THE DEEP STRUCTURE OF EXPERIENCE

ABSTRACT:
When we think about the structure of the physical world, we take the rich variety of physical things we perceptually observe to be made of the same basic physical ingredients. According to this picture, the many macrophysical properties we perceive are grounded in a small collection of fundamental microphysical properties. In other words, we take the physical world to have a deep structure. When we think about experiences, though, we typically assume that experience cannot have a deep structure. We do not suppose that all experiences might be made of the same basic phenomenal ingredients, and that the rich variety of macrophenomenal properties we introspect might be grounded in a small collection of fundamental microphenomenal properties. This paper characterizes a view where experience does have a deep structure, evaluates several predictions of the view, and considers our prospects for investigating the microphenomenal realm.
§0 | DEEP STRUCTURE

When we think about the structure of the physical world, we distinguish between the macrophysical realm and the microphysical realm. We take the macrophysical properties we observe with the naked eye (or ear, nose, tongue, etc.) to be systematically generated by the microphysical properties beyond our perceptual grasp. According to this picture of the physical world, the many different kinds of physical properties we perceive are made out of the same basic physical ingredients. Putting it another way, we take the physical world to have a deep structure.

This picture of the physical world is now both familiar and intuitive. But the fact that the physical world has a deep structure has not always been obvious. For an ancient theorist in a prescientific age, ascribing a deep structure to the physical world would have been a radical and speculative hypothesis. Perception alone reveals only the physical world’s surface structure. To investigate its deep structure, we had to develop tools, technology, and theories that allow us to discover more than what our bare perceptual capacities reveal.

Our perceptual capacities put us in contact with physical properties of the external world. Our introspective capacities, on the other hand, put us in contact with phenomenal properties of our own experiences. But for the most part, theorists have taken it for granted that experience does not have a deep structure. When we think about experience, seldom do we entertain the possibility that all experiences are made of the same basic phenomenal ingredients. And few have taken seriously the idea that in addition to the macrophenomenal properties we introspectively observe, there are microphenomenal properties beyond our introspective grasp. These skeptical sentiments are captured by Barry Dainton in the following passage:
“Although physical entities such as live cats and lumps of cheese seem to be very different kinds of things, it turns out that they are composed of exactly the same sorts of micro-constituents (e.g. quarks and electrons are the same the universe over). You could turn a lump of cheese into a cat...simply by re-arranging and re-combining the ultimate constituents of the cheese ... [But] there is no reason to think phenomenal objects decompose into anything akin to the micro-constituents of ordinary physical objects ... The only phenomenal parts possessed by a phenomenal object are those that are manifest in the experience itself.”


The picture of experience exemplified by this passage is the *surface theory*. According to the surface theory, there are many fundamental ingredients of experience and we have introspective access to what these ingredients are. A typical surface theorist would take the fundamental phenomenal ingredients to include color experiences, flavor experiences, emotions, pains, and so on. The surface theory posits an intimate relationship between the structure of experience and what introspection reveals. But it also requires us to adopt a complex and inelegant picture of experience, full of phenomenally inexplicable facts.

In contrast, the picture of experience I develop and explore in this paper is the *deep theory*. According to the deep theory, experience has a deep structure—the rich variety of phenomenal properties we introspectively observe are made of a small collection of basic phenomenal ingredients. For the deep theorist, there is more structure to experience than what we might think on the basis of our basic introspective capacities. Just as our picture of the physical world distinguishes between the macrophysical and the microphysical, the deep theorist about experience might distinguish between *macrophenomenal properties*—the phenomenal properties we can discern using our basic introspective capacities—and *microphenomenal properties*—the more fundamental phenomenal properties that ground the macrophenomenal properties. The deep theory posits a gap between the structure of experience and the grain of introspection. But it gives us a picture of experience that

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1 Dainton talks about experiences here, rather than phenomenal properties, but his remarks could easily be translated to apply to phenomenal properties.
is systematic and unified.

This paper characterizes the deep theory, evaluates several predictions of the view, and considers the prospects for systematically investigating the deep structure of experience. My aim is not to show that we must accept the deep theory—that is beyond the scope of this paper, and would require much more empirical and theoretical investigation. Instead, my aim is to sketch the deep theorist’s picture of experience and to argue that it is a credible hypothesis. Some have thought that the surface theory is the only defensible option. But this prematurely narrows the space of theoretical possibilities. As I hope to show, the deep theory gives us a promising picture of experience that is worth exploring further.

§1 THE DEEP THEORY

When I talk about experiences, I am concerned with the phenomenal character of experiences—the subjective, qualitative properties that characterize what it is like to have that experience. If you consider, for example, what it is like to experience redness, or feel pain, or taste vegemite, you are likely thinking about the phenomenal character of your experience. The phenomenal properties of an experience characterize what the phenomenal character of an experience is like.

