Opinion

Harmony in the pre consciousness

Abstract

I have taken a hypothesis about the resonance of neurons and laid it against the physiology of the optic paths from the eye into the brain to explore some changes that happen in pre-consciousness, the first 200ms. or so following the onset of stimulation. I explore several mechanisms to simplify and pattern the stimulation to prevent stimulus overload. I further present a hypothesis for the harmonic stimulation to vet the threat and reward value of the stimulation as a precursor to activating the amygdala and the conscious mind.

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Richard H Bloomer
Emeritus, The University of Connecticut, USA

Correspondence: Richard H Bloomer, Emeritus, The University of Connecticut, USA, Email rhbloomer@pobox.com

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Harmony in the pre-consciousness

The notion that consciousness is due to the resonance of neurons is appealing. It is simplistic to say that one neuron vibrates and causes another to vibrate harmonically, but this does not tell you how that happens. The question I would like to approach is how this harmonic concept effect visual stimulus does and how this concept might play out in the brain during the first 200ms of pre-consciousness' following stimulus onset. My concern in this paper is to explore the basic physiological neural mechanisms that occur in the initial preconscious period for a visual stimulus. How do our brains change an external visual stimulus, first into a neural form, and second how do we vet these forms for threat or reward to determine future action?

First, there are some givens:

Following the onset of a stimulus, there is a pre-conscious period of around 200ms. The brain is not inactive during that period. It is simply not conscious of what is going on. It is easy for stimuli to overload the brain and stimulus overload generates primitive defensive or offensive responses. Thus stimulation must be held to some mid-range, strong enough to activate neurons, but weak enough to prevent the disruption from over stimulation frenzy. If we assume a visual stimulus with some detail, how do we prevent overload?

The second given: If we posit that the need to survive underlies all behavior, essential for this survival is the ability to vet the stimulus for its threat or reward value. This vetting process must be rapid to be effective and must occur mainly within that initial preconscious 200ms.

1. Let's start with the retina. As you know the retina consists of two types of light sensors which convert light into neuro-electromagnetism. One set is for black and white, the other for color. These sensors vary in density according to their position on the retina which in turn reflect the type of vision they may expect to receive: the more sensors, the more detail. Several adjacent rod light receptors stimulate each single optic neuron. Further, these rod sensors represent a fixed position in relation to each other. Thus when this group of sensors is excited together, it has the effect of diminishing detail and simplifying the stimulus pattern. This combination of three of four retinal cells into a single optic neuron is one mechanism to prevent stimulus overload by cutting the amount of information to a third or a quarter. Those conical shaped sensors sensitive to different colors are fewer in number, and hence color vision is always less detailed than black and white vision. These optic neurons travel intact through the decussation where the stimulation from each of the two eyes is essentially merged and forwarded to synapse at the lateral geniculate attached to the thalamus. The function of the lateral geniculate in relation to the thalamus remains unclear, but it serves as a synaptic connection to the optic radiation.
2. The optic radiation is a series of long neurons reaching from the lateral geniculate of the thalamus to the calcarine fissure of the occipital lobe. As you dissect the brain the optic radiation makes a fan-shaped pattern, a circuitous route sweeping forward and then around to the very posterior of the brain. This whole formation appears to be uncharacteristically inefficient. This optic radiation assemblage of neurons is much larger and more circuitous than seems necessary until you realize that each of these neurons that synapses in the calcarine fissure are of a different length. Since the time for an impulse to traverse an axon is dependent upon its length, you realize that each of the stimulations from these optic radii is going to stimulate the calcarine fissure at a slightly different time. Thus our visual stimulus is not laid down a single burst of stimulation but is a pattern of stimulation in an orderly sequence from the periphery to the central, or from general to specific detailed information. The differing length of the optic radii thus serves to keep the pattern of the visual stimulus stable and also prevents the chaos of stimulus overload.
3. Calcarine fissure of the occipital lobe. The Magnocellular neurons are the shortest of the optic radiation. They carry information from the lateral retinas and hence are likely to involve motion. Motion in the periphery is likely to have survival information. This motion information will arrive at the calcarine fissure slightly before detailed information. Each neuron in the calcarine fissure responds to retinal information of a specific angle. The magnocellular information is treated separately from more detailed information from the intermediate retina which in turn precedes the parvocellular fine detailed information from the central retina. Within these three groups, the neurons synapse in the calcarine fissure in an orderly sequential fashion to induce a "neural form," a consistent approximation of the initial external visual stimulation. By stimulating these neurons sequentially the "neural form" is constructed as a composite of these angles.
4. Occipital Lobe Brodmann Area 18 These three types of information are sorted in the BA-18 occipital lobe and directed to different areas of the brain. The magnocellular motion information is directed to the mid-temporal lobe. The parvocellular, finely detailed, information is the detailed neural form. Phylogenetically, parvocellular neurons are more modern than magnocellular ones. This neural form is directed to the inferior temporal lobe and the lingual gyrus where we begin our vetting for threat or reward and vetted for emotional tone using harmonics stimulation with other prior stimulated neurons. Our preconscious visual information travels the lingual gyrus and the fusiform gyrus along the inferior temporal lobe to the amygdala.

