Searching for Evidence of Phenomenal Consciousness in NCC Research

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Abstract: Recent scientific work aiming to give a neurobiological explanation of phenomenal consciousness has largely focused on finding neural correlates of consciousness (NCC). The hope is that by locating neural correlates of phenomenally conscious mental states, some light will be cast on how the brain is able to give rise to such states. In this paper I argue that NCC research is unable to produce evidence of such neural correlates. I do this by considering two alternative interpretations of NCC research—an eliminativist and a disjunctivist interpretation. I show that each of these interpretations is compatible with the scientific data and yet is more parsimonious than accounts involving the supposed phenomenon of phenomenal consciousness.

The search for neural correlates of consciousness (NCC) is at the forefront of current scientific interest in consciousness. It is frequently asserted that the NCC project is the starting point for a science of consciousness. This is especially true for those researchers who aim to give a neurobiological theory of phenomenal consciousness—members of what I have termed the *new science of consciousness*. Many prominent new scientists hold that the first step in developing such a theory is to find neural activity that specifically correlates with the contents of a subject's phenomenal consciousness.[1] If these researchers are correct in their assessment of the importance of the NCC project, then the new science will rise or fall with the search for neural

[1] This is not the only goal that one can have in conducting research under the "NCC" label. Nonetheless, the search for neural correlates of the contents of phenomenal consciousness is arguably the most common project amongst NCC researchers and has often been considered the standard NCC project. For example, Jakob Hohwy writes (2007, 465, emphasis in the original): "The standard NCC approach is primarily interested in the neural substrate for having one rather another *content* represented in consciousness (e.g. a percept of a face rather than of a house)." See Chalmers (1998, 2000), Hohwy (2007), and Rees (2007) for discussions of NCC research; see also the articles collected in Metzinger (2000).

correlates of the contents of phenomenal consciousness. In this paper, I assess the empirical prospects of this research project. I challenge the claim that phenomenal consciousness exists, concluding that new scientists are erroneously trying to correlate neural activity with the contents of phenomenal consciousness.

To see this, we need to begin by articulating the phenomena that new scientists are interested in (the contents of phenomenal consciousness) and the data that are collected during NCC experiments (records of the behavioral reports of subjects and measures of their neural activity). I argue that the data that are collected in these experiments are insufficient evidence to establish the reality of the hypothesized phenomena of interest. This is shown by considering two alternative interpretations of the standard NCC experiment—viz. an eliminativist interpretation and a disjunctivist interpretation. I begin by considering an eliminativist interpretation that takes the behavioral reports to reflect the perceptual discriminations that the subject has made, but denies that they reflect the supposed contents of the subject's phenomenal consciousness. As such, on this interpretation, the NCC experiments tell us nothing whatsoever about phenomenal consciousness.

As the eliminativist interpretation is compatible with the data collected in NCC experiments, some other support is needed if we are to favor the new science interpretation. This might come from theoretical considerations or from another source of data. I examine each possibility in turn, showing that the new science interpretation rests on the beliefs of the researchers that in situations like those used in NCC experiments, they are visually acquainted with various qualities and that this acquaintance is reflected in their behavior (each researcher making this judgment about her own case). This acquaintance is considered a source of data, but not in the typical sense of the term. One's episodes of visual acquaintance with qualities are not

themselves publicly observable and, as such, are not included in the scientific data collected in NCC experiments; they are what are often called “first-person data” in the literature. The new scientists use their own first-person data to infer the existence of the phenomena of interest (the contents of phenomenal consciousness).

There are two main problems with this inference. First, the use of first-person data as scientific data is questionable. Second, it is far from clear that first-person data of visual acquaintance with qualities, in conjunction with the data collected in NCC experiments, actually provide evidence for the phenomena. The reason is that, even if we accept that the subjects in NCC experiments are each acquainted with qualities and that this acquaintance is reflected in their behavioral reports, this does not necessarily mean that the reports express people’s acquaintance with the contents of their phenomenal consciousness. For that we also need evidence that the qualities that the subjects are acquainted with are part of the contents of their phenomenal consciousness. To make this point clear I move from the eliminativist account to a second alternative interpretation of NCC research, one based on a disjunctivist account of perception. This interpretation accepts that the subject in an NCC experiment is acquainted with qualities and yet denies that those qualities are part of the contents of that subject’s phenomenal consciousness. The disjunctivist interpretation holds that what the subject is acquainted with are qualities of the experimental stimuli, not her phenomenally conscious mental states.

Once again, further support is needed for the new science interpretation of NCC research. And, again, such support might come from theoretical considerations or from another source of data. While philosophical arguments can be given against the disjunctivist account of the relevant qualities, the issue is far from settled, and it would be rather premature for a science of consciousness to dismiss the disjunctivist interpretation based on these arguments. The new

science interpretation might instead be supported by calling on another source of data: The new scientist might call on first-person data, again, but this time not simply claiming to be acquainted with qualities, but with those qualities *as phenomenal qualities*. The new scientist might claim, as several philosophers have done, that she has introspective knowledge that in situations like those found in NCC experiments she is visually acquainted with various qualities as being part of the contents of her phenomenal consciousness. As such, the new scientist would make a second appeal to first-person data. Such an appeal leads to a serious problem, however: Claims of introspective knowledge cannot be directly verified, and the closest that you can come to testing them is to put yourself into the same situation; but, when I do so, the qualities that I am acquainted with do not specifically seem to be phenomenal qualities. And, I am not alone in this—this is essentially the motivating claim for disjunctivism, is suggested by recent experimental work on the folk theory of consciousness, and is a key component of arguments from the transparency of experience.

In the remainder of this paper, I will spell out this line of argument in greater detail. In Section 1, I briefly introduce the new science of consciousness and the phenomenon that the new scientists hope to explain. In Section 2, I look at some typical NCC experiments, noting the data that are collected and distinguishing them from the phenomena at issue. In Section 3, I offer the first of two alternative interpretations of NCC research (the eliminativist interpretation). In Section 4, I consider what further support the new scientists could offer in favor of their interpretation. I argue that this support rests on an acceptance of scientifically questionable first-person data. In Section 5, I show that we can nonetheless accept these first-person data while denying the new science interpretation; I do this by offering a second alternative interpretation of

NCC research (the disjunctivist interpretation). In Section 6, I consider what further support could be offered to selectively favor the new science interpretation; I find the support wanting.

