Football stadium “wave” as analogy for brain function

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The rise and fall of spectators performing “the wave” in a football stadium offers an analogy for how brain waves ripple across the cortex and lower brain. In both, the underlying actors (humans, neurons) serve multiple roles.

First, in the stadium, each spectator dutifully passes along incoming waves to his neighbors. Second, any motivated spectator can initiate his own wave and enlist his neighbors’ support to broadcast it to the rest of the stadium. Third, a spectator can perceive incoming waves and retain a memory of their wave patterns (frequency and amplitude changes) in his local, private notebook. Fourth, a spectator can scour his library of existing notebooks (assuming he has these with him) to compare new incoming wave patterns with legacy patterns. Fifth, a spectator can assign himself a unique name within the stadium. Sixth, a spectator can broadcast (via waves) an inquiry to any other spectator in the stadium and receive a reply, addressing the other spectator by his unique name. Seventh, a spectator can train himself to learn more specifics and subtleties about his environment and make this skill available to any other spectator who requests it.

So, let’s extend this analogy to brain function. Once the brain has developed, hundreds of billions of neurons begin to fire electrical signals (pulses) at a frequency of hundreds of times per second, sending signals to thousands of their nearest neighbors, connected by axons, dendrites and synapses. The entire brain begins to hum and vibrate as these signals begin to align and synchronize and resonate into coherent packets of information. So how could this implement brain function?

First, neurons in this highly connected network could act as a substrate to pass along multiple overlapping brain waves (neural oscillations), unadulterated, to thousands of their nearest neighbors. Second, an individual neuron can broadcast its own wave patterns using a unique (and arbitrarily complex) frequency and amplitude signature; time-series patterns received from our senses (seeing, hearing, touching, smelling, tasting) are an example, but some neurons may broadcast signals spontaneously without external inputs (e.g., transmitting a complaint about not hearing from another neuron in while). It’s plausible that a neuron can broadcast its internal script or previously recorded wave signature stored in its private memory, or from a library of ancient patterns, represented in its cellular RNA or nuclear DNA sequences, respectively. Third, a neuron could perhaps act as a complex signal processor, using a fast Fourier transformation to identify oncoming frequency patterns, then store these wave patterns to a local DNA/RNA tape as a memory. [If RNA/DNA transcription proves too slow to act as a real-time tape recorder, epigenetic tags may serve as intermediary RNA selectors, the way spinning wheels of digits in an old cash register are latched to display single digits in the ones-place and tens-place.] Perhaps these memories-as-RNA can eventually be conveyed back to reproductive cells. Fourth, as every human neuron contains a complete, two-meter-long copy of our DNA, each neuron could compare oncoming wave patterns with its internal DNA/RNA libraries of ancient or recent wave patterns, and enact a response script (also recorded in DNA/RNA) to initiate a series of new brain waves. Fifth, a neuron could assign itself a unique name (from among all unique names listed in our shared DNA library) and broadcast this name to ensure other neurons avoid selecting the same name for themselves. Sixth, a neuron could associate itself with a specific section of DNA (wave patterns) in its shared library, allowing the neuron to take ownership of this set of patterns (recognizing them and alerting others) on behalf of the entire brain. Seventh, a neuron could train itself to recognize specific pattern subtleties in the current environment. For example, neuron12453 could train itself (using a heuristic also recorded in DNA script) to identify a “crowd of people” in a contemporary setting. This perception of crowds would be handled by a single neuron (unless it became incapacitated and another assumed its place). Any other neuron (say, neuron36473) that wished to know whether crowds have been identified in the environment merely needs to make an inquiry (“do you see crowds?”) via brain waves to this well-known neuron12453, which by the way has the same name across all humans. Neuron36473, then, could implement an innate trait such as “fear of crowds” in someone with social anxiety/mutism, or “love of crowds” in an innate politician, by harnessing (or exploiting) neuron12453’s skill by name.

All human brains must possess the same identified neurons, because that can explain how the language of thought (LOT) actually works. For example, for the brain rule “if crowds-are-present=Yes and I-have-social-anxiety=Yes then enact-fear-response”, the rule won’t work unless it knows exactly where in the brain to find the answer, in this case from a neuron named “crowds-are-present” a.k.a. “neuron12453”.

By innate, I mean how we’re born or develop, not how we’re conceived. All humans share 99.9% identical DNA. We each possess the same library of DNA “brain wave” patterns, and 0.1% is not enough genetic difference to account for human trait diversity. Instead, our specific and individual traits are selected for development by a roulette wheel during pregnancy, perhaps by epigenetically activating certain RNA/DNA sequences (containing patterns) and leaving others dormant. Human difference (in traits at least) does not result from genetic difference.

Every human perceives the world the same way (i.e. as the same set of wave signatures and named neurons.) It must be so, otherwise we could have no shared innate traits, e.g. motivation, fear, craving, envy, ambition, jealousy, and desire toward common objects. If we did not map our innate perceptions to the same set of underlying ancestral wave patterns, stored in our shared DNA, they could not be coherently passed on to the next generation (i.e., the same way “fear of wolves” is passed down in moose who have never experienced a wolf.) Of course, we humans exhibit subtleties in our responses, but these subtleties of perception and response are trained by an innate process, stored in well-known locations, and tagged with the same unique identifiers across the human species.

# References

Buzsáki, G., & Draguhn, A. (2004). Neuronal Oscillations in Cortical Networks. *Science,* *304*(5679), 1926-1929. Retrieved from http://www.jstor.org/stable/3837193

Alexis Bédécarrats, Shanping Chen, Kaycey Pearce, Diancai Cai, and David L. Glanzman. (2018). RNA from Trained Aplysia Can Induce an Epigenetic Engram for Long-Term Sensitization in Untrained Aplysia. *eNeuro 14 May 2018, ENEURO.0038-18.2018; DOI: 10.1523/ENEURO.0038-18.2018*