affect; when I try, I inevitably end up imagining nausea, jitters, headaches, which all involve representations of bodily states and locations. I cautiously conclude that a functionalist treatment of negative affect is consistent with the core tenets of the composite account.

5.5 Conclusion

In this chapter I argued that nociception cannot be distinguished from innocuous tactile sensation by any tracked content. Rather, nociception is phenomenally distinguished from innocuous touch by a profound difference in quantitative character. Ordinarily, nociceptive sensations are also negatively affective; when a nociceptive sensation has a negative affective dimension, it is a pain. Accounting for negative affect in functional terms is a greater challenge than functionally accounting for attentional phenomenology, and I have not attempted to do so here. I have argued only that functionalist analyses of negative affect are in principle compatible with the composite account. Indeed, the composite account ought to be compatible with a functional analysis of any phenomenal character, provided that the functional state to which the phenomenal character reduces is one that processes mere representations, and whose phenomenology plausibly reflects the functional transformations applied to those mere representational states.

CHAPTER 6

OBJECTUAL CONTENT AND PHENOMENAL PARTICULARITY

6.1 Introduction

In the preceding chapters I have focused on clarifying my account of quantitative character and defending the idea that it is compatible with a tracking view about qualitative character. This chapter has a broader scope. I discuss a pair of seemingly unrelated issues: whether to endorse the identity formulation or the supervenience formulation of reductive intentionalism, and whether the domain of attention includes objects or regions of space. I affirm the consensus view with respect to the former: the supervenience formulation is preferable, and hence perceptual experiences have singular contents that do not make a phenomenal difference. Reductive intentionalism must thereby take on a view about the metasemantics of the singular contents of perception. I present Levine's view on this topic, which locates the metasemantic mechanism responsible for singular perceptual reference in a fixture of attentional processing. If Levine's view is accepted, then a tension emerges in the composite account: the fixture to which Levine appeals arises on a view on which attention operates in the first instance on representations of objects, but the view of attention to which I have consistently appealed throughout this dissertation is one on which attention operates in the first instance on representations of spatial locations.

The purpose of this chapter is to dissolve this apparent tension, and in so doing describe in greater detail the phenomenal significance of the "object-representations" to which I have appealed in previous chapters. If the composite view is correct, then object-representations are the fundamental "data structures," so to speak, of phenomenal consciousness; if attentional processing determines quantitative character, if quantitative

character is a degree of phenomenal prominence that is necessarily nonzero for any phenomenally conscious representation, and if attention exclusively operates on object-representations, then the composite account offers an explanation for the transparency of experience. If, in addition, the object component of an object-representation is a mechanism that secures singular reference (at least in good cases), then the composite account goes some way in explaining phenomenal particularity, the observation that phenomenal experience presents us with apparent particulars even in cases where experience fails to refer to any distal particular.

6.2 Objectual Content

Experiences represent properties on any representationalist view of perception. For example, the content of my experience as of an orange mug includes, among other things, orangeness and roundness. It is broadly accepted that perceptual content may include distal particulars in addition to properties. So, besides orangeness and roundness, the content of my perception may include *the mug itself*, out there in the world, which appears to bear the properties represented in experience. Objects that feature in experiences in this way are *objectual contents*. I will call the view that distal particulars feature in perceptual contents *the objectual content view* and its foil, the view that perceptual contents do not include distal particulars, *the existential view*.⁵³ Whether a tracking representationalist accepts the objectual content view or the existential view determines the formulation of reductive intentionalism

⁵³ The objectual content view may be understood as a species of what is usually called *the singular content view*. Singular contents need not be distal particulars; they may instead be particular times, subjects, etc. Because this chapter is concerned exclusively with the question of whether distal particulars are among the contents of perception, I have called target specifically on objectual content. Resultantly, on the definition of the existential view that I have offered, it is possible for experience to have singular contents as long as those contents are *not* distal particulars. I will eschew discussion of the relative merits of wholly existential content, cf. “impure” existential content views on which singular contents other than distal particulars may enter into perceptual content. For discussion of impure existential content, see Tye (2007).

to which she is committed. If the objectual content view is accepted, then the tracking representationalist must accept that the phenomenal character of an experience merely supervenes on its content – the supervenience formulation of reductive intentionalism. After all, it is possible for distinct objects to bring about phenomenally identical experiences, so if objects are included in the content of experience, then contents outstrip phenomenal characters and they are therefore non-identical. The existential view, in contrast, is consistent with the identity formulation of reductive intentionalism, *viz.*, that the phenomenal character of an experience is identical to its content. In this section I will present the two main arguments that steer many theorists toward the objectual content view, and hence, for the tracking representationalist, toward the supervenience formulation of reductive intentionalism.