1. The New Science and Phenomenal Consciousness

The ultimate goal of the new science of consciousness is to give a naturalistic, indeed biological, account of phenomenal consciousness and phenomenal qualities. There is not space, here, to discuss the new science at length or to detail the understanding of phenomenal consciousness found within it (but, see Sytsma, forthcoming; Sytsma, ms, Chapter 1 and Chapter 2). Fortunately, the predominant understanding of phenomenal consciousness in the new science literature is a familiar one: It is thought that each one of us has mental states that are phenomenally conscious in virtue of having distinctive phenomenal qualities (typically referred to as qualia) that we are at least sometimes acquainted with. It is thought that these qualities, which together make up the *contents of phenomenal consciousness*, are somehow produced by the brain and the primary aim of new science researchers is to explain how this is done.[2]

Giving a convincing biological account of phenomenal consciousness is widely recognized to be a rather difficult task (a *hard problem* in David Chalmers's terminology (1995, 1996)). As such, the standard strategy in the new science is to tackle the problem indirectly, starting with the search for *correlations* between a subject's neural activity[3] and some quality of

[2] Typically this phrase is shortened to "content of consciousness" in discussions of NCC research (see Chalmers, 2000, for example). I will use the longer phrase, however, to keep clear that it is phenomenal consciousness—not access consciousness (Block, 1995), for example—that is at issue for new scientists.

[3] The "neural" side of the NCC correlations is typically understood in terms of neural representations; but, as there is much disagreement about how the brain represents the world, it is not too surprising that we find that different researchers have different expectations concerning the neural correlates (with some focusing on areas of the brain, others more specifically on types of neurons, or patterns of neural activity, or neural mechanisms). Nonetheless, the general approach is largely the same: The goal is to isolate some facet of the living brain (through the typical neuroscientific methods such as single-cell recordings or fMRI), showing it to be closely tied to the subjects' behavioral reports (which are then taken to be reports on the contents of their phenomenal consciousness). Although there are many issues to be explored with regard to the "neural" side of the correlations, I intend to sweep them

the content of one of her phenomenally conscious mental states. As Francis Crick and Christof Koch express the strategy (2003, 119):

> The most difficult aspect of consciousness is the so-called "hard problem" of qualia—the redness of red, the painfulness of pain, and so on. No one has produced any plausible explanation as to how the experience of the redness of red could arise from the actions of the brain. It appears fruitless to approach this problem head-on. Instead, we are attempting to find the neural correlate(s) of consciousness (NCC), in the hope that when we can explain the NCC in causal terms, this will make the problem of qualia clearer. In round terms, the NCC is the minimal set of neuronal events that gives rise to a specific aspect of a conscious percept.

New scientists like Crick and Koch aim to correlate neural activity with phenomenal qualities (such as the instances of redness that one is thought to be acquainted with in certain visual experiences). The hope is that such correlations will cast light on the mystery of phenomenal consciousness, leading researchers toward a solution to the hard problem. As such, it is essential to the goal of solving the hard problem that the correlations drawn from NCC research involve phenomenal consciousness. As Thomas Metzinger puts it in introducing his edited volume on the topic, "generally speaking, the epistemic goal—what we really want to *know*—in the type of correlation studies relevant to consciousness research consists in isolating the *minimally sufficient neural correlate* for specific kinds of phenomenal content" (2000, 4, emphasis in original).[4]

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under the rug. My focus in this paper is on the difficulties that arise on the other side of the correlations. As such, I will speak neutrally of "neural activity," meaning this to pick out whatever it is about the brain that a given researcher thinks best correlates with the behavioral reports.

[4] This passage suggests that the goal of NCC research is to match the *specific contents* of neural representations with the *specific contents* of consciousness. This "matching-content doctrine" is the target of one of the most prominent critiques of NCC research in the philosophical literature (the other owing to Ned Block and discussed briefly in Footnote 12). Alva Noë and Evan Thompson (2004) argue that on this understanding of NCC research, there is good reason to doubt that neural correlates can be found. Their objection centers on what would be needed to show a *systematic match* between the contents of a neural representation and the contents of consciousness. As such, Noë and Thompson's critique is rather different from the one presented here.

2. Data and Phenomena in NCC Research

The question I am interested in is whether the data collected in NCC experiments enable the researchers to establish neural correlates of the contents of phenomenal consciousness. To answer this question, we need to begin by considering what the data in these experiments are; this in turn requires that we have a clear understanding of what is meant by the term "data" in the context of a scientific experiment. Such an understanding is especially important, here, as the term has been used in the consciousness studies literature in ways that diverge from the understanding found in most recent philosophy of science.[5] In this paper I will adopt the formulation given by Jim Bogen and Jim Woodward in articulating the distinction between scientific data and scientific phenomena (1988, 1992; Woodward, 1989). I briefly discuss this distinction below, then show how it applies to actual NCC experiments.

Bogen and Woodward note that "data, which play the role of evidence for the existence of phenomena, for the most part can be straightforwardly observed" (1988, 305). In contrast, "phenomena are detected through the use of data, but in most cases are not observable in any interesting sense of that term" (306).[6] Data are what are *collected* during an experiment; these often include records of instrument readouts, computer displays or photographs, reports of subjects' behaviors (verbal or non-verbal), and so on. Importantly, the data should be readily accessible by humans: the point of conducting experiments is to learn something about the phenomenon of interest by collecting and analyzing the data. As Bogen and Woodward put it

[5] Specifically, "data" is sometimes used to refer to the phenomena that the new scientists are interested in (the contents of phenomenal consciousness) and sometimes used to refer to some supposed evidence for the phenomena that is distinct from the scientific data collected during the experiments (what are typically termed "first-person data" in the literature). The relationship between so-called first-person data and scientific data is discussed in Section 4.

[6] It is worth noting that the term "phenomenon" has been used in multiple ways, both in philosophy and popularly. In fact, this is seen in the terminology for the very phenomenon at issue in this paper, *phenomenal* consciousness. To avoid confusion, I will use the term exclusively in the sense of a *scientific phenomenon*—an entity, quality, process, or event that is either itself observed or otherwise inferred from the scientific data.

(1992, 593): "Data are *records* or *reports*—accessible to the human perceptual system and available for public inspection." To give a simple example, in measuring the temperature of a liquid the data might consist in records of the thermometer's display; these records are then used as evidence about the phenomenon being investigated (the temperature of the liquid). My first goal in this section is to make clear what the publicly accessible records collected in the typical NCC experiment are.

Scientific data are used as evidence in investigating the phenomena of interest; specifically, the data are used in deciding between diverging claims about those phenomena and this can include diverging claims about whether the phenomena exist in the first place.[7] As such, a key virtue of good scientific data is that they are collectively *reliable for purposes of deciding between competing claims about phenomena* (Bogen and Woodward, 1992, 594).[8] Once I have articulated what the data in the typical NCC experiments are, the next step will be to determine whether these data render some of the competing claims about phenomenal consciousness implausible. I consider whether the data collected in NCC experiments support the new scientists' claim that the behaviors of subjects in NCC experiments indicate the contents of their phenomenal consciousness, setting this claim against those made by the eliminativist and the disjunctivist. Specifically, the eliminativist claims that the behaviors merely indicate the visual discriminations that the subjects have made between stimuli, while the disjunctivist claims that the behaviors simply indicate which stimuli the subjects are visually acquainted with.

