Research Essay

Is It All in Your Head?

Ken Levi*

Abstract

Is consciousness all in our heads, as neuroscience contends, or does it derive, to some extent, from an alternative source? This article explores how far modern science has taken us. Through human and animal studies, investigators have produced a comprehensive mapping of areas in the brain and cerebral networks associated with our various senses and feelings. To what extent have they succeeded in explaining consciousness? In response, this article also details the many philosophical objections to neuroscientific assumptions. In particular, I cite skepticism about how, in the words of David Chalmers, "mental events emerge from physiological occurrences." To attempt at resolving the neuroscience-vs-philosopher dilemma, this article proposes two possible alternative solutions: templates and holograms.

Keywords: Consciousness, neuroscience, insular cortex, brain networks, animal brain studies, existentialism, template, hologram, holographic mind, perception.

1. Introduction

Is consciousness all in our heads, as neuroscience contends, or does it derive, to some extent, from an alternative source? Great advancements have been made in brain science through the use of new technologies, such as electroencephalographs (EEGs), magnetoencephalography (MEG), magnetic resonance imaging (MRI), functional MRIs (fMRIs), and resting state functional connectivity MRIs (rsfcMRIs), in addition to the traditional use of electrodes.

As a result, scientists now have a detailed mapping of the brain, and a precise schema of brain networks that become activated under varying stimuli. This includes how the brain processes the five senses that give us consciousness. One might therefore conclude that the "hard problem" of consciousness has been solved. One might presume that, indeed, it really is all in your head.

In this article, I will explore how far science has taken us. We will also consider philosophical objections to the brain model of consciousness, and whether those objections are valid. Finally, we will consider two ways of resolving the science-versus-philosophy dilemma.

* Correspondence: Ken Levi, Independent Researcher. Email: levik2016@yahoo.com

2. Animal Behavior

One argument favoring neuroscience is that sentient beings are born with the ability to respond to compound stimuli. In one study, researchers discovered that red wood ants possess an inborn template for enemy recognition (Dorosheva, et al, 2011). Two stimuli, in particular, incite their aggression. These include dark color and movement. The ants react to these stimuli with a lunge and a bite. This same behavior was observed not only in ants that had prior experience with enemies, but also naive ants that never did. They reacted this way 100% of the time. Researchers concluded that the ants had to be born with the ability to be "aware" of an enemy.

Frogs act in a similar way (Lettvin, et al, 1959). If a small dark moving object enters their field of vision, they dart out their tongue. A large dark object produces the opposite effect. Both experienced and naive frogs behave this way. Furthermore, as the researchers suggest, the frog's reaction has more of the appearance of "perception than sensation." This is because "a long assembly line of activity" in the frog's brain integrates the stimuli.

The same holds true for mice. According to researchers, mouse "responses to bitter and sweet are hardwired into the brain." These little rodents possess separate taste areas in their cortices, two millimeters part, for bitter and sweet (Wein, 2015). Activating these areas produces avoidance or approach behavior, even in the absence of any bitter or sweet compound (Zuker, 2015). Furthermore, when the mice were fed, they appeared to be reacting to the taste, *per se*, and not to any specific chemical compound, after the compounds were varied (Fu, 2019). In other words, instead of a strictly mechanical - or knee jerk - reaction to a specific formula, it seems the mice were reacting to a perception.

3. Brain Structures

In the study of consciousness, our brain has very specific areas that process sensation. For example, we saw how mice have separate areas not just for taste, but for sweet and bitter, in particular. For us humans, the central processing area for all sensations is the insular cortex (IC). It's located in the middle of the brain, within the lateral sulcus separating the frontal and parietal lobes from the temporal lobe (Masterclass, 2021).

The IC takes in information from all the senses. It "integrates multimodal salient information ranging from sensation to cognitive-affective events to create conscious interoception" (Lu, et al, 2016).

Two major sections of the IC are the anterior insular cortex (AI) and the posterior insular cortex (PI). Both are concerned with pain. The AI is involved with the affective aspects of pain; how the pain affects you emotionally. The PI is involved with the sensory features of pain; what type of pain it is and how much it hurts (Lu, et al, 2016).

Outside the IC, but nearby in the mid-brain, the ventral tegmental area (VTA) is involved with the sensation of pleasure, because it generates the neurotransmitter dopamine. In the same area, the nucleus accumbens (NAcc) produces the dopamine suppressor gamma-aminobutyric acid (GABA) (Lu, et al, 2016).

Other areas involved in the perception of pleasure and pain include the rostral agranular insular cortex (RAIC), a subset of the AI; the thalamus, the brain's way-station for all incoming sense data; and the amygdala, the doorway to the brain's pleasure center, the limbic system.