5. Lingual gyrus, Let us return to the recognition memory. One aspect we are reasonably clear about is that the lingual gyrus of the inferior temporal lobe contains a web of neurons which activates if the pattern of stimulation forms a face like structure. This face is not recognized as a specific person like your Aunt Mabel but rather is assessed for its potential as a threat or as a reward. In essence, what we extract at this point is the mood of this face. If the form is a dog with his upper teeth showing it is time to leave, but if that same dog has his tongue hanging out of a half opened mouth gives very different information. Vetting is done by comparison, by resonance, with prior learning in the recognition memory the inferior areas of the temporal lobe.
6. Fusiform gyrus and inferior temporal lobe. We might hypothesize that a neuron, like a violin string, is tuned to a particular frequency (attribute) and will resonate sympathetically when a harmonic neuron is stimulated. (Can creativity be so simple?) Similarly, some frequencies will serve to dampen the vibrations of neurons tuned to conflicting frequencies thus allowing both augmentation and conversely diminution to produce the isolation of the attribute cluster.

So you might ask, how does this neuron get tuned and stay tuned at a particular frequency without perceptibly vibrating continuously? Here I am going to stick my neck out here and postulate it is the arrangement of the Schwann cells interspersed with Nodes of Ranvier along the axon that tune the frequency. Basic Physics tells us that as electromagnetic energy travels along a conduit, like an axon, it produces a circular electromagnetic force field around that conduit. The Schwann cells wrapped around the neuron act to dampen the spread of electromagnetic energy from the neuron. The interspersed Nodes of Ranvier are more like bare wires and allow the spread of the electromagnetic force to escape from the axon in intermittent bursts and interact with other neurons.

As the electromagnetic force travels along an axon, a burst of energy spreads from the axon whenever it passes a Node of Ranvier thus giving a sort of Morse code of bursts of energy unique to the arrangement of Schwann cells and nodes of Ranvier of that particular neuron. If the pattern of this "Morse" code fits the Schwann cell arrangement of an adjacent or nearby neuron, it will begin to vibrate harmonically and these neurons are vibrating together will augment the signal, which increases the intensity of the signal received at the end of the stimulus journey in the lateral nucleus of the amygdala. This concept also accounts for the fact that neurons are not always vibrating but only vibrate when a harmonic neuron is activated.

The placement of the Schwann cells along the axon thus allows for "memory" without constant activity in the neuron. The neural Schwann cell pattern is available to vibrate harmonically or to dampen conflicting vibrations. This is why, in cases of Muscular Dystrophy, which attacks the Schwann cells, and exposes more 'bare' wire. The resulting rearrangement of the Nodes of Rangierz allows the neuron to produce unusual or uncoordinated frequencies. The result is muscular dis-coordination or bizarre thoughts, depending on the location of the MS attack on the Schwann cells.

I have taken a hypothesis about the resonance of neurons and laid it against the physiology of the eye and the brain with an expectation of some the changes that should happen in the first 200ms following the onset of stimulation. This exploration leads us to the lateral nucleus of the Amygdala with vetted information of threat or reward value of our initial stimulus. This in turn awakens a four-ways switch with poles of Positive/Negative and Strong/Weak in the amygdala which determines the selection or the next set of mental actions. In essence, this preconscious period sets the tone or mood for the conscious response, and it is the amygdala that fires up consciousness through a large set of complicated reactions which will be the subject of a future paper.

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None.

Conflicts of interest

The author declares that there is no conflict of interest.