[7] As phenomenal consciousness is often taken to be obvious (Sytsma, forthcoming), its denial might strike some readers as puzzling. My goal is not to deny anything that is truly obvious, but to explore what NCC research establishes; to do this it is helpful to contrast the new science interpretation of this research with a skeptical position that denies that during an NCC experiment the subject is acquainted with phenomenal qualities—either because she is not acquainted with qualities or (I think more plausibly) because the qualities she is acquainted with are not *phenomenal* qualities.

[8] It is worth noting that many philosophers of science now use the term "valid" rather than "reliable" in discussing this virtue. Nonetheless, I will follow Bogen and Woodward, investigating whether the scientific data collected in NCC experiments allows us to reliably infer the contents of phenomenal consciousness.

2.1 The Data collected in a Typical NCC Experiment

The most important work on neural correlates of consciousness has involved the use of binocular rivalry.[9] In fact, work on binocular rivalry has sponsored widespread optimism concerning the NCC project and the new science. I take this work to be the classic example of NCC research and will use it as the central example throughout this paper. Most famously, Nikos Logothetis and colleagues have used binocular rivalry to look for the NCC of visual consciousness in alert macaque monkeys using single-cell recordings (Leopold and Logothetis, 1996, 1999; Logothetis and Leopold, 1995; Logothetis and Schall, 1989a, 1989b, 1990; Sheinberg and Logothetis, 1997). Binocular rivalry experiments have also been conducted on human subjects, typically using fMRI or EEG/MEG recording techniques (Tong et al., 1998; Polonsky et al., 2000; Tong and Engel, 2001; Lee and Blake, 2002; Lee, Blake, and Heeger, 2005; Haynes, Deichmann, and Rees, 2005; Wunderlich, Schneider, and Kastner, 2005). While I could explore any of these studies for purposes of this discussion, for the sake of simplicity—and following the philosophical discussions (e.g., Noë and Thompson, 2004)—I will focus on the earlier experiments on monkeys.

In a typical NCC experiment using binocular rivalry, a monkey is first trained to pull different levers when shown different types of images. I will focus on horizontal and vertical gratings for purposes of discussion; in this case, the monkey is trained to pull one lever when a

[9] Interest in the phenomenon of binocular rivalry itself has a long history, with Nicholas Wade (1998) locating the first clear description of it in Porta (1593). See Blake (2001) for an accessible overview of current controversies concerning binocular rivalry; see also the articles collected in Alais and Blake (2005). In particular, it is worth noting that the phenomenon itself is not well understood and that this raises questions about its use as a *tool* in NCC research. Although the use of binocular rivalry "is widely thought to provide one of the most important experimental paradigms for determining the neural states whose contents match the contents of visual consciousness" (Noë and Thompson, 2004, 7), not all NCC experiments employ this paradigm. Other paradigms include the use of stimuli near the threshold for discrimination (Grill-Spector et al., 2000; Kjaer et al., 2001; Moutoussis and Zeki, 2002; Ress and Heeger, 2003; Pins and ffytche, 2003; Ojanen, Revonsuo, and Sams, 2003), other forms of bi-stable perception (Kleinshchidt et al., 1998; Sterzer et al., 2002; Sterzer, Haynes, and Rees, 2003; Eriksson et al., 2004), and alterations of atentional signals or stimulus context (Rees, Frith and Lavie, 1997; Rees et al., 1999; Sakai et al., 1995; Ehrsson, Spence and Passignham, 2004). See Rees and Frith (2007) for discussion.

horizontal grating is presented and another lever when a vertical grating is presented. The monkey then has a horizontal and a vertical grating presented simultaneously, one to each eye (see Figure 1).[10] Human subjects typically report binocular rivalry in this situation: They report seeing alternatively either single definite image or partial overlap of the two. The trained monkeys respond similarly to humans in this experimental set-up, alternatively pulling either the horizontal grating lever or the vertical grating lever (Logothetis, 1998, 1808).

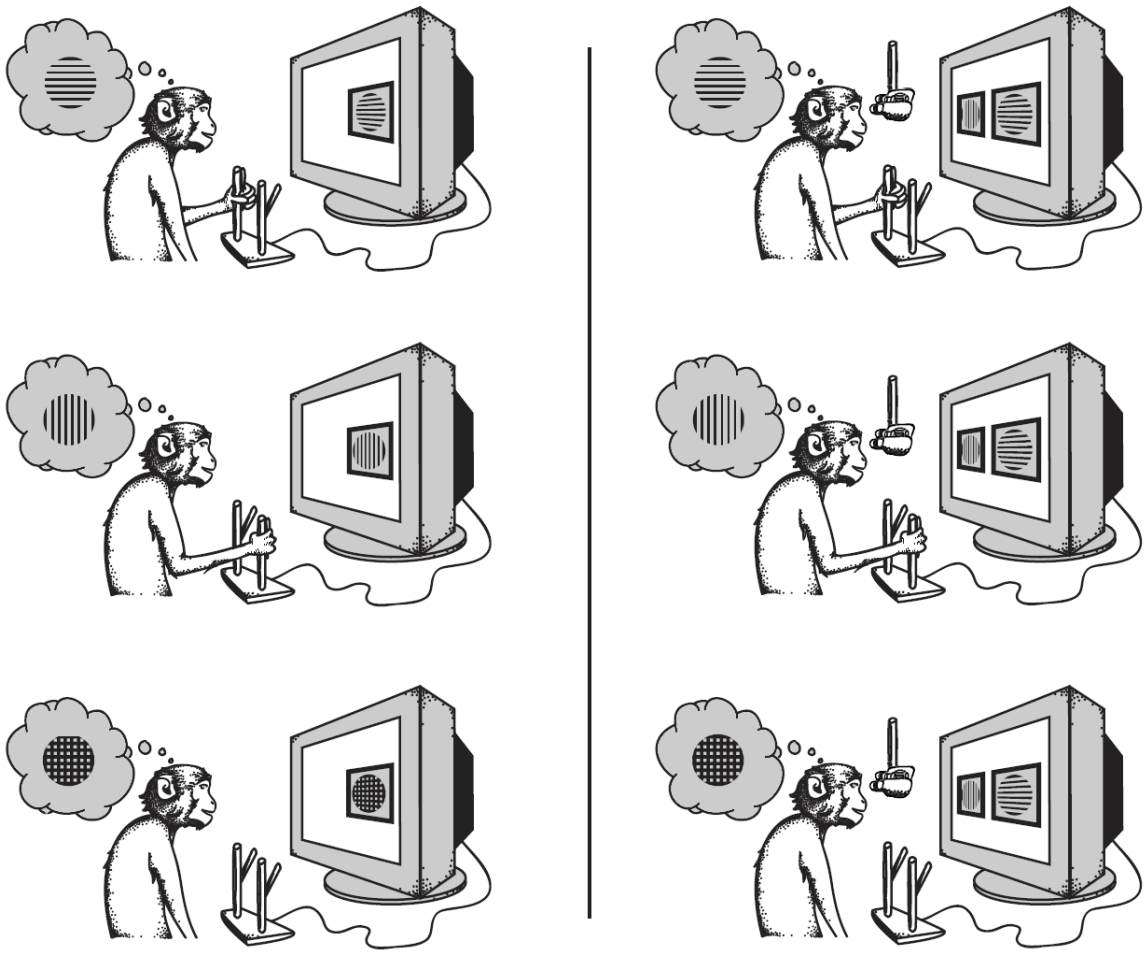

Figure 1: (a) Depiction of training session; (b) depiction of binocular rivalry testing session. Adapted from Logothetis (1998, Figure 4).

