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What Blindsight Can See

Jared Butler

The pathological phenomenon known as blindsight, indicated by visual processing without awareness, has provided fodder for recent debate in the philosophy of mind. Inspired by blindsight, Daniel Dennett (1991) turns out a thought experiment in which he imagines the abilities of a blindsight subject progressing to the extent that the patient seems to have regained his lost consciousness. Jason Holt (2003) objects to what he mistakenly views as a direct Dennettian assault on *qualia*, or the qualities of experience. He attacks the essential claim in Dennett's thought experiment that a super blindsight subject and normal perceiver would be functionally indistinguishable. By pointing out the confusion in Holt's somewhat overzealous objection and providing two simple, additional thought experiments, this essay will show that, given what is stipulated to be imagined in the super blindsight, Mary the Neuroscientist, and *Demoiselles d'Avignon* thought experiments, there is indeed no place we can identify in the brain where consciousness happens, no special "juice" that must be added to an experience to make it conscious.

An Historical Overview of Blindsight

Blindsight is a neural pathology in which patients who have suffered particular forms of brain damage can process visual information despite the fact that they report no visual consciousness of stimuli. A *scotoma*, or blind spot, occurs after damage to or excision of a portion of the visual cortex. Blindsight patients retain the ability to make discriminations about stimuli presented within their scotoma but are unaware of the stimuli themselves, and thus their reports appear to be mere guesswork. However, patients' abilities to guess about shape, pattern, motion, and even color far exceed mere chance; their "shots in the dark betray excellent marksmanship."[1]

1 Jason Holt, Blindsight and the Nature of Consciousness (Orchard Park, NY: Broadview Press, 2003), 7.

Traditionally, damage to the visual cortex had been thought to cause permanent blindness in the corresponding, contralateral visual field. Following early investigations in the 1970s, the phenomenon was dubbed *blindsight* by Lawrence Weiskrantz.[2] Patient D.B., whose visual cortex was removed in 1973 at the age of thirty-three, was a famous pioneer case of blindsight. He attracted attention only six weeks after surgery when medical observers noticed that he could locate objects in his blind field more adeptly than expected. Maintaining his reported lack of awareness, his abilities opened up the rigorous study of blindsight.[3]

Two types of blindsight have been described. Patients with Type I blindsight possess no awareness of visual stimuli in the blind field, but show reflexive responses (e.g. pupillary reaction and improved performance in processing when exposed to stimuli in both the blind and normal visual fields). Conversely, Type II blindsight patients demonstrate a limited awareness of stimuli in the blind field (e.g. target detection, saccadic eye movements, and manual pointing that show a modicum of movement and orientation detection).[4]

Since the abilities of blindsight patients vary to a considerable degree, criticisms, grounded in both physiology and methodology, have been put forth that challenge the phenomenon's legitimacy. Physiologically, it has been suggested that intact remnants of the primary visual cortex can account for the residual visual function observed in blindsight. In addition to the problem of blindsight's neural substrates, methodological inadequacies of the initial research may have resulted in unreliable results. Inadequate eye fixations that fail to keep track of saccadic movements may not have isolated the blind field to the precise standard necessitated by the nature of the experiment. Light scatter, where light from the blind field is deflected into and processed by the normal

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2 Holt, 2003, 19; Ptito and Leh, "Neural Substrates of Blindsight After Hemispherectomy" in The Neuroscientist Vol. 13, 2007: 506-518.

3 Laurence Weiskrantz. Blindsight (New York, NY: Oxford University Press, 2009), 86-87.

4 Ptito and Leh, 2007, 506.

visual field, could also explain away blindsight. Finally, the forced-choice paradigm, where patients are forced to guess about the presence of a stimulus in their blind field, has been said to result in a response bias where patients' reactions are independent of sensitivity to stimuli.[5]

Recent studies on hemispherectomized patients—patients whose right or left cerebral hemispheres have been completely removed—have demonstrated that blindsight is in fact a legitimate phenomenon. Since no functional patches of the striate cortex remain, the physiological criticisms of blindsight's neural substrates are rendered inert. Further, to avoid light scatter, patients are shown stimuli in both visual fields. This indirect method of testing shows that, in cases of blindsight, the patient can make discriminations in shorter amounts of time than when shown a stimulus in the visual field alone.[6] These studies have also shown that peripheral structures such as the superior colliculus play a role in unconscious visual processing left over despite damage to the striate cortex.