A phenomenal primitive is a phenomenal property that is not grounded in more fundamental phenomenal properties. The deep theorist and the surface theorist disagree about which phenomenal properties are the phenomenal primitives. A typical surface theorist thinks that the phenomenal primitives characterize specific color experiences or specific pain experiences. A typical deep theorist thinks that those phenomenal properties are grounded in more fundamental phenomenal properties that we cannot introspectively discern. The deep theorist and the surface theorist also disagree about how many different kinds of phenomenal primitives there are. Whereas the surface theorist must posit a vast multitude of phenomenal properties the deep theorist need only postulate a small number of more fundamental phenomenal properties.

2 Grounding is most commonly thought of as a relation between facts [Fine 2012]. But it is not uncommon to see grounding used to relate properties [Schaffer 2009], including phenomenal properties [Chalmers forthcoming a]. Those who prefer to construe grounding as a relation between facts might instead construe my discussion as discussing grounding relations between facts about the instantiation of phenomenal properties.
primitives, the deep theorist holds that there are relatively few. The key idea of the deep theory is that all experiences are generated from a small collection of phenomenal primitives. In principle, this claim need not commit one to the existence of a microphenomenal realm. But it is quite implausible that some of the macrophenomenal properties of our experiences might be the grounds of all other phenomenal properties. McGinn [2006] expresses this sentiment when he says that “you cannot get pains from experiences of colours, or emotions from thoughts, or thoughts from acts of will.” Perhaps part of why few have thought that experience might have a deep structure is because few have entertained the possibility of microphenomenal properties. But the most promising versions of the deep theory are those that take seriously the existence of a microphenomenal realm. Accordingly, when I talk the deep theory, I’ll presume that the views under consideration are committed to the existence of microphenomenal properties.

Just because a deep theorist posits microphenomenal properties does not mean that they think that all phenomenal primitives are microphenomenal. The deep theorist might still think that some of the phenomenal primitives are introspectively observable. Relatedly, the deep theorist need not hold that microphenomenal properties must be different in kind from macrophenomenal properties. Just as charge might be a microphysical primitive with macrophysical manifestations, so too there might be microphenomenal primitives with macrophenomenal manifestations.

I’m principally interested in global deep theories, or views that concern all experiences. But we could also consider local deep theories, or views that concern specific domains of experiences. For example, we might consider whether color experience, or auditory experience, or cognitive experience have deep structures, independently of whether a global deep theory is true. Though establishing some local deep theories does not automatically suffice for establishing a global deep theory, establishing local deep theories can serve as evidential support for the deep theory. And if a global deep theory is true, then the development of local deep theories.

What about a view that holds that there are no phenomenal primitives (perhaps the structure of experience gets endlessly more fine-grained)? Intuitively, such a position should count as a deep theory. This might be a limit case for the deep theory, where the number of phenomenal primitives is zero.
theories might serve as the initial steps towards progressing to global deep theory.

For the most part, I presume an atomist framework about experience, according to which phenomenal wholes are grounded in phenomenal parts. According to an atomist, the phenomenal primitives are properties of proper parts of total experiences. However, the deep theory is also consistent with holist views about experience, according to which phenomenal parts are grounded in phenomenal wholes. According to a holist, the phenomenal primitives are properties of total experiences. For both the atomist and the holist, whether or not experience has a deep structure depends upon whether a small collection of phenomenal primitives suffices to generate all the phenomenal properties of experiences. In the case of the holist, this concerns the question of whether the phenomenal properties we are familiar with through introspection can be generated from a sparse set of phenomenal primitives that characterize total experiences.

I’ll take it for granted that there is an explanatory gap between physical facts and phenomenal facts. This is the claim that phenomenal facts are not conceptually entailed by physical facts. If there were no explanatory gap, then the question of whether experience has a deep structure becomes straightforwardly resolvable either by engaging in more third-personal investigation or simply by thinking about our concept of the phenomenal. Assuming an explanatory excludes strongly deflationist views about phenomenology, such as analytic functionalism. But it leaves open most contemporary views about experience, including the most popular forms of physicalism. More broadly, my discussion is neutral on the metaphysical nature of experience—the deep theory is consistent with physicalism, dualism, and dual-aspect monist theories.

Some might wonder whether accepting physicalism obviates some of the virtues of the deep theory, since the physicalist thinks that all phenomenal properties

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4 In fact, the deep theory accords particularly well with dual-aspect monism (also known as Russellian monism). The most popular versions of dual-aspect monism entail that experience has a deep structure (see Chalmers [forthcoming a] for more discussion). Accordingly, motivation for dual-aspect monism can be taken as indirect motivation for the deep theory. Conversely, if the deep theory itself is defensible on independent grounds, then that supports the defensibility of the dual-aspect monist theories that entail the deep theory.
are ultimately grounded in physical properties. If physicalism is true, then the surface theory and the deep theory are on a par with respect to ontological parsimony. But theoretical parsimony still favors the deep theory. Given the explanatory gap, the physicalist still must posit a number of explanatorily primitive connections between the phenomenal primitives and their physical correlates. Since the surface theorist must posit many more phenomenal primitives than the deep theorist, the surface theorist must also posit many more explanatorily primitive connections.