[10] The training procedure is actually somewhat more complicated than described here, although this should suffice for our purposes; see Logothetis (1998, 1808) for a summary.

The data collected on the consciousness side of the correlations consist in the timed sequence of lever pulls made by the monkeys. As the monkeys were trained to pull the horizontal grating lever when presented with horizontal gratings and the vertical grating lever when presented with vertical gratings, it is reasonable to interpret a lever pull during binocular rivalry as indicating that the monkey has identified of one of the two types of stimuli (and I will not challenge this interpretation). I will express this by simply saying that the lever pulls indicate which of the two stimuli the monkey *sees* at that time.

During the experiment, cells that selectively respond to either horizontal or vertical gratings are monitored and their firing rates recorded. These are the data collected on the neural side of the correlation. The responses of the cells are then correlated with the behavioral responses of the monkey. The goal is to locate cells that show higher activity *specifically* when the monkey pulls the lever for the corresponding grating and not otherwise (even though the other stimulus is still being presented to one of the monkey's eyes). It turns out that the strength of the correlation depends importantly on the area of the cortex being monitored: Cells in the primary visual cortex do not correlate well (Leopold and Logothetis, 1996), while cells in the inferior temporal cortex correlate strongly (Sheinberg and Logothetis, 1997).[11] That is, the firing of "vertical grating cells" in the inferior temporal cortex correlates strongly with the monkey specifically pulling the vertical grating lever, while the firing of "horizontal grating cells" in the inferior temporal cortex correlates strongly with the monkey specifically pulling the horizontal grating lever.

[11] The studies on the primary visual cortex and the inferior temporal cortex were conducted separately using different monkeys, although the training procedures remained the same. The types of stimuli used in the studies differed, with Sheinberg and Logothetis using a sunburst-like image for one stimulus and a variety of images for the other (including images of humans, monkeys, butterflies, etc.). For the sake of simplicity, however, I will continue to treat these experiments jointly, using the stimuli from Leopold and Logothetis (1996) for both studies.

Again, the data collected in this experiment consist in records of cell firing rates and the levers that the trained monkey pulled. The cell firing rates are used as a measure of neural activity and the lever pulls are reasonably taken to indicate which of the two stimuli the monkey sees. As noted above, however, the phenomena of interest to new scientists in NCC experiments are the contents of phenomenal consciousness. The question we must now ask is whether the data collected allow us to reliably infer the reality of the hypothesized phenomena. I argue that that they do not.

3. An Alternative Interpretation: The Eliminativist Take on NCC Experiments

The new scientist holds that the behaviors recorded in NCC experiments like the one described in the previous section reliably indicate something about the contents of the subject's phenomenal consciousness; for example, the monkey pulling the horizontal grating lever is taken to indicate that the content of the monkey's phenomenal consciousness at that time was in part characterized by a horizontal grating (and not a vertical grating). As such, the new scientist takes the behaviors to be evidence of the contents of the monkey's phenomenal consciousness, inferring the existence of the phenomena from the collected data. I argue that this is a bad inference. In this section I begin by showing that the existence of the phenomena—phenomenal consciousness with this or that content—are not established by the data collected in NCC experiments. This is shown by considering an alternative interpretation of NCC experiments, one that is compatible with taking an eliminativist stance toward phenomenal consciousness.

As noted in the previous section, a desirable virtue of experimental data is that they allow us to reliably discriminate between competing claims concerning the phenomena that we are interested in. The new scientist takes the data in an NCC experiment to allow us to infer the

content of the subject's phenomenal consciousness at different points in the experiment. In contrast, the eliminativist denies that phenomenal consciousness exists—denies that we have mental states that are phenomenally conscious in virtue of having distinctive phenomenal qualities—and takes the data in the NCC experiment to simply indicate the visual discriminations that the subject has made. When we consider the scientific data produced in NCC experiments like the one considered in the previous section, we find that they do not provide direct evidence of phenomenal consciousness: The data consist in records of the subject's behaviors and both the eliminativist and the new scientist take these to indicate the visual discriminations that the subject has made. The eliminativist stops at the visual discriminations, while the new scientist takes the visual discriminations to also indicate *something further*—the contents of the subject's phenomenal consciousness. As such, focusing on the scientific data, the eliminativist account is not only perfectly compatible with the data, but is also the more parsimonious of the two accounts.

Looking specifically at our example NCC experiment from the previous section, the eliminativist takes the data to reliably discriminate between two different phenomena claims (whether the monkey saw the horizontal or the vertical grating at a given time), while telling us nothing about the supposed content of the monkey's phenomenal consciousness. Thus, the eliminativist accepts that the monkey is able to *see*—in the sense that the monkey is *able to identify some distinctive visual stimuli as being of a certain type and to distinguish those from other types of stimuli*. The behavioral reports are then taken to indicate that the monkey has identified one of the stimuli as belonging to one of the types that she has been trained on.[12]

[12] Inspiration for the eliminativist interpretation of NCC research can be found in the work of Dan Dennett, including his discussions of his heterophenomenological method (1991, 2003, 2005). The eliminativist interpretation also can be taken to be related to an objection to NCC research raised by Ned Block (2001). The objection is that NCC research gets at *access consciousness* and not *phenomenal consciousness* (Block, 1995).

The crucial point to note is that the new scientist agrees with the eliminativist that *the behavioral reports indicate what the monkey sees*. Both the new scientist and the eliminativist accept that the monkey's behaviors—the lever pulls—indicate that the monkey has detected the type of stimulus that was associated with that lever during training. This inference is not controversial and is supported by the monkey's behavior during the training sessions. The new scientist goes further than the eliminativist, however, in not just taking the behavioral data to be reliable indicators of what the monkey sees, but *also* of the contents of the monkey's phenomenal consciousness. The question is what supports this *further* inference of the contents of phenomenal consciousness? It cannot be the behavioral data on their own, as those data do not decide between the new scientist's interpretation and the simpler eliminativist interpretation. The new scientist therefore needs another source of evidence.