6.2.1 First Argument: Veridical Illusions

Suppose that you have an experience as of a green cube at location *l*. Unbeknownst to you, though, your experience is caused by a mirror directly in front of *l*, reflecting a white cube bathed in green light at location *m*. As it happens, there actually *is* a green cube at location *l*, but it is occluded by the mirror. If experiences do not have objectual contents – if they represent only properties and not the objects to which they apparently belong – then your experience expresses something like ‘there is a green cube at *l*’. So, on the existential view, this experience is veridical since the world is just as the existential contents of the experience indicate; there is, in fact, a green cube at *l*. The challenge to the existential view is that, intuitively, your experience is falsidical in an important sense: the cube that you actually see is white, not green, and it is at *m*, not *l*. The causally irrelevant green cube at *l* surely cannot make a veridical experience of an otherwise falsidical one; the experience is a *veridical illusion*. In order to get the verdict that the causally irrelevant cube is likewise irrelevant to the

falsidical status of the experience, it must be the case that the perceived object – the white cube at *m* – is among the contents of the green-cube-at-*l* experience. This seems to motivate a turn away from the existential view.⁵⁴

The proponent of the existential view may, of course, bite the bullet and maintain that the experience described above is not a veridical *illusion*, but veridical full-stop; you *perceive* that there is a green cube at *l* and the world abides – and that is all there is to the veridicality of perception. Proponents of this strategy might insist that the intuition that the perception is falsidical is due to a false belief – perhaps a belief to the effect that a green cube at *l* is the cause of my experience. You perceive that there is a green cube at *l*, and mistakenly *infer* that a green cube at *l* caused your experience as of a green cube at *l*. The strategy here is to hold that veridical “illusions” are interactions between falsidical beliefs and the veridical perceptions upon which they are founded.

This strategy is not very compelling. It does not seem like any inferences must be made in order to be duped by the mirror. We do not make overt inferences from experiences as of objects bearing properties to conclusions that some object with those properties is the cause of the experience, but are nonetheless surprised when the mirror is revealed. Granted, there is something belief-*like* about perceptual experience, akin to the notion of a ‘phen-desire’ to which Aydede and Fulkerson appeal in describe the phenomenology of affect; the unpleasantness of pain is not a propositional attitude, and hence cannot be a desire that the pain cease, but the way that affect motivates is desire-*like*. Just so for the present case of “beliefs” formed on the basis of perception. Though it seems correct that we tacitly believe that the causes of our perceptual experiences are objects

⁵⁴ Cases of this form originate in Grice (1961).

bearing the properties we perceive them as having, this seems to be due to something belief-like about perceptual experience – a “phen-belief,” as it were, that the objects of a perception are its distal causes. This does not seem like an inference, but a basic feature of perceptual experience that the bullet-biting reply must deny.

Another reply on behalf of the existential view is to object that the occluded cube in the veridical illusion case does not, in fact, satisfy the representational content of the green-cube-experience and hence the relevant experience is no more than an ordinary illusion. To that end, they may claim that the scope of quantification in perceptual content includes those things within a perceptual system’s “range.” For example, suppose you have an experience as of a green cube, and indeed there is a green cube somewhere out there – in Grenada, say – but the cube you are looking is white, bathed in green light. Surely no one would maintain that your experience turns out veridical even if experience content is wholly general since all it “says” is that something-or-other is green and cubical, and there is such an object in Grenada. No one thinks that items included in perceptual content may exceed a perceptual system’s range; the most general content a perception could reasonably be expected to have quantifies over only those things perceptually available to the subject. So, with respect to the veridical illusions case, it may be claimed that the content of the experience is something like ‘something *in range* is green and cubical’, and that occluded items such as the green cube in question are, by virtue of being occluded, *not* in range.

What sorts of things fall within a perceptual system’s range? Perhaps a perceptual system’s range includes objects that causally interact with a given perceptual system at a given time. This delivers the intuitive verdict that the white cube at *m* is in range and the green cube at *l* is not. Alternatively, perhaps range may be understood in terms of locations: a location *l* is in range of a perceptual system *p* at time *t* *iff* a difference in properties

representable by p and instantiated at $\langle l, t \rangle$ would result in a difference in what p represents at t .⁵⁵ Either option allows the existential view to evade the veridical illusions worry.

I have sketched two lines of reply to the veridical illusion case on behalf of the existential view. The first is to accept that the relevant experience is veridical, chalking up the contrary intuition to a false belief rather than a falsidical element of the perception. This line of reply is not as compelling as the second, which is to impose a scope constraint on experience content such that an experience's veridicality conditions are satisfied only if the properties it represents are instantiated at a perceptually available location. Ultimately, I do not think that veridical illusions cases are a death knell for the existential view.