A core claim of the deep theorist is that some phenomenal properties are not introspectively discernible. But what exactly is introspection? For the most part we can remain neutral, and simply take *introspection* to be whatever proprietary process it is by which we learn and form judgments about our own experiences. This leaves open a wide range of views about the nature of introspection. I’ll take the objects of introspection to be properties, though I take it that we can also talk about introspecting facts. For example, we might take the object of introspection to be the phenomenal redness of my current visual experience, or we might take the object of introspection to be the fact that phenomenal redness is instantiated by my current visual experience.

What does it mean to say that a phenomenal property is not introspectible? On the one hand, there is *basic introspection*, whereby we attain knowledge about a phenomenal property by carefully attending to features of our experiences. When I say that the deep theory takes there to be microphenomenal properties that are not introspectively discernible, it is basic introspectibility that I have in mind. For the deep theorist, basic introspection upon our ordinary experiences fails to grant knowledge of the full structure of experience.

This leaves open whether we might acquire knowledge of microphenomenal properties through *augmented introspection*, which includes basic introspection as well as more sophisticated methods, such as the method of phenomenal contrast.

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5 See Chalmers [2013] for discussion of this.
6 If you are skeptical that there is any single proprietary process by which we form judgments about our own experiences, then my claims can instead be taken to apply to whatever set of processes ‘introspection’ denotes.
aggregating judgments across subjects, multidimensional analyses. More broadly, augmented introspection includes basic introspection plus tools, methods, or technology that we might use to enhance our introspective inquiry. A super-optimistic deep theorist thinks that all microphenomenal properties can be discovered with augmented introspection, whereas a super-pessimistic deep theorist thinks that no microphenomenal properties are discoverable, even with augmented introspection. My own view is in the middle—though I think we can acquire some knowledge of microphenomenal properties, I think there are reasons to be cautious about our prospects for probing into the bottom layer of experience. In Section 3, I discuss some of the basic methodological challenges for investigating the microphenomenal.

What makes a phenomenal property introspectible or not depends upon the introspective capacities of normal humans. Just as what counts as microphysical depends on what normal humans cannot perceptually discern, what counts as microphenomenal depends on what normal humans cannot introspectively discern. This leaves open whether other creatures (or certain unusual humans) might be able to introspectively discern microphenomenal properties. This also means that there is no sharp boundary between the microphenomenal and the macrophenomenal, just as there is no sharp boundary between the microphysical and the macrophysical.

The picture of experience that the deep theory endorses is analogous to the Democritean picture of the physical world. According to the Democritean, the world is made out of microphysical entities called atoms, which have microphysical properties that combine in systematic ways to yield the macrophysical properties that we observe. Just as the Democritean theory posits physical properties beyond the macrophysical properties we have perceptual access to, the deep theory posits

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8 Although not being introspectible is necessary for being a microphenomenal property, it may not be sufficient. For example, a maximally specific color experience might not be basically introspectible (we cannot know that we are having a red_{max}-experience rather than a red_{min}-experience just by carefully attending to our experience), but intuitively it should not count as microphenomenal. This mirrors the perceptual case. For example, we cannot perceptually discern UV rays, but that does not automatically mean that arrays of UV light are microphysical. This raises the question of what exactly is required for a property to count as microscopic, but I will not address this issue here.
phenomenal properties beyond the microphenomenal properties we have introspective access to. But just as the Democritean theory takes the wide variety of macrophysical properties to be grounded in a sparse set of microphysical primitives, the deep theory takes the wide variety of macrophenomenal properties to be grounded in a sparse set of microphenomenal primitives.

In contrast, the picture of experience that the surface theory endorses is analogous to the Edenic picture\textsuperscript{9} of the physical world. According to the Edenic theorist, we have perfect perceptual contact with the external world. Under the Edenic picture, there is no structure to the physical world beyond what we have direct perceptual access to. Similarly, the surface theory takes there to be no more structure to the phenomenal world beyond what we have direct introspective access to. But just as the Edenic theory leads to a proliferation of physical primitives, the surface theory leads to a proliferation of phenomenal primitives.

There are many further questions that we might ask about how to characterize the deep theory. We might desire a more precise account of what it is for a property to be microphenomenal, of further options for carving up different versions of deep theories, or of the points where the analogy with the deep structure of the physical world breaks down. We might wonder about the ways in which the deep theory interacts with different views about the metaphysical nature of consciousness, of the structural differences between atomist and holist deep theories, or of which principles about introspection are consistent with the deep theory. These are all worthwhile questions to think about—but they are questions I’ll set aside. Our discussion so far suffices for a core characterization of the deep theory.