4. Further Support for the New Science Interpretation

In this section I consider what additional evidence the new scientist might call on to support her interpretation over the eliminativist interpretation. In general, such evidence could come from two sources: The new science interpretation might be supported by theoretical considerations or

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(Roughly, "access consciousness" refers to information that is available for behavioral report and, as such, the eliminativist interpretation can be seen as a way of drawing out the failure of NCC research to get at phenomenal consciousness as opposed to access consciousness.) For example, Jakob Hohwy (2007, 464) reads Block in this way: "Block argues that much of the current NCC work prioritizes access over phenomenality. The risk is that the neural substrate of access consciousness is irrelevant for the neural substrate of phenomenality." Unlike Block, however, I do not think there is phenomenal consciousness that an appropriate NCC experiment could produce correlations for; as such, I offer the eliminativist interpretation as part of an objection that is ultimately rather different from Block's. Thus, while Block criticizes those NCC researchers who seem to target access consciousness, I argue that they have actually gotten things right. Of course, Block is correct that sometimes NCC researchers will discuss consciousness in ways that suggest that they are interested in something other than phenomenal consciousness. For example, Geraint Rees (2007, 877) writes: "Consciousness and awareness of a stimulus are used interchangeably in this review to indicate the ability of an observer to report either the presence of that stimulus or its identity." Insofar as this description is accurate, Rees's interpretation coincides with the eliminativist interpretation and diverges from the new science interpretation. Researchers holding such a view of NCC experiments are not the target of the present critique.

it might gain credence from another source of data beyond the scientific data discussed in Section 2. Both strategies are found in the literature and I will consider each in turn.

4.1 Phenomenal Consciousness as a Theoretical Construct

We have just seen that the scientific data collected in NCC experiments on their own do not allow the new scientist to infer anything about phenomenal consciousness; it might be, however, that the data support inferences about phenomenal consciousness when taken in conjunction with a well-supported scientific theory that posits phenomenal consciousness.[13] Scientific research is not typically carried out in isolation from scientific theory and often theory plays a critical role in inferring a phenomenon from the scientific data. A well-known example is black holes. Although black holes cannot be directly observed, their existence can be inferred from observations of their surroundings in conjunction with general relativity theory. It might be claimed that the inference of phenomenal consciousness can be supported in a similar way. In fact, this is suggested by some researchers who have treated phenomenal consciousness as a theoretical construct, comparable to any of a number of commonly accepted—but typically not straightforwardly observable—entities in modern science.

For example, new scientist Bernard Baars (1997, 2003) appears to adopt this strategy. Thus, Baars explicitly accepts that the scientific data on phenomenal consciousness are restricted to the behavioral reports. While he also holds that each of us knows about our own phenomenal consciousness from our own experience, he asserts that phenomenal consciousness can be inferred from the scientific data on their own. This leads Baars to treat phenomenal consciousness as a theoretical construct for scientific purposes (2003, 4):

[13] Alternatively, the data might be considered in conjunction with philosophical arguments for the existence of phenomenal consciousness; I postpone a discussion of this possibility until Section 6, focusing here on the support that can be drawn from scientific theory.

> Many observers have pointed out that science is obliged to treat consciousness not as an observable datum but as an inferred concept based on public evidence. To each of us conscious sights and sounds appear as primary events, but as researchers dealing with public evidence, we can confirm only the reports people make about their conscious experience. Scientifically, therefore, consciousness is not something that we know directly; it is a theoretical construct based on shared, public observations.

Baars specifically compares the inference of phenomenal consciousness to a number of commonly accepted theoretical constructs, each of which is supported by the success of the scientific theory that it is embedded in. Thus, he writes (2003, 4):

> All sciences make inferences that go beyond the observations. The atom was highly inferential in its first modern century; so was the gene; so was the vastness of geological time, a necessary assumption for Darwinian evolution; and other scientific constructs too numerous to list.

The implication is that Baars holds that the inference of phenomenal consciousness also *goes beyond the observations* and that it is justified by the same types of considerations that supported the inference of the atom or the gene.

The case of phenomenal consciousness is rather different from the examples that Baars lists, however. Specifically, it is not the case that phenomenal consciousness has been *constructed* to fill a particular need in a scientific theory; and, as such, it is not the case that the construction has then been vindicated by the success of the scientific theory that posits it, for there is no such theory.[14] In fact, one of the big worries about phenomenal consciousness is exactly that we do not know what it is for. This is perhaps best illustrated by considering the debate over the possibility of philosophical zombies (see Chalmers, 1996). The debate is premised on phenomenal consciousness not playing any known role in the production of our

[14] Perhaps one could argue that folk psychology is such a theory. It is unclear, however, that folk psychology is best thought of as a scientific theory (e.g., Goldman, 1989) and it is unclear that the concept of phenomenal consciousness is part of folk psychology (see Sytsma and Machery, 2009, forthcoming; Sytsma, forthcoming, under review). Furthermore, even assuming that the concept of phenomenal consciousness is part of the concept of folk psychology, and that folk psychology as a whole has been successful, it is far from clear that the concept of phenomenal consciousness plays any role in that success (Knobe and Prinz, 2008). This is suggested by the consideration that the corresponding folk psychology for philosophical zombies (our folk psychology minus the concepts of phenomenal consciousness and qualia) would presumably make the same predictions.

behavior; but, of course, this debate would be utterly inexplicable if phenomenal consciousness was a theoretical construct designed to fulfill a functional role in a scientific theory of the mind. Although Baars suggests that the justification for phenomenal consciousness is the same as for theoretical constructs like the atom or the gene, this cannot be correct.

Alternatively, it might be argued that Baars is better read as saying that phenomenal consciousness *in others* is a theoretical construct. We might interpret him as holding that each of us can infer that *other people* are phenomenally conscious from the behavioral data *coupled with* our own knowledge about our own phenomenal consciousness in similar circumstances. Note, however, that if we read Baars in this way, then it is *not* the case that the inference of phenomenal consciousness is based on the public evidence; rather, this inference critically relies on an additional source of evidence—our supposed introspective knowledge of our own phenomenal consciousness.

However we read Baars, such a position is clearly suggested by other advocates of a science of consciousness. For example, John Searle writes (1998, 1936):

> I experience my own conscious states, but I can neither experience nor observe those of another human or animal, nor can they experience or observe mine. But the fact that the consciousness of others is "unobservable" does not by itself prevent us from obtaining a scientific account of consciousness. Electrons, black holes and the "Big Bang" are not observable by anybody, but that does not prevent their scientific investigation.

Certainly, as noted in Section 2, Searle is correct that it is not generally a requirement for being a legitimate scientific phenomenon that it be publicly observable. The key point to note, however, is that having *some evidence that the phenomenon exists* is in fact a requirement for being treated as a legitimate scientific phenomenon. For cases like electrons and black holes we have a great deal of evidence for them, evidence that reflects the success of the scientific theories that posit them. For phenomenal consciousness, however, there is no theoretical support of this type, as

we have just seen. The supposed evidence for the phenomenon instead involves another source of data. Specifically, the researcher claims to have introspective knowledge about her own acquaintance with qualities in situations like those used in NCC experiments and this is called on in interpreting the data collected in the experiments. These supposed episodes of acquaintance are often termed "first-person data" in the literature.[15]

4.2 The First-Person Data in a Binocular Rivalry Experiment

What exactly are the first-person data that are being called on in justifying the new science interpretation of NCC experiments? Note that Searle's claim—"I experience my own mental states"—can be read in two ways.[16] For purposes of exposition let us assume that Searle was looking at a ripe tomato when he made this claim. Now, it might be that Searle was claiming to have first-person data that he was acquainted with redness, for example, and was *also noting* that he took that redness to be a quality of a phenomenally conscious mental state of his (although he had no first-person data to this effect); or, it might be that Searle was claiming to have first-person data that he was acquainted with the quality as a quality of a phenomenally conscious mental state of his. I find that the former first-person data claim is far less contentious than the latter and, as such, will focus on it in this section; the latter claim will be considered in Section 6.