Dennett's Super Blindsight Thought Experiment

In his *Consciousness Explained* (CE, 1991), Daniel Dennett gives a thought experiment imagining a blindsight subject's abilities advancing to the point that his treatment of stimuli is functionally indistinguishable from that of a normal perceiver. He calls this imaginary case *super blindsight*. Before turning out his thought experiment, or what he calls derisively "intuition pump," he makes an important distinction between hysterically blind patients and blindsight patients. Like blindsight subjects, the hysterically blind report blindness, but display no physiological damage or cause—they suffer from psychosomatic blindness in effect.

> Are they really blind? They might be. After all, if psychosomatic pain is real pain and psychosomatic nausea is real enough to make

[5] Ptito and Leh, 2007, 507.

[6] Weiskrantz, 2005, 26–27.

> one vomit, why shouldn't psychosomatic blindness be real blindness?[7]

We doubt the abilities of the hysterically blind patient because hysterically blind patients sometimes use the information their eyes provide them in a way unlike blindsight patients do—they "have an uncanny knack of finding chairs to bump into."[8] With the support of scans of both brains, our skepticism is confirmed when we see physical evidence of blindness on the one hand, and a healthy brain on the other.

But we believe when a blindsight patient reports no conscious experience and say that he does not possess visual awareness. What if a blindsight patient who comes to recognize the information presented to him indirectly (without direct awareness), but can represent to himself the dispositions he undergoes in response to a stimulus. If he does come to be in such an informed state, does he regain visual awareness, and if so, when can conscious experience be ascribed to a perceiver? His thought experiment prompts these questions with the following structure. Provided a standard blindsight patient whose guesses when cued are better than chance:

1. Despite their abilities, blindsight patients have no visual awareness in their blind fields.
2. Blindsight patients are not unchanging in their talents and can improve with practice.
3. After time and practice, suppose an improving patient could guess about a stimulus in the blind field without having been cued.
4. If the subject continues to perform significantly above chance and to a high degree of reliability, then he could treat those stimuli on

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[7] Daniel Dennett, Consciousness Explained (New York, NY: Hatchet Book Group, 1991), 327.

[8] Dennett, 1991, 327.

par with any conscious experience, such as those of normal perceivers.

5. If there's no difference between how a super blindsight subject and how a normal perceiver treat stimuli, then there is no difference between their ability to make themselves consciously aware of a stimulus

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There is nothing more "added on" to the normal perceiver to account for visual consciousness beyond "blind mechanical processes."[9]

If the ways in which these two subjects come into an informed state are indistinguishable, which would seem to be the case if we imagine (4), then there is no special place where the "juice" of consciousness must be added. Is there any real difference between coming to an informed state and being conscious?

Holt's Objections

Super blindsight, being a thought experiment, asks the reader to imagine a possibility. Holt maintains that blindsight itself "seems essentially to depend on at least minimal help in the form of cues or options, except in cases where the relevant options are conceptually decidable (e.g., present/absent) rather than informative (e.g., red/green)."[10] Despite this reservation, he entertains Dennett's argument and makes an attempt to critique it. He denies that a super blindsight patient's visual field would have overall functional equivalence and, if it did, then super blindsight could no longer be described as a pathology. Without this functional equivalence, there is a real difference between a super blindsight patient and a normal perceiver.

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[9] Dennett, 1991, 330; 343.

[10] Holt, 2003, 60.

Dennett's move, according to Holt, is to "idealize blindsight out of the functional impairments patients suffer," so that, although the imagined patient is bankrupt of visual consciousness, he is functionally equivalent to normal perceivers in processing visual information.[11] Holt makes his case precisely against this functional equivalence, denying that visual fields would be on a par in a super blindsight patient.

Now it may be true that both visual fields contain information about visible properties, and functionally the patient treats them on a par. "However," Holt contends, the "imagined patient will make the same perceptual judgments about the world, but he will not make the same reports on how he arrived at those judgments…. Consider what the patient would say about the two fields."[12] His argument hinges on this question of the functional difference between blind and visual fields.