\section*{\S 2 | Predictions}

The deep theory makes several predictions about the structure of experience. To evaluate whether the deep theory is tenable, we can evaluate whether these predictions are plausible.

The first prediction concerns RELIABILITY. The deep theory predicts that as we consider increasingly fine-grained phenomenal properties, our introspective

\textsuperscript{9} The Edenic theory comes from Chalmers [2006].
judgments will gradually decrease in reliability. But you might have thought that judgments about our own experiences are especially reliable, or even infallible. If so, then our introspective judgments cannot be limited in the same way as our perceptual judgments.

The second prediction concerns STRUCTURE. The deep theory predicts that some experiences are more complex than what is revealed by introspection. But you might have thought that experience is the domain where appearance and reality intersect. If so, then there cannot be more structure to our experience than what is revealed by introspection.

The third prediction concerns DIVERSITY. If the deep theory is correct, then a sparse palette of fundamental phenomenal properties generates a rich palette of derivative phenomenal properties. But you might have thought that qualitative diversity could not arise from qualitative sparseness. If so, then experiences cannot all be made from the same basic ingredients.

For each prediction, I’ll present two cases that illustrate how that prediction might be fruitful. Of course, even if these predictions are correct, that does not mean that the deep theory itself is correct—there may be alternative explanations for each of the cases. Instead, these predictions should be taken as challenges for the deep theory, and the discussion below as showing how the deep theorist might respond to these challenges. My aim is not to show that we must accept the deep theory, but rather to argue that it is promising and worth exploring.

RELIABILITY

If the deep theory is correct, then our introspective judgments gradually become less reliable as we consider increasingly fine-grained phenomenal properties. It may be tempting to think that experience is self-intimating if you think only about coarse-grained phenomenal properties, such as the shape represented by your experience in the center of your visual field or the feeling of an acute pain. But this

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10 Technically one could endorse the deep theory and think that there is a sharp cutoff between when our introspective judgments are reliable and when they are not. I think the graded view is more natural and better accords with how we think about our perceptual relationship to the physical world, so I will assume this prediction about reliability.
becomes less obvious when we begin to consider fine-grained phenomenal properties. Just as our perceptual judgments gradually become less reliable when directed towards more fine-grained physical properties, our introspective judgments gradually become less reliable when directed at more fine-grained phenomenal properties.

Consider our first case—PIXEL MOSAIC—concerning the following figure:

![Image of pixel mosaic](image)

**FIGURE 1:** A pixel mosaic.

You can easily tell that your experience represents a square composed from a mosaic of colored shapes. But try introspecting upon the details of your experience. What shape is the smallest unit of color represented by your experience? Is each part of the image discretely and determinately colored? If so, what color is the top-left most part of the image represented as being? Is your visual experience of the image stable from moment to moment, or does it slightly change as your attention shifts from one part of the image to another? Unless your introspective capacities are much better than mine, you’ll find it hard to answer any of these questions with confidence.

Some might be tempted to say that your experience in this case is simply indeterminate. But this response confuses the representation of an indeterminate property with the indeterminate representation of a property. Though it is plausible that the representational content of experience is indeterminate, it is implausible that phenomenology itself is indeterminate. If I take off my glasses, then I visually represent the world more coarsely—there are more possibilities that are consistent with how my experience represents the world, and my experience represents less determinate properties. But there is still a precise fact of the matter about what my experience is like—namely, that it’s a visual experience with a certain degree of blurriness. What is indeterminate is what the experience represents, rather than the
experience itself.\textsuperscript{11}

Our second case—HEARING TEST—reinforces these points. Suppose you are undergoing a hearing test where you are asked to raise your hand whenever you experience a tone. In some instances, you are uncertain whether you hear a very faint tone, whether you imagine hearing a faint tone, or whether you have no auditory experience at all. Although you attend carefully to your experience during the test, there are times when you are uncertain what the character of your experience is like. As the stimulus approaches the threshold for detectability, you become less certain what the character of your experience is like.

\begin{figure}[h]
\centering
\includegraphics[width=0.5\textwidth]{detectability_graph.png}
\caption{Detectability decreases as volume decreases.}
\end{figure}

Some might contend that you have an auditory experience just in case you judge that you have an auditory experience. But judgments about experiences are not all or nothing. This is evident from psychophysics experiments on threshold stimuli.\textsuperscript{12} As the stimuli that subjects are asked to discriminate or detect approach threshold level, not only do their first-order judgments about whether a stimulus was

\textsuperscript{11} For a classic criticism of ontic indeterminacy, see Russell [1923]. For a recent criticism of the view that consciousness can be indeterminate, see Antony [2006].