As the first-person data are thought to be restricted to the person doing the introspecting, I will discuss my own experience with binocular rivalry between a horizontal and a vertical grating in considering whether the first-person data reliably support the new science interpretation. What I find is that, after a period of adjustment, I see either a horizontal or a

[15] While I will follow this convention, it is important to be clear that so-called *first-person data* are not actually *data* as I have been using the term: First-person data are not records or reports collected in any experiment and they are not publicly observable.

[16] The same holds for the above claim by Baars that "to each of us conscious sights and sounds appear as primary events" (2003, 4).

vertical grating in alternating fashion (occasionally interspersed with a partial overlap of the two). When I see the horizontal grating, for example, I take myself to be acquainted with bars of color running horizontally and likewise for the vertical grating. In reporting what I see, I take myself to be reporting on my visual acquaintance with those qualities. My visual acquaintance with these shapes and colors, however, is distinct from any reports I might give: My episodes of acquaintance with the bars are first-person data, while my reports could be collected as scientific data. Taking myself to be typical, I might use my first-person data to infer that the scientific data collected in our example NCC experiment likewise correspond with the subject's episodes of visual acquaintance.

Does the inclusion of first-person data—the researcher's own episodes of visual acquaintance in binocular rivalry situations—support the new science interpretation of NCC experiments over the eliminativist interpretation? If so, should we place evidential weight on first-person data? I do not think that the answer to either question is clear. First, recall that the eliminativist accepts that the behavioral data are a reliable indicator of something about the subject, corresponding with what the subject *sees* or the visual discriminations that she makes; it might then be argued that so-called visual acquaintance is nothing more than the subject's seeing. If this is correct, then the first-person data that the new scientist calls on are just the phenomena that the eliminativist infers from the scientific data (from the behavioral reports). The new scientist therefore needs to resist this deflationary account of visual acquaintance, holding that visual acquaintance involves *something more* than making visual discriminations.

Note, however, that if the new scientist claims that when she introspects her episodes of visual acquaintance she finds that they involve *something more* than her having made the various visual discriminations at issue, then we have no way to test the reliability of her judgments that

this is the case. We can, of course, test her ability to make the visual discriminations—testing her ability to identify different visual stimuli and their features in a controlled setting, for example; but, insofar as the new scientist claims that her episodes of acquaintance in such cases involve *something more* than making these visual discriminations, her ability to make such judgments is not tested in testing her ability to see. Thus, if the new scientist responds in this way, she buys the support of the first-person data at the cost of casting doubt on their evidential value: She construes the first-person data such that they favor the new science interpretation over the eliminativist interpretation, but in doing so it is no longer clear why we should place evidential weight on the first-person data.[17]

Even if we grant that we have first-person data that we are visually acquainted with qualities in making visual discriminations, and we grant that our acquaintance goes beyond merely making those discriminations, the evidence still does not specifically support the new science interpretation of NCC experiments. This is because the other alternative phenomena claim noted in Section 2—the disjunctivist claim—*also* interprets the behavioral data in terms of visual acquaintance, even though the disjunctivist denies that the qualities that the subject is acquainted with are phenomenal qualities. Specifically, the disjunctivist claims that the behaviors of subjects in NCC experiments simply indicate which of the stimuli they are visually acquainted with. This claim is discussed in the following section.

5. A Second Alternative: The Disjunctivist Take on NCC Experiments

Note that the phenomena at issue for the new science interpretation of NCC research are not episodes of visual acquaintance with qualities, but the contents of phenomenal consciousness. One way to put this is that it is not just acquaintance with *qualities* that concerns the new

[17] I will discuss the legitimacy of appeals to first-person data further in Section 6.

scientist, but specifically acquaintance with *phenomenal qualities*. Thus, even if we suppose that the eliminativist interpretation discussed in the previous two sections fails to take into account our acquaintance with the relevant qualities in a binocular rivalry situation, this does not necessarily support the new science interpretation. This is clearly seen if we change to an alternative interpretation of NCC research, replacing the eliminativist interpretation with a disjunctivist one.

The core motivation for disjunctivism in philosophy of perception is to defend a relational view of ordinary perception from attacks such as the argument from hallucination (see Smith, 2002, Chapter 7, for a recent articulation of this argument).[18] Thus, M. G. F. Martin articulates the position as follows (2008, 354):

> Disjunctivism about perceptual appearances, as I conceive of it, is a theory which seeks to preserve a naïve realist conception of veridical perception in the light of the challenge from the argument from hallucination. The naïve realist claims that some sensory experiences are relations to mind-independent objects. That is to say, taking experiences to be episodes or events, the naïve realist supposes that some such episodes have as constituents mind-independent objects. In turn, the disjunctivist claims that in a case of veridical perception like this very kind of experience that you now have, the experiential episode you enjoy is of a kind which could not be occurring were you having an hallucination.

For our purposes, what is most important is that the disjunctivist takes an ordinary event like looking at a ripe tomato—a "sensory experience" in Martin's terminology—to be a relation between the perceiving subject and a perceived object. The disjunctivist holds that the redness that I am acquainted with in participating in such an event, for example, is itself a quality of the tomato and that it is not a phenomenal quality (that it is not a quality of a phenomenally conscious mental state somehow produced by my brain).

[18] Disjunctivism was proposed by Hinton (1967, 1973) and developed by Snowdon (1979), McDowell (1982, 1986), Martin (2002, 2004, 2008), and others. Also see the papers collected in Haddock and Macpherson (2008).

The disjunctivist does not necessarily deny the existence of phenomenal consciousness outright, as the eliminativist does, allowing that we might be acquainted with phenomenal qualities in unordinary cases (such as in hallucinating a ripe tomato). Accepting that the subject's perception in the binocular rivalry experiment is ordinary, the disjunctivist interpretation takes the behavioral data to indicate what the subject was acquainted with at different times, but holds that the object of acquaintance in each case is one or the other of the two stimuli used.[19] This contrasts with the new science interpretation, which takes the behavioral data to indicate the subject's visual acquaintance with the contents of her phenomenal consciousness.[20] The important point is that both interpretations agree that the data collected are reasonably interpreted in terms of the subject's visual acquaintance with qualities, but they diverge with regard to the nature of those qualities (whether they are phenomenal qualities or not). What we find is that the collected data—even when supplemented with the first-person data of acquaintance with visual qualities—do not adjudicate on the nature of the qualities at issue. Again, the new scientist requires further support for her interpretation.