6.2.2 Second Argument: Demonstrative Thoughts

Looking over my garden I notice that a jade plant has pronounced pockmarks in its leaves. "That plant needs water," I think. I've entertained a *demonstrative thought*.

Demonstrative thoughts are thoughts that involve particulars by means of a *mental demonstrative*, such as the thought expressed by 'that plant'. Demonstrative thoughts are analogs of utterances involving true demonstratives in ordinary language. Kaplan (1989) tells us that a true demonstrative (henceforth "demonstrative") in ordinary language is a type of indexical, a term with content that varies as a function of context. The term 'today', for example, is an indexical; the day to which the term 'today' refers depends on the day on which it is uttered. Demonstratives are a variety of indexical that essentially involve a

⁵⁵ Note that this proposal does not require any correspondence between actual and represented locations. So, in the veridical illusions case, location m is in range of the subject's visual system (even though it is represented as location j) because if representable differences occurred there – if the cube there were red, say – then the subject would have a different visual experience. Likewise, location l is not in range of the subject's perceptual system since changes in the properties instantiated there do not make a representational difference. It may thereby be claimed by a proponent of the existential view that the content of the so-called veridical illusion is that 'something in range—', that is, something at one of the locations of which I am in perceptual contact, '—is green and cubical and at location l '. This turns out false, since nothing at any in-range location is green and cubical..

demonstration or an intention to refer that aids in fixing the singular reference of the term. For example, suppose I tell my friend “that one is my favorite” as we look upon an array of plants. My friend has no way of knowing to which plant ‘that’ refers if I do not somehow indicate it. If I intentionally point at the jade plant as I utter ‘that’, then ‘that’ refers to the jade plant.

Like demonstrative expressions in ordinary language, the contents of mental demonstratives are singular and context-dependent; ‘that plant’ may pick out a jade plant right now, but a calathea when I am tending to the indoor plants. Moreover, when I *think* ‘that plant’, there can be no ambiguity with respect to the referent of my thought; I know exactly which plant I am thinking about. Even if my garden contains a hundred pockmarked jade plants, the one my thought is about is *that* one, the one I had in mind as the thought about watering arose.

Here, then, is the problem posed by demonstrative thoughts for the existential view. It can hardly be denied that we sometimes entertain demonstrative thoughts, and it is overwhelmingly plausible that the contents of demonstrative thoughts involve objectual contents, at least in good cases. Intuitively, when these thoughts arise on the basis of perception, the contents of the thought are informed by the contents of the relevant perceptual episode; the contents of my visual experience of a certain plant enables me to think about *that plant*. If perception accomplishes this in the intuitive way – passing singular contents into demonstrative thoughts – then it must be the case that the singular content of the thought is among the contents of the perceptual episode. However, on the existential view, perception does not possess objectual contents and thereby cannot pass them into thought contents. Campbell (2002) puts the point as follows:

[W]hen you say 'that cup' you know which cup you are talking about, and when I say 'that cup', I know which cup I am talking about. So what is the

source of this knowledge? The natural answer is that it is your experience of the cup that provides you with knowledge of which cup is in question. But on [the existential view], perception could not provide you with knowledge of which particular thing you are talking about. The whole point of the view is to insist that consulting perception will only provide you with a number of existential propositions, to the effect that there is, for example, a cup of a certain type on a tray, without ever getting down to brass tacks and telling you which cup it is that is on top of which tray. (p. 124)

So, since the singular contents of demonstrative thoughts are at least sometimes distal particulars, then, contrary to the existential view, distal particulars are at least sometimes among the contents of perception.

The existential view may be defended against this objection in only two ways. The first is to deny that demonstrative thoughts possess singular contents. This defense would require either a compelling reason to deny that demonstrative thoughts are akin to demonstrative linguistic expressions or a substantial revision in the way philosophers of language conceive of demonstratives in ordinary language. Lacking the former and wary of the latter, I set this approach aside.

The second way, then, is to accept that demonstrative thoughts may possess objectual contents but deny that perception supplies them. This places a demand on the metaseantics of demonstrative thoughts. It requires that in the informational pipeline that begins with a distal object and ends with a demonstrative thought, direct semantic contact with a distal particular first occurs with some mental state downstream from perception. The success of this reply thereby turns on whether there is a plausible metasemantic account of demonstrative thoughts that meets this demand; demonstrative thoughts must obtain their objectual contents in a way that circumvents perceptual processing. As we will see in the next section, the prospects for such an account are grim.