\textsuperscript{12} These psychophysics experiments examine subjects’ perceptual judgments about the presence or absence of a stimulus, rather than introspective judgments about their own mental states. However, these experiments can plausibly be interpreted as indirectly examining introspective judgments. Moreover, the metacognitive judgments mentioned later plausibly examine introspective judgments directly.
present gradually become less reliable, but their second-order judgments about their confidence in their first-order judgments also decrease (see Gescheider [1997] for more discussion). This suggests that our introspective judgments come in differing degrees of confidence—a fact that is hard to straightforwardly reconcile with the claim that experiences have whatever phenomenal character they are judged to have.

There are many more examples of a similar kind. When you are upset, can you always discern what proportion of your emotions consists of anger versus frustration versus anxiety? If you drink a complex wine, are all the features of your gustatory and olfactory experiences manifest to you? Can you tell precisely which parts of your body you have more fine-grained proprioceptive awareness of, and which parts more coarse-grained? The deep theory predicts that in cases like PIXEL MOSAIC, HEARING TEST, and other cases of these kinds, our introspective judgments become gradually less reliable as we consider fine-grained phenomenal properties. Just as our perceptual judgments approach their limits as we consider physical properties closer to the microphysical, our introspective judgments approach their limits as we consider properties closer to the microphenomenal.

STRUCTURE

If the deep theory is correct, some experiences are more complex than we might have thought. Just as perception might erroneously lead us to think that certain physical properties are less complex than they actually are, introspection might erroneously lead us to think that certain phenomenal properties are less complex than they actually are.

Our third case—PAIN ASYMBOLIA—is an example of this kind. Introspecting upon a bodily pain experience does not reveal any internal structure. Instead, pain experience seems characterized by a simple phenomenal property—a certain kind of sensation that feels bad by its very nature. But it turns out we actually have empirical reasons to think that ordinary pain experience involves two distinct components. Pain asymbolia is a neurological condition caused by damage to the posterior insula [Grahek 2007]. Pain asymbolics report experiencing pain sensations without feeling motivated to stop those sensations. For example, if a pain asymbolic’s hand is placed in a bucket of ice water or on a hot stove, they will report experiencing the same pain sensations they felt prior to their brain damage, but without the unpleasantness.
The standard explanation of pain asymbolia is that pain experience has two separable components: a sensory component (corresponding to the pain sensation) and an affective component (corresponding to the unpleasantness). This is the view that takes the reports of pain asymbolics at face value view, and has been defended by philosophers and scientists alike (see Dennett [1978], Hardcastle [1997], Price [2000], and Grahek [2007] for some examples). According to the view, pain asymbolics retain the sensory component of pain, but because they lack the affective component they do not feel the immediate motivation to withdraw from painful stimuli.

FIGURE 3: The structure of an ordinary pain experience.

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13 Grahek [2007] says: “[A]lthough pain appears to be simple, homogenous experience, is actually a complex experience comprising sensory-discriminative, emotional-cognitive and behavioural components. These components are normally linked together, but they can become disconnected and therefore, much to our astonishment, they can exist separately.”

14 For a recent criticism of this interpretation, see Klein [2015].

15 This interpretation of pain asymbolia is corroborated by another case discussed by Ploner, Freund, and Schnitzler [1999]. The case they discuss involves a patient with a post-central lesion, where stimulation of the patient’s hand caused him to report experiencing a sensation that was not painful but was “clearly unpleasant” and which he “wanted to avoid”. They argue that this is a case where the affective component of pain experience is present without the sensory component. Taken along with pain asymbolia, we have evidence of a double dissociation between the two components of pain.
Not only does pain asymbolia gives us an example where there is more structure to experience than what we might initially have thought, but it also exemplifies how phenomenal properties that we do not introspectively discern can still contribute to the overall phenomenology of an experience. Even though we could not pick apart the individual components of pain through introspection, each component still makes a difference to the phenomenal character of our experience. If our pain experiences were to lack their affective quality, for example, they would feel much different. It may seem surprising that we could fail to grasp the structure of such a common and salient kind of experience. If the deep theory is correct, then we should not be surprised to find cases of this kind.

Our fourth case—SURFACE—concerns a more prosaic experience. You look at a uniformly gray surface. Your visual experience of the surface does not seem to be composed of minimal discrete units. Instead, your experience seems continuous in structure—you experience the surface as perfectly smooth. On the other hand, the most promising candidates for the physical correlates of your experience are not continuous in structure. Brains are discretely structured, and are ultimately made of discretely structured things. Maxwell [1978] raises the question of “how it is that the occurrence of a smooth continuous expanse of red in our visual experience can be identical with a brain process that must...involve particulate, discontinuous affairs such as transfers of or interactions among large numbers of electrons or the like.” The grain problem\textsuperscript{16} is the puzzle of how to reconcile the apparently continuous structures of experience with the apparently discrete structures of the physical correlates of experience.