6. Further, Further Support for the New Science Interpretation

And, once again, the new scientist might call on theoretical considerations or on another source of data to support her interpretation over the alternative (this time the disjunctivist interpretation). As we saw in Section 4, however, phenomenal consciousness is not posited by a successful scientific theory and thus the existence of this supposed phenomenon is not supported by

[19] One might question whether situations of binocular rivalry are really instances of ordinary perception, and certainly in one sense they are not (as they involve rivalry). Nonetheless, the disjunctivist distinguishes ordinary perception from cases that could fuel the argument from hallucination and binocular rivalry is not such a case; at least, no more so than alternating between closing one eye and the other.

[20] It might be that the new scientist takes the behavioral reports to also indicate the subject's visual acquaintance with the content of her phenomenal consciousness in addition to the subject's acquaintance with one of the stimuli. This would raise further difficulties concerning how one could distinguish between these two types of acquaintance; but, regardless, the arguments that follow are applicable to either version of the new science interpretation.

theoretical considerations of that sort. Alternatively, the new scientist might call on philosophical arguments; in particular, she might support her interpretation indirectly by arguing that no relevant form of disjunctivism is a viable position.

The argument in the new science literature that most clearly supports the denial of disjunctivism is that science shows us that at least some of the qualities that we are acquainted with in ordinary visual perception are not qualities of external objects. For example, it is often held that modern science shows us that the colors that we are acquainted with are not qualities of entities outside of the skull.[21] Accepting this, it is then argued that these qualities must be phenomenal qualities produced by the brain.

It is far from clear, however, that science shows us that the colors that we are acquainted with are not qualities of entities outside of the skull; furthermore, while the view that external objects are not actually colored is the majority opinion amongst color scientists, it has also been vigorously contested. As Alex Byrne and David Hilbert note (2003, 3):

> [Do] these objects like tomatoes, strawberries, and radishes that appear to have this property really have it? In other words, are objects, like tomatoes, red? Color scientists, philosophers, and other cognitive scientists with opinions on the matter strongly disagree about the answers to these questions.

Such disagreement is possible, in part, because our best current scientific account of color vision does not so much include that the colors we are acquainted with are not qualities of entities outside the skull, as it is simply silent about these qualities. New scientists often treat this silence as tantamount to a denial that the colors that we are acquainted with are qualities of

[21] Thus, to give just a couple of examples, Thomas Metzinger opens the introduction to his edited volume on neural correlates of consciousness by noting a subtle trap in Colin McGinn's (1989, 349) oft-repeated question, "How can Technicolor phenomenology arise from soggy gray matter?" Metzinger writes: "The brain is not gray. The brain is colorless…. The subjective qualities inherent in a phenomenal color experience are a paradigm example of something that is accessible from a first-person perspective only. Color consciousness—regardless whether in gray or Technicolor—is a *subjective* phenomenon." (2000, 1, emphasis in original). Similarly, Christof Koch (2004, 52) writes that "the much-cherished sense of color is a construct of the nervous system"; he continues, "there are no 'red' or 'blue' objects in the world."

objects outside the skull, but this inference is questionable. Furthermore, allowing the inference from mere silence to outright denial leads to problems for the new scientist as well, as the scientific account no more places the colors that we are acquainted with in the mind/brain than it does in the world outside the skull. What the new scientist needs to establish is that the colors we are acquainted with are phenomenal, but the absence of such qualities from our scientific account of visual perception does not establish that: Such an absence does not selectively favor the new scientist's position over the disjunctivist's and, therefore, does not provide the support that the new scientist requires.

Of course, other arguments for the denial of disjunctivism could be given. While I cannot do justice to these arguments, or the disjunctivist responses, here, suffice it to say that disjunctivism currently seems to be a live position. If, on top of the difficulties discussed in Section 4, the new science interpretation of NCC experiments *also* critically involves the assumption that such contentious philosophical arguments are correct, then the claim that the new science is a scientific discipline is brought into serious doubt. In fact, although the literature is not clear on the point, I do not think that most new scientists would be happy to have their interpretation of NCC experiments rest on contentious arguments in the philosophy of perception.

Alternatively, the new scientist might claim to have another source of data that directly supports her interpretation: The new scientist might claim that when she puts herself into a situation like that used in our example NCC experiment, she is not only visually acquainted with qualities, but she is acquainted with those qualities as phenomenal qualities. That is, the new scientist might claim to have introspective knowledge that she is acquainted with the contents of

her phenomenal consciousness in such situations. This is the second, more controversial reading of the first-person data claims considered in Section 4.[22]

If the new scientist claims that she has first-person data that she is acquainted with qualities as phenomenal qualities in the relevant situations, treats those supposed first-person data as legitimate scientific data, and assumes that her experiences are typical, then the inference from the behavioral data in an NCC experiment to the contents of the subject's phenomenal consciousness is straightforward. Is this inference a good one? I argue that it is not, noting that there are serious problems with the new scientist treating the supposed first-person data as legitimate scientific data and with the new scientist taking her experiences to be typical in this case. I consider each problem in turn.

6.1 The Problem with First-Person Data

Recall that first-person data are not data as that term is typically understood in the context of scientific experiments: first-person data are not records or reports that are accessible by humans and available for public inspection. Rather, first-person data are episodes of acquaintance and are distinct from any recorded behaviors corresponding with those episodes. These episodes are thought to be restricted to the person who undergoes them, such that each first-person datum is accessible by only one person—the person doing the introspecting. In the standard terminology, first-person data are *private*. The use of first-person data is controversial, violating what is often held to be a fundamental principle of scientific methodology—what has been called the *publicity*

[22] While new scientists are not typically clear in distinguishing between claims of having introspective knowledge of qualities that they take to be phenomenal qualities and having introspective knowledge of qualities as phenomenal qualities, some philosophers are fairly clear in making the latter claim (see, for example, Block, 1996; Loar, 1990; Gertler, 2001).

principle. The basic idea is that whatever else science is, it is a fundamentally third-person enterprise with scientific theorizing being constrained by the public data.[23]

Perhaps being in accord with the publicity principle should be treated as more of a rule of thumb than a necessary criterion for being a science, however—or otherwise loosened so as to accommodate the new science interpretation of NCC experiments. There is good reason to think that this is a bad idea. Gualtiero Piccinini (2003) has detailed one central reason: To abandon the publicity principle is to risk epistemic divergence.[24] Piccinini writes:

> [Epistemic divergence] occurs when different investigators answer the same question in different ways using private methods for collecting evidence. Disagreement leads to controversy, and in scientific controversies, researchers routinely criticize each others' methods….
>
> When methods are private, the parties in the dispute share no means to prove that a method is flawed—they have no common epistemic ground on which to resolve their disagreement. As long as investigators are in epistemic divergence, their controversies can never be settled. (600)

This is exactly the situation that threatens with regard to NCC experiments, with the new scientist employing private methods in arriving at first-person data that are not shared by the eliminativist or disjunctivist. In such a situation a principled consensus cannot be reached, as the dispute centers on supposed evidence that is not available for public inspection. So long as the supposed first-person data are treated as legitimate scientific evidence, the new scientist will not be swayed; and so long as her opponent lacks comparable first-person data, she will not be swayed. But, this is exactly the type of impasse that scientific methodology is designed to help us avoid and a compelling reason to abide by the publicity principle.