6.3 The Metasemantics of Objectual Content in Demonstrative Thought

In the last section it was noted that demonstrative linguistic expressions are distinguished from the broader category of indexicals by a demonstration or intention that fixes the reference of the indexical term. If demonstrative thoughts are akin to demonstrative linguistic expressions, then we should expect that some mental activity plays the role of that performative element in securing the reference of demonstrative thoughts. Presumably this activity is thinking *that thing* – “mentally pointing,” as Levine (2010) calls it. With respect to the demonstrative thought argument against the existential view, the most important characteristic of this mental activity is its place in the cognitive pipeline. Since the performative element is the final piece needed for securing the reference of a demonstrative, its falling within the bounds of perception would indicate that direct semantic contact with distal particulars occurs prior to that, and so necessarily during perceptual processing – not downstream from perception as the existential view requires. Now, there is no consensus as to whether and to what extent perception is partitioned off from cognition, but on the plausible assumption that there is *some* important difference between the two, the thinking of propositional thoughts like ‘that plant needs water’ surely falls on the cognitive side of the division. The existential view is not yet in peril.

However, the mechanism underlying the faculty of mental demonstration is also relevant, for even if the act of “mental pointing” is a cognitive affair, the existential view is sunk if the ability to mentally demonstrate is sustained, in whole or in part, by perceptual representations with objectual contents. What is needed, then, is a metasemantic account of demonstrative thought.

In pursuit of such an account, it is useful to begin with some bad cases: distal items about which we may *not* have demonstrative thoughts and non-distal items about which we

may. The former category includes items exhibiting perfect camouflage. Suppose the scene before you includes a tree and a moth upon the tree whose dappled coloration is an exact match for the tree's bark at the moth's location. Even if you look right at the moth from a distance at which you would typically be able to recognize moths, you are unable to do so owing to the moth's extraordinary camouflage. Even though the moth is causally interacting with your visual system – light reflected from its wings is reflected onto your retina and processed in the typical way – there is an intuitive sense in which you cannot see the moth; it is effectively invisible to you. As such, you may not have demonstrative thoughts about the moth; you cannot think about *that moth* or even *that thing* because you do not perceive that something is there at all. On the other hand, there is a class of pseudo-items about which we *may* form demonstrative thoughts. Afterimages, floaters, and various other sensory phenomena are all mentally demonstrable in the same way that distal particulars are; I may ask of an afterimage, “what is *that*?” or think things like “*that floater* looks like Orion's Belt.”

These cases illustrate that distal particularity is neither necessary nor sufficient for an item's being perceived *as* a particular. Instead, the feature by which jade plants and afterimages are mentally demonstrable but camouflaged moths are not is that the former look like, for lack of a better term, *something*. Granted, there is a sense in which the moth looks like something – tree bark – but that is not the sense of ‘something’ that I mean to evoke. The relevant sense of ‘something’ has to do with apparent objecthood, which is to say, roughly, that there is no item in perception to which only properties of the moth seem to be attributed; all of its visible properties appear to belong to the tree. The jade plant, in contrast, looks like a distal *something*, and the floater looks like *something* even if it does not appear to be distal. There is more to be said about apparent objecthood, but for now only two points are relevant. The first is an affirmation of the transparency intuition: perception

presents its subject with items – not necessarily distal items, but nonetheless items apparently distinct from experience itself – to which features are attributed. Second, as evinced by camouflaged moths, not all distal items in the scene before a subject are picked out by a corresponding apparent object.

If we may not mentally demonstrate items that have no corresponding apparent object in perception, it follows immediately that a distal item is mentally demonstrable only if an apparent object corresponding to that distal item has already been encoded at the time of demonstration. This observation comports nicely with Levine's proposal regarding the metasemantics of demonstrative thoughts. On Levine's view, mental demonstration is sustained in part by attention; we cannot mentally demonstrate things to which we cannot attend. In agreement with Pylyshyn (1989), Levine takes the domain of attention to include objects.⁵⁶ If attention is directed at objects, then it shares with mental demonstration the need for an intermediary representation of objecthood on which to operate, for one cannot anymore attend to a camouflaged moth than mentally demonstrate it. The relevant question, then, is whether these intermediary representations possess objectual contents.