\textsuperscript{16} In fact, there are different formulations of the grain problem, each of which generates somewhat different issues. See Lockwood [1993] for a classic discussion of the problem.
If experiences have continuous structures while the physical correlates of experience have discrete structures, then the structure of experience outstrips the structure of the physical correlate of experience. Every experiential element would map onto a physical element, but not vice versa. But this is surprising—many have thought that the structure of the physical correlates of experience might outstrip the structure of experience, but not vice versa.

One solution is to alter our conception of the physical correlates of experience. Perhaps we could constrain the list of candidates for the physical correlates of experience—we might consider only physical correlates with continuous structures, such as certain electromagnetic properties. However, this option highly constrains which physical properties could be candidates for the physical correlates of experience. Or perhaps we could hold that the physical world is gunky—if there is no bottom level of physical reality, then it is possible for continuous structures to arise from discrete structures. However, this option requires a highly substantive position on the nature of physical reality, and on the relationship between physical properties and their phenomenal correlates. Though these options might be tenable, they have the flavor of putting the cart before the horse.

The grain problem dissolves if the deep theory is correct. The deep theorist can reject the initial assumption that the structure of experience is continuous. Even if introspection suggests that the structure of experience is continuous, it might ultimately be discrete. Just as perception might lead us to erroneously think that certain physical phenomena are continuous, such as water, are fundamentally continuous, introspection might erroneously lead us to think that certain experiential
phenomena, such as your experience of the surface, are fundamentally continuous.

The deep theory predicts that a sparse palette of phenomenal primitives can generate a rich palette of phenomenal derivatives. It’s hard to imagine how a few basic phenomenal primitives could generate the rich range of macrophenomenal properties we are familiar with. But it was also hard to imagine how a few basic physical primitives could generate the rich range of macrophysical properties we perceptually observe. But the idea of phenomenal diversity arising from phenomenal sparseness is not impossible in principle. We can see this by considering some local cases.

Consider case 5—BINARY COLORS. Some colors—such as red and yellow—are unary in structure, while others—such as orange and purple—are binary in structure. For example, orange seems to be a mix of yellow and red, and purple seems to be a mix of red and blue. In contrast, red and yellow do not themselves seem to be a mix of other colors. And while it seems natural to describe orange as a mix of red and yellow, it seems arcane to describe red as a mix of orange and purple.

These judgments about color structure are well established by research in psychophysics. Normal perceivers reliably identify red, yellow, blue, and green as unique colors that do not seem to be a mixture of other colors [Hurvich 1981, Valberg 2001], a finding remains robust even across cultures and languages [Berlin & Kay 1969, Regier et al. 2005]. The different status of unary versus binary colors is also reflected in the neuroscience of color perception. The opponent processes hypothesis, the most popular account of color processing, takes the visual system to be organized into several antagonistic processing channels, corresponding to red/green, blue/yellow, and black/white [Hardin 1993]. In other words, each of the colors judged to be unary correspond to special reference points in the color processing system.

The considerations above primarily concern judgments about the colors of external objects. This has lead to plenty of debate about the ontology of colors [Hardin 1993, Degenaar & Myn, 2013]. But we can remain neutral on what colors

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17 For a more extended discussion of the palette problem and phenomenal combination, see Roelofs [2014], who uses some of the same examples to argue for similar conclusions.
themselves are—our concern is with color experiences. And both the psychophysics data and the neuroscience of color processing support the view that color experiences are themselves have unary and binary structures.

The structured view of color experience not only better accords with the psychophysics and neurophysiological data—it also has some distinctive philosophical advantages. First, it delivers an account of color similarity. Two color experiences, such as phenomenal scarlet and phenomenal crimson, are similar when they are partly grounded in the same basic color magnitudes, such as phenomenal redness. And the structured view correctly predicts that there is no color similarity between distinct unary experiences, such as phenomenal red and phenomenal green. Second, the structured view avoids proliferating phenomenal primitives. Rather than taking every specific color experience to correspond to a primitive phenomenal property, we need only adopt a few basic color experience magnitudes.

Most relevant for our purposes, though, the structured view of color experience shows how phenomenal diversity might arise from phenomenal scarcity. By taking a few phenomenal color magnitudes as primitive, we can recover the character of any specific color experience. To generate our entire phenomenal color palette, we need only the unary phenomenal color properties—everything else can be derived by mixing these basic ingredients.