In sum, we can conclude that sensation is very much the brain's job. Scientists have discovered many discrete areas of the brain dedicated to processing not just gross sensation, but specific aspects of it.

4. Brain Networks

The discrete areas of the brain outlined above interact with each other to produce particular sensory effects. Consider, for example, taste (Dowdey, 2007). Our tongues include between 2000 and 4000 taste buds, each containing 10 to 50 gustatory receptor cells. Saliva breaks food down into component chemicals, which activate the gustatory receptors for: sweet, bitter, salty, sour, and savory (umami). These activated cells pass electric impulses to the thalamus and the gustatory area of the insular cortex. Until these impulses reach the brain, taste cannot occur.

Consider the case of pain - or noxious stimuli in general, including trauma, burn, or toxic chemicals. Special receptor cells in the skin called nociceptors capture the stimuli and pass them along via nerve fibers to the spinal cord, and then to the thalamus in the brain. The thalamus directs the signal to the IC, then to the AI and then the RAIC. The RAIC directs the signal to the amygdala and the limbic system where the affective aspects of the signal are processed. This is called the "insula-amygdala circuit" (Lu, et al, 2016). At the same time, the PI receives the signal in order to deal with the sensory features of the pain.

Alternatively, consider the case of pleasure. The skin contains special heat receptors and tactile receptors, including Merkel cells and Meissner corpuscles, for light touch and vibration. Electric impulses from these cells, again, are passed along nerve fibers, through the spinal cord, and to the brain. In the brain the thalamus conveys signals to the IC, which directs them to a nearby cluster of neurons called the ventral tegmental area (VTA). This is the main area where dopamine is made.

Dopaminergic neurons project into GABAergic cells in the NAcc, which modulates the effects of the dopamine. Ordinarily, GABA continuously inhibits dopamine. It's known as the brain's "brake pedal." But the GABA neurons have receptor cells. For example, cannabis stimulates cannabinoid receptor cells (Wenk, 2021). When stimulated, these cells prevent the release of GABA. As a result, the inhibition of dopamine is turned off. The NAcc releases dopamine. The dopamine stimulates the pituitary gland to produce mood altering endorphins, oxytocin, and serotonin into the bloodstream.

At the same time, the NAcc and the medial prefrontal cortex start talking to each other. The mPFC plays a major role in cognition.

The interaction among the VTA, the NAcc, the IC, and the amygdala is known as the "mesocortico-limbic-dopamine system"

5. Dopamine

The link between dopamine and consciousness may be stronger than suspected. One scientific article is even entitled "Dopamine Signaling as a Neural Correlate of Consciousness" (Palmiter, 2011). Dopamine plays a major part in what is called "the reward system" of the brain. It is associated with everything from the modest pleasure of, say, chewing gum, to a full-blown state of euphoria. Within the brain, dopamine divides out into four major pathways: mesolimbic, nigrostriatal, mesocortical, and tuberoinfundibular. The mesolimbic leads to the limbic system by way of the NAcc. The nigrostriatal leads to motor function. The mesocortical leads to the prefrontal cortex. And the tuberoinfundibular leads to the pituitary gland by way of the hypothalamus.

These pathways are related to a wide range of reactions, including: pleasure, reward, memory, fine-tuned motor function, compulsion, perseveration, and the coordination of information.

Associated with the four pathways are five types of dopamine receptors, labelled D1 to D5, respectively. These are variously associated with excitation or inhibition of the neurons they're attached to.

In all, the focus on dopamine offers a moderately detailed view of how one critical neurotransmitter operates within the brain. And the question arises: to what extent does this explain consciousness?

6. What We Can and Cannot Conclude

What We Can Conclude

To what extent does neuroscience explain consciousness?

1. Sentient beings are born with an ability to respond to compound stimuli. In studies of ants and frogs, what we find is not just reaction to single stimuli, but rather reaction to a set of stimuli in combination. It's as if they were drawing a conclusion.

2. Studies of mouse responses to bitter and sweet indicate they are reacting to taste, *per se*, rather than any specific chemical compound. It's as if they were experiencing a qualia.

3. The mice, frogs, and ants have these reactions, even if they have never had any prior experience with the respective stimuli. It's as if they were born - not just with stimulus-response behavior - but also with perception.

4. Furthermore, the fact that for mice the taste of bitter and sweet can be activated, even in the absence of a compound - even in the absence of food - would seem to undermine the argument of

Direct Realism. That is the branch of philosophy that maintains the source of any perception must be the object perceived.