The role of 'apparent object' in the observations above is filled on Levine's view by what Pylyshyn (1989) calls a 'finger of instantiation' – a 'FINST'. A FINST is attached to a cluster of features detected by early vision, tagging those features as belonging to a single object and thereby allowing the subject to track that object as it moves through space. Although the tokening of a FINST depends on the detection of some-or-other cluster of features and the referent of a FINST is whatever object in fact possesses those features at

⁵⁶ Cf. the view that attention is directed at regions of space, which is espoused by, e.g., Downing and Pinker (1985) and Treisman and Gelade (1980). Unlike Pylyshyn, Levine is not committed to holding that *only* objects fall within the domain of attention. This point is not crucial for now, but I will return to it in a bit.

the time of the FINST's deployment, FINSTs do not themselves encode those features; after all, subjects are able to track objects through space even as those objects change in color, shape, and size. Instead, when the right kind of cluster of features is detected at a certain location, a FINST is tokened to say nothing more than, very roughly, "here is an object." Indeed, the notion of a *finger* of instantiation is meant to convey the idea that if a subject had extraordinary fingers that reached out to touch all of the objects she tracks through space, then she could track the movement of the object touching, say, her pinky simply by awareness of her pinky's location; as long as the object remains in contact with her pinky, then no changes in the object's features could prevent her from identifying it as being that same object. FINSTs likewise individuate objects in a way that allows subjects to identify and track those objects without involving representations of their features.

Do FINSTs have objectual content? It seems that they must. Since FINSTs do not encode descriptive content, their content must be directly referential. Ordinarily, the items to which we attend are distal ones, so if attention is mediated by FINSTs, it must be that FINSTs have those attended distal items as contents. FINSTs are deployed in early vision, prior to attentional selection, and so it would be difficult to argue that they are not the result of a perceptual process. Thus, on Levine's account of the metasemantics of demonstrative thought, the existential view is untenable. It will not do for the existential view to simply reject Levine's account in favor of another account of demonstrative thoughts, for FINSTs are theorized to be deployed with every occurrence of visual attention, not just those that lead to demonstrative thoughts. The existential view must contend instead with Pylyshyn's visual indexing theory, of which FINSTs are a crucial element.

Now, visual indexing theory is not the only contender for a theory of attention. On Feature Integration Theory ("FIT"), which I previously discussed in the context of salience

determination, the domain of visual attention is regions of space rather than objects. FIT posits an array of “feature maps” for visible features such as color, shape, and motion that are filled out early in visual processing. Directing attention to a particular spatial location – spatial locations are encoded across all feature maps – results in co-present features being bound together as an apparent object. The upshot is that on FIT, perception of objects as such is a result of – not an input to – attention (Treisman & Gelade, 1980). This view does not immediately rule out the existential view since attention is not obviously part of perceptual processing. Unlike FINSTs and propositional thoughts, visual attention does not fit clearly within the boundaries of either perception or cognition, for some but not all visual attention seems to be under executive control of the subject. As such, attention has been a persistent nettle for both tracking representationalism and its critics; on the one hand, the tracking representationalist must contend with myriad examples of phenomenal differences in perception that arise due to the interference of attention, but on the other hand, she may insist that in these cases attention is a process outside the bounds of perception, controlling the position of the sense organs and thereby modulating the inputs to perceptual processes in a way that brings about content differences corresponding to the phenomenal ones. So, if attention is itself the mental process with which objecthood first enters into perceptual content, then the existential theorist could with some precedent claim that direct semantic contact with objects does not occur within perception.

The rub here is that in espousing this view the existential theorist denies that direct semantic contact with objects occurs via attention *at all*. If FIT is true, or at least if perceptual processing does not include anything like a FINST, then object representations depend crucially on representations of properties and of locations; it is only in virtue of representing a set of features as co-located that representations of objecthood emerge.

Object representations on this view thereby employ a sort of descriptive reference; an experience as of a red square at location *l* has as its referent whatever object, if any, is red, square, and at *l*. Thus, on FIT, attention may play no part in securing the objectual reference of demonstrative thoughts.⁵⁷ The most that could be said without some other ingredient is that a thought like ‘that plant needs watering’ does not directly refer to *that plant*, but instead is a disguised description of roughly the form ‘something plant-y at location *l*’. So, unless the existential view offers some metasemantic mechanism outside of perception and other than attention for securing objectual reference, it cannot countenance *bona fide* demonstrative thoughts.

6.4 Perceptual Data Structures and Phenomenal Particularity

Visual Indexing Theory and FIT are rival views. On Visual Indexing Theory, attention targets objects via FINSTs, not feature representations. On FIT, attention targets locations via the “master map” that encodes conspicuous locations, and object representations arise out of the binding of represented features at a selected location. Throughout this dissertation I have appealed to FIT with respect to salience attributions, but in the previous section I denied that the way object representations are instantiated on FIT may underlie singular reference and agreed with Levine that FINSTs, and by extension Visual Indexing Theory, are plausible metasemantic mechanisms underlying this function. In this section I address this apparent inconsistency and offer a sketch of the overall cognitive architecture on which my project depends. I conclude with a discussion of phenomenal particularity and its relationship to the transparency intuition, and argue that the cognitive architecture to which I am committed affords an explanation of both.