Our final case—FLAVOR EXPERIENCE—is another example where phenomenal diversity arises from phenomenal scarcity. Consider the vast range of flavor experiences that are possible. The skill of a food critic or wine connoisseur
consists not only paring down the flavors that they taste, but also developing a great stock of knowledge of the different kinds of flavor experiences. We might get a glimpse of the rich variety of flavor experiences when we think about different cuisines across different cultures, though it is worth appreciating how even this comprises only a small subset of the possible flavor experiences. In other words, the space of possible flavor experiences is enormous. But just as there was reason for adopting a structured view of color experience, where the various phenomenal color properties are plausibly grounded in a set of basic phenomenal color primitives, there is reason to adopt a structured view of flavor experience, where the various phenomenal flavor properties are plausibly grounded in a set of basic gustatory and olfactory primitives.

The science of flavor perception favors a structured view of flavor experience. Psychologists studying flavor perception standardly take flavor perception to involve a mix of olfactory and gustatory perception, with some claiming that it also involves somatosensory, trigeminal, and hedonic sensations (Auvray & Spence [2008], Spence & Smith [2013]). And Smith [2013] argues that the science of flavor perception shows that flavor experience is multimodal, even though “experiences [of tasting]...can strike us as whole, unified percepts,” and even though “on the basis of that phenomenology, we are often unable to distinguish the sensory components that feed into such experiences.” If this is right, then flavor experiences are themselves blends of gustatory, olfactory, and perhaps other experiences. And while it is difficult to distinguish the different sensory elements through basic introspection, it is easy to tease them apart with a little experimentation—just pinch
your nose while eating a food, and you can see how certain aspects of the phenomenology are lost when the contribution from olfaction is removed.

The structured view of flavor experience also has some distinctively philosophical advantages. Like in the case of color experience, the structured view enables an intuitive account of similarity between flavor experiences. The degree of similarity between flavor experiences can be understood to be a function of how many basic gustatory and olfactory experiences are shared. For example, the flavor of kiwi is similar (in at least one respect) to the flavor of pineapple because both flavor experiences involve the gustatory experience of sweetness. Moreover, the structured view of flavor experience gives us a much more parsimonious account of flavor experience than a view that takes every distinct flavor experience to be primitive. Rather than taking every distinct flavor experience to correspond to a primitive phenomenal property, we can reduce the flavor phenomenal properties to olfactory and gustatory phenomenal properties.

Both COLOR EXPERIENCE and FLAVOR EXPERIENCE are cases where a local deep theory is plausible. Of course, even if we were to develop many local deep theories, there would still be much more work needed to develop a global deep theory. But seeing how local domains of experience might themselves have a deep structure lends support to the global deep theory. And if a global deep theory is true, then we should expect to find local deep theories, as in the case of color experience and flavor experience.

UPSHOT

There is more to be said about each of these cases. But the preceding discussion provides reason to think that each of the predictions of the deep theory—RELIABILITY, STRUCTURE, and DIVERSITY—is plausible. If these predictions are correct, that does not show that the deep theory is true. But it does show how the deep theorist can respond to some of the challenges for the view, and how the deep theory can guide our theorizing about the structure of experience.

There is also more to be said about the deep theory. We have been thinking about the deep theory at a general level, and the predictions discussed have likewise been general. But as our investigation and theorizing of experience develops, we could consider particular implementations of deep theories. Specific deep theories would
make further predictions, bringing with them more specific challenges and more substantial constraints on how to theorize about the structure of experience.

§3 | INVESTIGATING THE MICROPHENOMENAL

If the deep theory is correct, we might wonder what our prospects are for investigating the microphenomenal realm. In this section, I consider the central methodological limitations for investigating microphenomenal properties and our prospects for overcoming those limitations.

The methodological problems for investigating the deep structure of experience stem from two main sources. First, there are problems that arise from microphenomenal properties being phenomenal. Second, there are problems that arise from microphenomenal properties being microscopic. I’ll discuss each of these briefly, and then problems for the investigation of microphenomenal properties more generally.

The principal limitation for investigating phenomenal properties is that attaining knowledge of phenomenal properties requires first-personal (in addition to third-personal) methods. Even if we collect all of the relevant third-personal data, we still would not gain knowledge of phenomenal properties unless we also integrated the third-person data with first-personal data. But collecting first-personal data is a difficult task—it is often unclear both what the best methods are for producing data and how to best interpret the data that is collected.

The principal limitation for investigating microscopic properties is that attaining knowledge of microscopic properties requires tools that transcend our bare observational capacities. When we investigate the microphysical realm we cannot rely merely on our perceptual capacities, for they are not acute enough to discern microphysical properties. To investigate the deep structure of the physical world, we have had to develop tools, technology, and theories designed to be sensitive to microphysical properties.

These two problems come together in the case of microphenomenal properties. Since microphenomenal properties are phenomenal, we cannot get a grasp of their phenomenal characters without using first-personal methods. But since microphenomenal properties are microscopic, we cannot use our basic introspective
capacities for investigating them. What we need in order to investigate microphenomenal properties are first-personal methods that go beyond basic introspection.