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[23] This general principle is well expressed by Gualtiero Piccinini (2003, 597-598): "Scientific statements must be intersubjectively testable. If evidence for a statement cannot be obtained by different investigators, then neither the evidence nor the statement are scientific. Classical defenses of this principle have been given by Herbert Feigl (1953, 11), Carl Hempel (1952, 22), Immanuel Kant (1965, 645), and Karl Popper (1959, 44)."

[24] It is worth noting that while Piccinini's defense of the publicity principle is given in response to Alvin Goldman's (1997) criticism of it, the new science interpretation is also dubious if we instead adopt Goldman's alternative, including the requirement that the method be reliable. The problem is that if we do not accept the first-person data at issue as evidence to begin with, then we have no evidence for the reliability of the corresponding claims.

6.2 The Problem with Assuming Typicality

Furthermore, to support her interpretation the new scientist needs to do more than to simply accept the use of her first-person data as scientific data; the new scientist also needs to assume that her experiences in situations like those found in NCC experiments are typical. Specifically, she needs to assume that the subjects in NCC experiments are acquainted with qualities that she would introspectively judge to be phenomenal qualities were she to have their experiences. This assumption could only be justified on the basis of similarity between the new scientist and the subjects. But, there is reason to doubt that they are relevantly similar: The new scientist is quite *atypical* in the introspective judgments that she makes about her perceptual experiences, giving us reason to doubt that her perceptual experiences are like those of NCC subjects.

This can be shown in several ways. First, recall Martin's contention from Section 5 that the disjunctivist seeks to uphold a *naïve* realist conception of ordinary perceptual experience. The claim is that this is the naïve view (the pretheoretical, common-sense view) of ordinary perception. Thus, Tim Crane (2008, 140-141) writes that "to preserve this relationality would be to preserve one of the central features of perception as we experience it—part of the commonsense conception, if you like." But, this view of ordinary perceptual experience clashes with what the new scientist claims to experience: The disjunctivist claims that the naïve view is that in ordinary perception we are acquainted with qualities as qualities of objects outside the skull, but the new scientist instead claims to be acquainted with those qualities as phenomenal qualities. In fact, there is empirical evidence supporting the disjunctivist's assessment of the naïve view, with a number of recent studies suggesting that people without training in philosophy understand colors and pains in this way (Sytsma, under review).

Perhaps it might be argued, however, that ordinary people are somehow deficient in their introspective ability and that we should therefore favor the claims of researchers interested in consciousness over those made by the folk (or those who follow them). It is far from clear why we should think that this is the case, but let us suppose that this is correct for the sake of argument. It *still* does not seem that the new scientist is typical in what she claims to find in introspecting episodes of ordinary visual perception. Thus, many philosophers have found claims about the supposed transparency of experience to be compelling, clearly suggesting that they do not find themselves to be acquainted with qualities as phenomenal qualities in ordinary visual perception.

What one typically finds in discussions of the transparency of experience is that the existence of phenomenal qualities is assumed and transparency is then called on as part of an argument for a particular account of those phenomenal qualities. Ignoring the assumption of phenomenal qualities, however, when philosophers claim that an ordinary visual experience is transparent they are in part indicating that in introspecting they do not find that they are acquainted with qualities as phenomenal qualities. In fact, these philosophers often claim quite the opposite, noting that in cases of ordinary visual perception they seem to be acquainted with qualities as qualities of external objects. For example, in his classic statement of the point, Gilbert Harman writes (1990, 39):

> When Eloise sees a tree before her, the colors she experiences are all experienced as features of the tree and its surroundings. None of them are experienced as intrinsic features of her experience. Nor does she experience any features of anything as intrinsic features of her experience. And that is true of you too. There is nothing special about Eloise's visual experience.

If Harman is correct in taking this description to be typical of ordinary visual perception in humans, then those who claim to be acquainted with qualities as phenomenal qualities in ordinary visual perception are unusual in this regard.

Is Harman correct? As a phenomenological point about ordinary visual perception, the philosophical consensus seems to clearly support the claim. Thus, even critics of the arguments typically derived from claims about the transparency of experience will often agree with the phenomenological point that I am calling on. To illustrate, consider Amy Kind's endorsement of this point in a recent critique of transparency claims as used by representationalists:

> Even if there are special cases in which perceptual experience is not transparent, it might be that ordinary visual experience (or, more broadly, even ordinary perceptual experience) is transparent. While this point strikes me as right in principle, I doubt it will sound very appealing to proponents of transparency. (2003, 235)

Accepting that this is the philosophical consensus, and that it coincides with the evidence that we have for non-philosophers, the new scientist does not seem to be typical in claiming to be acquainted with qualities as phenomenal qualities in the cases at issue. That the new scientist is atypical in this regard, however, casts serious doubt on the assumption that the subjects in NCC experiments are like her in having the relevant phenomenally conscious mental states. Thus, even if we were to accept the new scientist's use of first-person data as scientific data, it does not seem that this enables the new scientist to reasonably infer that the behavioral data collected in NCC experiments correspond with the contents of phenomenal consciousness.

7. Conclusion

The new science aims to give a neurobiological explanation of phenomenal consciousness and the NCC project is widely considered to be the first step in doing so. The hope is that finding neural correlates of the content of phenomenally conscious mental states will cast some light on

how neural activity gives rise to such states. In this paper I have questioned whether NCC research is able to produce evidence of such neural correlates. I have done so by challenging the claim that we have scientific evidence of the contents of phenomenal consciousness. This challenge centers around offering two alternative interpretations of NCC experiments that do not treat the scientific data collected as casting light on the contents of phenomenal consciousness. We find that the new scientist requires another source of evidence and that this critically involves claims about first-person data. Specifically, insofar as the new scientist holds that she has scientific evidence for her interpretation, rather than merely resting her case on contentious philosophical arguments (viz. that disjunctivism cannot be defended or that colors are not real), the new scientist must hold that she is acquainted with the contents of her phenomenal consciousness as being phenomenally conscious. This first-person data are then used in conjunction with the data collected in NCC experiments to infer the phenomena of interest. This inference is unwarranted: First, the first-person data that are relied on in making this inference are problematic, leading to epistemic divergence; second, there is good reason to doubt that the new scientist's experiences are typical and, thus, reason to deny the generalization based on them. I conclude that researchers in the new science have not offered compelling support for the claim that phenomenal consciousness exists and that they have failed in their attempts to establish correlations between neural activity and the supposed contents of phenomenal consciousness.

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