5. Mapping of the human brain shows very discrete areas dedicated to processing sensory stimuli. For example, the AI and PI process affective versus sensory aspects of pain, respectively.

6. Neuroscientists have not only discovered specific areas, but also how those areas function as a unit, such as the insula-amygdala circuit, or the mesocortico-limbic-dopamine system.

All of these discoveries may persuade us to conclude that we now know all there is to know about how consciousness arises. Clearly, we must conclude that processes within the brain are integral to our awareness. They may not be the whole story, but they certainly are a very big part of it.

What We Cannot Conclude

Most neuroscientists, it appears, do believe they know the whole story. In reading through the literature, we encounter such statements as:

"*. . . the brain interprets the sensations* [of sour and bitter] *as taste"* (Dowdey, 2007)

"We are born with the ability to perceive sweets" (Wein, 2015).

"The insular cortex integrates multi-modal salient information ranging from sensation to cognitive affective events to create conscious interoception" (Lu, et al, 2016).

"The IC receives nociceptive thalamic inputs to create emotional awareness" (Lu, et al, 2016).

"The AI serves as a critical site where multi-modal information competes and integrates with nociception to create an awareness of body state" (Lu, et al, 2016).

"Dopaminergic signaling as a neural correlate of consciousness" (Palmiter, 2011).

"Voila - you are now euphoric" (Wenk, 2021).

The use of the terms "euphoric," "perception," "awareness," and "consciousness" in these various quotes is significant. In each case, the researcher is drawing the conclusion that the age-old question of consciousness has been adequately explained. They are assuming that the cerebral processes they describe are sufficient to put the matter to rest.

But are they? Numerous philosophers have sharply placed that assumption in doubt. For example:

"Imagine someone walking through an expanded brain, as if they were walking through a mill and seeing its mechanical operations. Nowhere would you see conscious thoughts" (Liebnitz, 1714, cited in Montgomery, 1992).

"How is it possible that anything so remarkable as a state of consciousness, comes about as a result of irritating nervous tissue? [It] is just as unaccountable as the appearance of the Djin when Aladdin rubbed his lamp" (Huxley, 1866).

"There is nothing in the study of matter that allows us to explain qualities of experience." Kastrup (2018).

"At least for now, we have no scientific purchase on the special extra ingredient that gives rise to sentience" Pinker (1997).

These philosophers take issue with neuroscience. To them, there is a sharp disconnect between the mechanics of the brain and the subjective feeling of sensation. They cannot understand, as David Chalmers (1996) observes, how " . . . *mental events emerge from physiological occurrences*."

Are they wrong? To what extent have the neuroscientists proven their case? And, to what extent is the skepticism of the philosophers warranted?

Problems

a. Neuroscience

The problem with neuroscience is that it does not describe how feelings happen. It does give an empirical description of the pathways that stimuli travel through the nervous system, and then through the brain. It describes the release of dopamine from the VTA, and either the inhibition of dopamine in the NAcc, or the release of dopamine, through the inhibition of GABA. We can see all that happening. We see the correlation between this activity and feelings of pleasure or pain. But association is not causation.

What we cannot see in our MRI or other neuroimaging studies is sensations. Nor can we see what exactly produces those sensations. As Aaron White (2016) comments, "*The bigger question, for which there is no answer, is how activation of pain/pleasure pathways leads to the conscious experience of pain/pleasure*."

To illustrate this point, consider the following. University of Connecticut scientists have developed an artificial tongue (Dowdey, 2007). It is capable of capturing bitter and sweet molecules, and then sending electronic messages to internal processing algorithms, which determine the bitterness or sweetness of the stimuli. The behavioral response is the delineation of patterns on a graph. So, we have stimulus, processing, and response. But would anyone claim that the artificial tongue is *conscious* of the taste? Of course not.

We might even imbue the tongue with neurotransmitters like dopamine, and channel those NTs through the tongue's circuitry. It would be to no avail.

In effect the AI tongue would be doing almost everything, step by step, that neuroscientists say our brain does. Yet, the tongue would not be aware.

b. Philosophy

The problem for philosophers skeptical of neuroscience is two-fold. First is the specificity of the brain mapping science has discovered. Clearly, the brain is a big part of the story, and it seems that we are just a few experiments away from solving it all. In light of the tremendous success science has achieved so far, philosophical skepticism seems quaint.

The second problem is the extent to which perception seems not only the product of the brain, but also *not* the product of anything else.

For example, "supertasters" are people who are born with elevated sensitivity to certain tastes, such as bitter and sweet. Their sensitivity can be attributed to a dominant allele in the gene TAS2R28 (Dowdey, 2007). In other words, taste qualia appears to derive from the genetics of the brain. So, it seems the product of the brain.