⁵⁷ It might contribute *some* types of singular contents – locations, for example – but objectual contents are right out.

At its inception, Treisman and Gelade's (1980) FIT was intended as a solution for the *binding problem* – the question of how the visual system binds feature representations together to form representations of objects. For example, an experience as of a red square presents redness and squareness as features of the same item. The binding problem with respect to this experience is to describe the mechanism by which redness and roundness, distinct kinds of properties processed separately from one another, end up co-represented as features of a single item. FIT's answer to the binding problem is that the deployment of visual attention to a location binds together all of the features encoded at that location across independent feature maps. Literature on the binding problem is too vast to review here; what is relevant for present purposes is that there are many serious empirical problems with FIT as a theory of feature binding.⁵⁸ Indeed, skepticism that the mechanisms underlying feature binding should be expected to yield behaviorally testable effects together with burgeoning understanding of computational neural networks has increasingly shifted investigations of feature binding into the realm of neuroscience.⁵⁹

Visual Indexing Theory is incompatible with FIT, for a key claim of FIT is that representations as of objects do not emerge until the application of attention and FINSTs are pre-attentive. However, there are compelling reasons to reject FIT, and the FINSTs of Visual Indexing Theory, however they turn out to be implemented, are ineliminable from a

⁵⁸ For a review of these problems, see Quinlan (2003). Among these problems, notes Quinlan, are clear violations of core tenets of FIT. According to FIT, feature detection occurs prior to and independent of the deployment of attention, and attention is necessary for the formation of conjunctions of features bound to the same object. However, "[n]ot only are there many examples of conjunction formation in the absence of attention, but there are also several clear demonstrations of attention being implicated in feature detection," (p. 668).

⁵⁹ Quinlan (2003) discusses this skepticism. The shift toward a neuroscientific understanding of the binding problem is exemplified by the development of hierarchical models of feature encoding (e.g. Duncan & Humphreys, 1989), which have given way to notions like "binding neurons" that connect lower levels of the feature-encoding hierarchy to higher ones and preserve part-whole relations between low- and high-level features through, e.g., synchronic neural spike trains (von der Malsburg, 1999).

theory of perceptual content that allows for perception to accomplish singular reference. So, FIT must be rejected.

Nonetheless, saliency map models of bottom-up attention inspired by FIT are perfectly compatible with Visual Indexing Theory. Like FIT, saliency map models posit that bottom-up attentional selection involves the conspicuity of locations across several feature maps being encoded onto a single map – the “saliency map” rather than the “master map” – that guides attentional selection. Unlike FIT, saliency map models do not purport to solve the binding problem – feature integration theory without the feature integration, as it were. Resultantly, saliency map models may be neutral with respect to where and when representations of objects arise in the cognitive pipeline. To that point, a growing body of evidence indicates that attention is directed at interesting objects, and that saliency maps are but one mechanism subserving that function.⁶⁰

On the composite account, saliency maps explain how salience is accrued by object-representations, not how object-representations are formed. The object component of an object-representation is or involves a FINST, or at any rate some relevantly similar mechanism that can underlie singular reference to distal particulars. The features attributed to objects in object-representations are representations of tracked distal features, and these features determine the salience of their object-representation, whether by bottom-up or top-down influences. The salience of an object-representation determines the amount of attentional processing that the object-representation receives, and the amount of attentional processing that an object-representation receives is reflected in its quantitative character. So, the cognitive architecture to which I am committed assumes that attention processes object-

⁶⁰ See, e.g., Einhauser *et al.* (2008) and ‘t Hart *et al.* (2013).

representations, and hence the object-representations emerge at some point prior to attentional processing. In principle, objects could be bound to features as the last computational process prior to attentional processing, a view that crucially differs from FIT only in that feature binding would involve attention's hooking up a collection of co-located features with the appropriate already-instantiated FINST rather than instantiating a new object. When and how features are attributed to objects in the cognitive pipeline is an empirical question, of course – the present point is just that the composite account makes no claims about when the object component of object-representations, which is or involves a FINST, comes to have features attributed to it beyond the modest commitment that it happens before the kind of attentional processing that gives rise to quantitative character.