1. For overall functional equivalence, one must not be able to tell the difference between two sets of sense data, e.g. visual and blind fields.
2. Blindsight patients can tell the difference between their visual and blind fields.
3. If super blindsight patients can distinguish between their visual and blind fields, then no overall functional equivalence is present.
4. But if a super blindsight patient cannot distinguish between visual fields, then he wouldn't have blindsight but in fact, would possess normal vision.

An imagined super blindsight patient must be able to tell the difference between visual fields if he remains a blindsight patient.

[11] Holt, 2003, 61.

[12] Holt, 2003, 62.

Say a normal perceiver comes across a set of dice; naturally, he could tell either by sight or by touch that these dice are cubes. Two sensory modes make things seem the same way, but there is a noticeable difference between touch and sight.[13] As there is a functional difference between two sensory modes, so too would there a difference between the blind field and the normal visual field, despite the fact that stimuli can be treated on a par. If there were no reportable difference, then the super blindsight patient would possess normal vision. Therefore, in order to understand blindsight and its imaginary offspring as pathologies, we must understand what is missing from normal vision, namely visual awareness.

A Dennettian Response

Dennett would not counter that what is pathologically missing in blindsight are real representations. However, he would contend that these representations are not real structures in the brain; there is no need to report information back to some "central meaner" in order for consciousness to arise. It is clear that visual processing is not a simple matter of electromagnetic radiation striking the retina and traveling through brain circuits. Perception is a matter of context and interpretation.[14] Since perception is informed by a constellation of concepts and associations, the informed state of being dispositionally affected by a stimulus is a matter of self-representation on a level higher than the visual tract in isolation. If a super blindsight patient can make the self-representation of his affect, then he is visually conscious, regardless of pathology and physiology.

Nor does the patient have to bear the title "blindsight patient." If functional equivalence means his condition has been idealized out of the impairments of blindsight and thus has normal vision, his condition is a mere

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[13] This is a derivative of Molyneux's Problem, which first appeared in John Locke's An Essay Concerning Human Understanding. See Stanford Encyclopedia of Philosophy, "Molyneux's Problem" (http://plato.stanford.edu/entries/molyneux-problem) or Locke, J. An Essay Concerning Human Understanding (1690).

[14] Sekuler and Blake, Perception, fourth ed. (New York, NY: McGraw-Hill, 2002), 33.

play on terminology. In other words, call it what you'd like, but our imaginary subject has still regained consciousness and this is marked precisely by the onset of an informed state. Thus, Holt's challenge is really just a matter of terms on the one hand. On the other hand, even if there is a physiological difference in visual function, if this physiological difference fails to manifest itself in behavioral output, then it is simply a difference that makes no difference. There may very well be a physiological difference in the way two normal perceivers come to be in an informed state in response to the same stimulus, but if the behavioral responses are effectively indistinguishable, then the physiological difference(s) make no difference.

Holt's arguments against Dennett probably rest on a misunderstanding of Dennett's aim in his thought experiment. The most obvious evidence of this is Holt's extended use of the term "visual qualia" throughout his chapter on super blindsight. Dennett, in his initial argument, primarily references visual consciousness and brings up qualia in a way rather tangential to his main discussion of informed states and intentionality, or the "aboutness" of a conscious state. He simply makes the claim that, add enough to an imagined case of blindsight and you end up with a super blindsight patient whose talents, indistinguishable from visual awareness as they are, allow him to chuckle to himself while reading the comics because he can bring himself into the same dispositional states any normal observer could.[15] Dennett's particular aim in this passage is simply not a direct offense against qualia, as Holt mistakenly implies. If Holt's charge against Dennett is to prevent him from co-opting arguments in his project against qualia, then Holt should have picked a more relevant passage from Dennett.