Perhaps more problematic are the studies of taste in mice. The mice appear to react to bitter and sweet, even if they have never tasted them before; even if they are given a variety of different chemical compounds; even, in fact, if there is *nothing there for them to taste*! In other words, mouse knowledge of bitter and sweet can't come from prior experience. It can't come from a simple stimulus-response to a particular formula. And it doesn't even have to come from any external object whatsoever. Simply put, it's all in the brain.

7. Possible Solutions

If we accept, on the one hand, that consciousness is not primarily a mechanical operation, but, on the other hand, that the brain is critical to awareness, then, can the differences between neuroscience and philosophy be resolved? Here are two possible solutions:

a. Templates

In an article in *Entomological Review*, the authors propose that, "red wood ants possess an inborn template for enemy recognition" (Dorosheva, et al, 2011, 275). This is based, in part, on the fact that even "naive" ants - those who never encountered an enemy before - react aggressively to cues such as dark color and movement. The authors suggest that the template is not just an instinctual reflex, but actually a perception involving an "enemy image."

What if, like the ants, we are born with a set of "perceptual templates"? For example, might we have an innate ability to perceive red, blue, green, and combinations thereof; or bitter, sour and sweet? Although these templates would be in our brains, they would not be the result of brain mechanics. They would be something different. Once the brain has done its job of passing electric charges and neurotransmitters from synapse to synapse, the innate templates would be activated. Those templates would then translate encoded stimuli into actual feelings and perceptions.

The templates would be encoded in our DNA. They would be the result of an evolutionary process that necessitated an awareness of our environment, for the sake of complex decision-making.

Such a solution would satisfy both neuroscientists and philosophers, because, on the one hand, the templates would not be the result of mechanical processing, but, on the other hand, would still be encoded in our DNA.

b. Holograms

In an article entitled "The Holographic Mind," (Levi, 2020) presented a theory of consciousness based on the teachings of Henri Bergson (1896) and Stephen Robbins (2016, 2019) The theory consists of two parts. The first part is *access* and the second part is *realization*.

Access involves external stimuli processed through our nervous system, encoded in our brain, and finally consolidated and bound every 1/40th of a second into a frame of experience (Pinker, 1997; Blakeslee, 1998). These are "focus frames," because they capture exactly what we are attending to in any given moment. Until the focus frame is formed, consciousness cannot occur.

Realization happens when signals from the focus frame reconstruct a hologram of the reality before us. Where does that hologram come from? According to Bergson and Robbins, all things in the universe emit lines of force, and wherever those lines intersect they create two-dimensional coded representations of the objects that emitted them. Bizarre as that sounds, it is consistent with the "Holographic Principle," the widely accepted theory in physics that won Gerard T'Hooft the Nobel Prize (PBS, 2019; Matthews, et al, 2017).

Turning the two-dimension code into a three-dimension image is the next step. In ordinary holography, laser beams, directed at the encoded area, form "reconstructive waves" which produce the complete hologram. Just so, focus frames from our brains act like those lasers. They emit reconstructive waves that turn two-dimensional information into three-dimensional realities.

The reconstructive waves are "modulated," according to Bergson (1896), in terms of "action relatability." In other words, "prospective physical action is the 'information selection principle' from the holofield" (Robbins, 2016).

The resulting holo-frame includes not only the objects of our attention, but, significantly, *ourselves* as the subjects of that attention. In that way we experience a self. We experience a self referentially from our environment. We experience a self in terms of our action-relatability to that environment. What the hologram does is connect us to that environment through the eyes of a subject, and that subject happens to be us.

That connection is existential. It includes the smell, taste, look, sound, and feel of everything in the holo-frame (Drumm, 2016; Dyslexic Artist, 2017; Phillips, 2014). Our bodies already create analog copies of the world around us. For example, our retinas create mirror reflections. Our eardrums create tape-recorded sounds. The images in the hologram are already physically imprinted on our bodies. What the hologram does is make those imprints meaningful, in terms of sight, sound, taste, smell, and touch, and their action-relatability to a self.

8. Conclusion

Is consciousness all in your head? To the extent we are talking about the passing of electric impulses and neurotransmitters from one synapse to another, most neuroscientists say yes, but most philosophers say no. On the other hand, is the brain irrelevant to perception? Some philosophers and theologians might agree, preferring a spiritual or psychic ontology. But neuroscience tells us emphatically no.

How can these opposing positions be reconciled? How can we choose between body and soul? I have suggested two possible solutions, both of them offering a third alternative to the body/soul dilemma.