On this view, the object-representation is the fundamental data structure of phenomenal experience. Though object-representations decompose into an object-component (an 'object-s', to distinguish it as a structural feature of an object-representation rather than the distal object, if any, to which it refers) and some attributed features, these parts are nonetheless bound together by the time attentional processing occurs. Since attention takes as input object-representations, since quantitative character is determined by attentional processing, and since an item with no quantitative character has no phenomenal presence, it follows that object-representations are at the ground level of phenomenal consciousness, for anything that cannot be processed by attention can have no phenomenal presence.⁶¹

⁶¹ The relationship between attention and phenomenal experience is a matter of some controversy. Nonetheless, the plausibility of the composite account depends heavily on attention's being necessary for phenomenal experience. In a survey of the state of empirical work on this topic, Pitts *et al.* (2018) argue that the balance of evidence currently supports the view that attention is necessary (but not sufficient) for phenomenality, which bodes well for the composite account. If the empirical chips fall the other way, whether the composite account is salvageable depends on what sorts of phenomenal episodes do not require attention; perhaps the view could be finagled if, say, features of background scenes do not require attention to be phenomenally conscious. However, if it turns out that attention is not necessary for object-representations to

If object-representations are the fundamental data structures of phenomenal experience, then the transparency of experience is unsurprising. The reason that the features apparent in experience always seem to be features of something other than experience itself is that by the time a feature enters into phenomenal consciousness, the representational token that realizes it is already part of the object-representation complex and hence is bound to an object-s. Because the object-s is or involves a FINST, the features apparent in perceptual experience end up directed at whatever object, if any, that the FINST picks out. Transparency falls out of the kind of data structure by which we have phenomenal experiences. While this guarantees the necessity of transparency in creatures like us whose experiences always bottom out as object-representations, it leaves open whether transparency is a necessary feature of phenomenal consciousness; perhaps minds with a very different functional arrangement from ours could realize phenomenal consciousness of features unincorporated into object-representations. Nonetheless, the transparency of *our* experiences falls out of the fact that our experiences are constituted by object-representations. For creatures like us, experience is not a medium by which experienced features may be attributed to distal objects; experience does not stand between subjects and objects to “see through.” Rather, the objects of experience bubble up into phenomenal consciousness right alongside their features. So, though I argued against formulations of transparency that appeal to the scope of attention in Chapter 1, transparency and attention are ultimately related. It turns out that, in creatures like us, facts about attentional processing

be phenomenally conscious, then the composite account is in trouble, for the account of quantitative character to which it is committed holds that attentional processing explains the degree to which, and by extension whether, an object-representation is phenomenally prominent.

and the relationship between attention and phenomenal consciousness predict that *our* experiences must be transparent.

Related to transparency is *phenomenal particularity*, the notion that perceptual experience is *as of* particulars. I borrow this term from Montague (2011), who introduces the idea with the observation that “[a]lmost everyone agrees that we perceive individual physical objects, and almost everyone agrees that we perceive them *as* individual physical objects – as discrete, numerically distinct, as particulars,” (p. 121). As Tye (2007) puts it, experience features “singular phenomenology, or at least putatively singular phenomenology,” or alternatively that there is “a particularity in our experience,” (p. 608). Phenomenal particularity in this sense is an entirely phenomenal observation; it is apparent that even a *hallucinated* object which does not refer to any distal particular nonetheless *looks* like one. Indeed, what I intend by *phenomenal particularity* outstrips even Montague’s gloss above, for it seems to me that phosphene experiences exhibit phenomenal particularity despite not looking like particular *physical* objects. As with transparency, the apparent materiality of an item is orthogonal to its phenomenal particularity.

Hence, an account of phenomenal particularity need not involve what Schellenberg (2010) calls the “relational particularity” of perceptual experience, “the mind-independent object of an experience making a difference to individuating the experience,” (p. 20). The objectual content of an experience need not feature in an explanation of phenomenal particularity because whether an experience has a distal particular as content is independent of whether the experience looks to be of a particular. Certainly, the existential theorist cannot appeal to the objectual content of an experience to explain phenomenal particularity, for the existential view denies that there is such content. However, as Montague stresses, the singular content view fares no better since on that view, particular objects featuring in the

content of perceptual experience expressly do not make a phenomenal difference. In her words, “[a]ppealing to a supposed object-dependency of perceptual content does not give a satisfactory *phenomenological* account of phenomenal particularity because it doesn’t explain why particularity is a phenomenal feature of perceptual experience,” (p. 122, emphasis in original). Since phenomenal particularity is a fact about phenomenal experience, and since singular contents of experience, assuming there are any, do not make a phenomenal difference, then the singular contents of experience cannot explain phenomenal particularity.

Montague accounts for phenomenal particularity in terms of the *object-positing* structure of thought. The idea here is that the category of ‘object’ is the most fundamental category of thought; we must take something to be an object before we can take it to be anything else – brown, a dog, Fido, etc. Montague holds that it is taking something as an object that explains phenomenal particularity; a thing’s looking like a particular is a matter of taking it *as* a particular, in some primitive but nonetheless conceptual sense. So, for Montague, phenomenal particularity is a kind of cognitive phenomenology; the perception of an item *as* an individual is explained by our thinking of it as such because “sensory phenomenology on its own is incapable of accounting for particularity,” (pp. 136-137). This straightforwardly commits her to the view that conceptual thought is required for phenomenal particularity. She bites the bullet on this point, suggesting that creatures without concepts, like bees, may “only strictly perceive [e.g.] color contrasts” rather than particular objects.