Some progress might be made using various kinds of abductive methods. We might employ the method of phenomenal contrast, where two experiences that differ with respect to their phenomenal characters are contrasted with each other. If the best explanation for the contrast between two experiences is that one experience instantiates some microphenomenal property and the other does not, then this may be evidence that that microphenomenal property exists, even if the subject cannot introspectively discern that microphenomenal property directly. We might consider dissociation cases, or cases where two phenomenal properties that we thought were inextricably connected come apart. For example, pain asymbolia suggests that the sensory and the affective components of ordinary pain experience are dissociable from each other. And we might conduct multidimensional analyses, or data analyses that aim to extract different dimensions of variation for a set of data. For example, we could aggregate similarity judgments across a range of seemingly simple phenomenal properties and extract the independent dimensions of variation that best account for the data. All of these kinds of abductive methods might provide us with indirect knowledge of microphenomenal, even if we do not have a direct grasp of those properties through introspection.

There is a question of how far abductive methods could take us. Perhaps even the most sophisticated abductive methods would still allow us to investigate microphenomenal properties only near the surface level of experience. Though this is an open possibility, we should not be prematurely pessimistic. We have acquired substantial knowledge about the physical world using primarily abductive methods plus observation. Even if observing the microphysical properties of atoms required more than just abductive methods, we still developed substantive theories of the physical world before using sophisticated tools and technology that we have today. Perhaps a similar story might hold for experience. Whatever the limits of abductive methods are, though, they can plausibly take us much further than our current stage in investigating the structure of experience.

To enrich our investigation of the physical world, we have developed technology that gives us third-personal access to the microphysical realm. Perhaps
to thoroughly investigate the deep structure of experience, we need to develop first-personal technology that gives us first-personal access to the microphenomenal realm. Whereas we use microscopes to examine microphysical properties beyond our perceptual grasp, we might develop introspectoscopes to examine microphenomenal properties beyond our introspective grasp. Third-personal technology consists of tools that are external to ourselves. But first-personal technology would likely have to consist of internal tools—perhaps in the form of intensive introspective training, or specially designed drugs, or artificial alterations to our cognitive architectures. If first-personal technology could be developed, we might be able to investigate the structure of experience as deeply as we have investigated the structure of the physical world.

However, the prospect of augmenting a subject’s introspective capacities raises a number of issues. There are epistemological issues, such as how we would know that we are altering a subject’s introspective capacities rather than the phenomenal character of the subject’s experience or the subject’s dispositions to make reports about their own experiences. To gain traction on that issue, we need to understand more precisely the nature and mechanisms of introspection. There are engineering issues, such as how we could alter the introspective capacities of a subject without also significantly altering the subject’s experiences. To gain traction on that issue, we would need to better understand how altering certain physical properties results in corresponding changes to experience. And there are methodological issues, such as how introspective data about microphenomenal properties might be recorded. To gain traction on that issue, we need to develop reliable ways of translating first-personal data into formats that are third-personally accessible. These are all tough problems, though I think we can make at least some progress on them. But we should appreciate from the outset that the development of first-personal technology requires us to address some hard problems.

It is possible that there are principled limitations on how far we could get in investigating the microphenomenal realm, and that we could never investigate the structure of experience past a certain point. For some, this might seem like a strike against the deep theory. But it is worth keeping in mind that it is common for data to underdetermine theory. Even which theory of the physical world is true might turn out to be underdetermined by our best empirical evidence. And it is worth keeping
in mind that experience is an especially difficult domain to investigate. Even it is unclear whether we could acquire substantive knowledge of microphenomenal properties, it is also unclear whether we could acquire substantive knowledge of the experiences of creatures very different from ourselves, such as bats or octopuses or robots.

§4 | CLOSING REMARKS

The deep theory is a radical idea. But so was the idea that the physical world has a deep structure. While it may have seemed incredible that all physical things might be made from the same basic physical ingredients, it turns out that such a theory is true of the physical world. At this stage, it may be too early to decide whether we ought to accept the deep theory. But it would be epistemically imprudent to take the surface theory for granted or to antecedently rule out the deep theory as a live option. The deep theory gives us a promising picture of experience that is worth exploring further.

To investigate the deep theory more thoroughly requires addressing some hard methodological and conceptual challenges. But we are at early stages for investigating the structure of experience. Our epistemic position with respect to the structure of experience is like the epistemic position of ancient theorists with respect to the structure of the physical world. Perhaps just as ancient theorists were not in a position to appreciate the tools and methods we have developed for investigating the physical world, we are not in a position to appreciate the tools and methods that could be developed for investigating experience. Perhaps in the future ingenious new ways of investigating experience will be devised, and we shall explore the depths of the microphenomenal realm.
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