Neither templates nor holograms fall into the category of "soul," or even of "panpsychism." Both of them are physical entities and belong squarely to the category of material objects. On the other hand, neither one is the simple product of "irritating nervous tissue." Templates are encoded features of our DNA. Holograms are external images.

If either one of these solutions were correct, then the answer to the question posed by this article would be "No." It is not all in your head.

Received August 9, 2021; Accepted September 19, 2021

References

Bergson, H. (1896). *Mattier et Memoire*. Transl. N.M. Paul and W.S. Palmer (*Matter and Memory,* 1990). New York: Zone Books.

Blakeslee, S. (1998). How the Brain Might Work: A New Theory of Consciousness, (232-237). In Wade, N., (ed.), *The Science Times Book of the Brain*. New York: Lyons Press.

Chalmers, D. (1996). *The Conscious Mind: In Search of a Fundamental Theory*. New York: Oxford University Press.

Dorosheva, I.K., Yakovlev, Zh., Reznikova, I. (2011). Red Wood Ants Possess an Inborn Template for Enemy Recognition. *Entomological Review.* Vol 91, no. 2, pp. 184-191.

Dowdey, S. (2007). How Taste Works. *Howstuffworks.*

Drumm, A. (2016). Training for a 5D World Shift Using Holograms. *Kitegirl*, April 26. https://www.kitegirlcoach.com/training-for-a-5d-world-shift-using-holograms

Dyslexic Artist. (2017). 3D Physics on a 2D Boundary: the Holographic Principle. *YouTube.* https://binged.it/30hBgfA

Fu, J. (2019). How Does the Brain Experience Taste? *The Counter.* March 20

Huxley, T. H., (1866). quoted in Block, N. (2013). The Harder Problem of Consciousness. *The Journal of Philosophy*, XCIX(8), Jan.

Kastrup, B. (2018). The Universe in Consciousness. *Journal of Consciousness Studies*, vol. 25, Nos. 5-6, 125-155.

Leibnitz, G., (1714). *Discourse on Metaphysics*. Montgomery, G.R., transl., New York: Prometheus Books (1992).

Lettvin, J.Y., Maturana, H., McCulloch, W.S., & Pitts, W. (1959). What the Frog's Eye Tells the Frog Brain. *Proceedings of the Institute of Radio Engineering*, vol. 47, 1940-1951.

Levi, K., (2020). The Holographic Mind. *Journal of Consciousness Exploration and Research.* December, Volume 11, Issue 8, pp. 784-795.

Lu, C., Yang, T., Zhao, H., Zhang, M., Fancheng, M., Fu, H., Xu, H. (2016). Insular Cortex Is Critical for the Perception, Modulation, and Chronification of Pain. *Springer Neuroscience Bulletin*. April 32 (2): 191-201.

Masterclass Staff. (2021). How the Insular Cortex Works: Seven Functions of the Insular Cortex. *Masterclass*. May 5.

Matthews, E., Sandy, N. Michael Faraday's "Lines of Force" and the Role of Heuristic Models in Early Electromagnetic Field Theory (2017). *Senior Projects Spring 2017*. 278. https://digitalcommons.bard.edu/senproj_s2017/278

Palmiter, R.D. (2011). Dopamine Signaling as a Neural Correlate of Consciousness. *Neuroscience*. Dec 15;198:213-20 [Accessed 2 August 2021].

PBS Spacetime. (2019). The Holographic Universe Explained, Part 39. *YouTube*, April 10. https://www.youtube.com/watch?v=klpDHn8viX8&t=74s

Phillips, C. (2014). Scientists Invent Hologram that You Can Touch. *Newsweek*, December 5.

Pinker, S. (1997). *How the Mind Works*. New York: W.W. Norton and Co.

Robbins, S. (2016). Bergson and the Holographic Theory of Mind, Part 1. *YouTube*, Dec. 27. https://www.youtube.com/watch?v=RtuxTXEhj3A

Robbins, S. (2019). Bergson and the Holographic Theory of Mind, Part 39. *YouTube*, May 30. https://www.youtube.com/watch?v=RtuxTXEhj3A

Wein, H. (2015). How Taste Is Perceived in the Brain. *National Institutes of Health*. December 7.

Wenk, G (2021). Watching the Brain Get High on Cannabis in Real Time. *Psychology Today*. May, 13.

White, A. (2016) How Does the Brain Make Us Feel Pleasure or Pain? *Quora*, Dec. 31.

Zuker, C.S. (2015). Scientists Turn Tastes On and Off by Activating and Silencing Clusters of Brain Cells. *Columbia: Zuckerman Institute.* November 18.