I think this is a bridge too far; I do not know what bees’ experiences are like, but my own experiences of phenomenal particularity do not feel conceptual. It does not feel like I must think of objects as such for them to look like particulars, and they continue to look like particular objects even if I attempt not to see them as such. Nonetheless, I will not here

argue that phenomenal particularity *is* not cognitive phenomenology, but rather that, even by Montague's lights, it need not be. For, I broadly agree with Montague's take on phenomenal particularity. I think that experience is, in an important sense, "object-positing," and that object-positing is related to the mechanism by which perceptions secure singular contents. Like Levine, Montague observes that demonstrative thoughts are mediated by perceptual experience. To that point she says that:

[I]t is the experience of a *this thing* that the perceptual experience involves – the *object-positing* feature of the perceptual experience – that makes it possible for that particular experience to secure external reference to that particular object...To *perceive* a particular object (given appropriate causal connections), we need an aspect of *experience* to deliver that particular object, and that is precisely what *object-positing* does. (p. 138, emphasis in original)

Per the previous section, I agree with all this. Finally, I agree that "sensory phenomenology" – the qualitative features of experience, I suppose – does not capture phenomenal particularity, for sensory phenomenology consists only of the attributes, not the items to which they are attributed.

However, Montague seems to think of phenomenal particularity, and hence the items to which features apparently belong, as severable from and less fundamental than sensory phenomenology. She asks us to imagine an experience of a dog, then subtract the object-positing feature from the experience. Ostensibly, this eliminates the ability to experience the object *as* a dog since seeing something as a dog requires seeing it as an object, but is supposed to leave behind an array of colors – the sensory phenomenology. So, the relegation of phenomenal particularity to the realm of the conceptual is based on the supposition that sensory features are cognitively prior to phenomenal particulars.

On the view I am advancing, this experience – as of features untethered to any apparent object – is not possible for creatures like us. If the fundamental data structure of experience is the object-representation, then where there is no object-s, there are no features.

Sensory phenomenology is neither more nor less fundamental than phenomenal particularity; they are inextricably bound together. Hence, object-representations explain phenomenal particularity nonconceptually; the experience of particular objecthood arises from the fact that the items that enter phenomenal consciousness are object-representations. A cluster of features that we experience as belonging to a particular object appear that way because they are the attributes of a particular object-representation. Indeed, the explanations afforded by object-representations for transparency and phenomenal particularity are virtually the same; the reason that features apparent in experience always seem to belong to something other than experience itself and the reason that experience seems to present us with particular objects is that the fundamental constituents of experience are object-representations, which do not allow for experience to be other than transparent and phenomenally particular.

6.5 Conclusion

In this chapter I address some issues that may initially seem to be peripheral to the composite account – whether and how perceptual experiences possess singular contents and whether objects or locations are in the domain of attention. Though an apparent inconsistency in empirical commitments emerges, its resolution delivers explanations for both transparency and phenomenal particularity. This is important for the composite account, which must in the end be measured against tracking representationalism and its explanations for the elements of phenomenal consciousness.

This dissertation began with a discussion of tracking representationalism. For all the critical attention that the view has received, it seems to me to have only a handful of serious problems, all related to the externalist commitment of the view; it is evident that tracking views cannot adequately account for affective states or a certain class of phenomenal

intensities, and the phenomenology of attention is a significant worry, if not an insurmountable one.

The composite account is intended as a minimal intervention to address these problems. Though it is not a tracking account of *phenomenal* character, the composite account maintains tracking representationalism for *qualitative* character. That qualitative character is explained by a tracking account is necessary for the plausibility of the functionalist account of quantitative character that I propose, which addresses the problem of phenomenal intensities. Because quantitative character is explained in terms of attentional processing, the composite account likewise addresses the problems that attentional phenomenology raises for tracking representationalism; differences in attentional phenomenology are differences in quantitative character. And, given that the composite account already features a functionalist component, there is no reason in principle that a functionalist account of affective states could not be incorporated into the composite account.

The composite account maintains the naturalistic appeal of tracking representationalism. The account of quantitative character here offered owes more to empirical evidence than intuitive or introspective, and the demands that the composite account makes on the cognitive architecture are both broad and plausible. So, though wholesale tracking representationalism about phenomenal character is untenable, tracking views of qualitative character remain an attractive foundation for a reductive account of phenomenal consciousness.

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