Mary and the Demoiselles

Indeed, Dennett's super blindsight says more about the nature of thought experiments as philosophical tools than it has anything to do with the debate

[15] Dennett, 1991, 343.

over qualia. As noted, he refers to thought experiments as intuition pumps, "often fiendishly clever devices" that

> invite the "audience to imagine some specially contrived or stipulated state of affairs, and then—without properly checking to see if this feat of imagination has actually been accomplished—inviting the audience to "notice" various consequences in the fantasy.[16]

Of the thought experiments that Dennett tinkers with in Part Three of CE, Frank Jackson's classic Mary the Neuroscientist has a structure most relevant to purposes here. We are invited to imagine Mary, who is deprived of color experiences for the duration of her life. Despite having no experience of color, she is a brilliant scientist and knows everything there is to know about the physical processes of color vision. From retinal input to processing in the central nervous system to speech acts, she knows all the physical information. Were she exposed to a color, say the blue sky, would she *learn* anything?[17]

Dennett puts a clever twist on this thought experiment to illustrate his point about their status as intuition pumps. Say we showed Mary a blue banana. Much to our surprise, she scoffs at our attempt to trick her, claiming she knows that this banana is blue and real bananas are yellow. Recalling that she's had no exposure to color in the real world, we're shocked and demand an explanation. She gives one:

> 'You have to remember that I know *everything*—absolutely everything—that could ever be known about the physical causes and effects of color vision….I realize it is *hard for you to imagine* that I could know so much about my reactive dispositions that the way blue affected me came as no surprise. Of course it's hard for

[16] Dennett, 1991, 282.

[17] Frank Jackson "Epiphenomenal Qualia" (1982), excerpt, in Dennett, 1991, 398.

> you to imagine. It's hard for anyone to imagine the consequences of someone knowing absolutely everything physical about anything!'[18]

Obviously no one can really imagine what it's like to possess all the physical knowledge there is to know about *any* subject, especially one as complex as color perception. If we must imagine that Mary possesses this knowledge, then we must assume she possess the knowledge about the subsequent brain states that correspond to color perception. If she knows this, then what is to stop her from putting herself in those brain states, and thus, what is to stop her from having a color experience? More precisely, what must be *added* to her dispositional states to give her color consciousness or qualia?

We can adapt the super blindsight intuition pump to drive this sentiment home. Imagine the experience of a super blindsight subject shown a familiar painting in his blind field, one that prompted an intellectual and emotional response. Since the subject is able to treat objects in the blind field on a par with those in the visual field, a response normally associated with visual consciousness is perfectly conceivable. Suppose he could identify Picasso's *Demoiselles d'Avignon* and can remember learning about its composition, or being surprised and intrigued by the figures' mask-like faces and unusual colors. Say he sees that painting in person, and, overcome by the experience of gazing at his favorite painting first hand, tears begin to well in his eyes. How could anyone deny that our subject has visual consciousness?

Say our super blindsighted art lover comes across a completely novel picture. Having never seen it before, he has no memories of the composition or what it looks like, yet he can describe a woman's pale profiled face crowned and jeweled against a mustard yellow background, with squares of pink, purple, and blue littering the bottom half of the screenprint. He reports that although

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[18] Dennett, 1991, 399 (emphasis in original).

the woman is pretty, he hates that shade of yellow, the other colors are too sour for him and, frankly, he hates pop art.[19]

These examples remind us about the temptation that carelessness thought experiments present when they invite imaginings. If we imagine the abilities of blindsight patients to progress beyond what looks like mere guesswork, then they could indeed come to be in an informed state about the stimuli they "perceived" in their blind fields to the extent that the scare quotes around perceived become quite unnecessary. So too, if we imagine Mary to know everything there is to know about color perception, then there's nothing for her to learn when she sees clear blue skies over open green fields for the first time. Dennett invites readers to thoroughly consider what it means when we're asked to imagine such great bounds. He also shows that if, as in the imagined case of super blindsight, two responses are functionally indistinguishable and both subjects possess the ability to make themselves aware of the onset of an informed state via a self-representation integrating the web of concepts, dispositions, and associations characteristic of any conscious experience, then there can be no central place where information is reported to "make it" conscious. There can be no seat of power, no "Central Meaner," Inner "I," or Mind's Eye, only blind, mechanical processes that give rise to what *seems* to be the miraculous.

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[19] He's just come across Andy Warhol's Queen Margrethe II of Denmark, 1985, 39.25 " x 31.5", Screenprint on Lenox Museum Board.