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The Brain is More Complicated Than a Tweet

By Neil Seeman, Founder and CEO, The RIWI Corporation

Internet Titans such as Google's Larry Page now invoke neuroscience in human decision-making online. This is personally thrilling, because of my Internet work and my lifelong curiosity and support for neuroscience (N. Seeman et al., 2011). Although neuroscience is the study of the nervous system, business leaders around the world spend large sums of money applying fashionable "neuroscience" Web-based solutions to try to predict consumer intentions using "machine learning". Try Googling how often the term "neuroscience" appears in Web company offerings.



What should give people in the Internet industry pause is that the brain is more complicated than a tweet. The medical objective of neuroscience is to help people who suffer from brain diseases to improve their condition and prolong their lives. To compare neuroscience to digital applications to divine customer intent or to find ‘hidden gems’ in “Big Data” ignores the massively complicated neural pathways in the brain.

For example, a major advance in neuroscience was the discovery of the antipsychotic receptor (Madras, 2013; N. Seeman et al., 2011), now known as the dopamine D2 receptor, the target for all antipsychotic medications (P. Seeman, 2013). This receptor is critical to normal thinking and cognition, because its over-activity leads to psychotic thinking and deranged behavior. However, it would be a leap too far, and it would not be sensible, to invoke the state of this dopamine receptor into the every-day language of business and commercial activity, despite an occasional deranged or bad business decision.

The commercial promise for business leaders of what is called “neuroscience” in all things digital needs to be tempered with caution. Beware the hype.

Recently, *Harvard Business Review* published a blog by Dr. Srinivas Pillay called “Which Messages Go Viral and Which Ones Don’t”. “Going viral” is the Holy Grail of millions of companies wishing to sell more products online. The article stated:

“A recent study demonstrated that we can successfully predict which messages will go viral and which will not. This study showed that the ideas that are destined to spread have a characteristic signature at their origin — that is, quite literally, within the brain of the sender. These messages specifically activate key regions in two circuits in the sender’s brain: the “reward” circuit, which registers the value of the message to the sender, and the “mentalizing” circuit, which activates when we see things from the point of view of the person who receives the message.”



Dr. Pillay is a respected academic. He is CEO of NeuroBusiness Group and an award-winning author of numerous books, including *Life Unlocked: 7 Revolutionary Lessons to Overcome Fear*, as well as *Your Brain and Business: The Neuroscience of Great Leaders*. He is also Assistant Clinical Professor at Harvard Medical School and teaches at Harvard Business School. So when Dr. Pillay writes in HBR that neuroscience can help messages “go viral,” business leaders will pay attention.

Because the article itself created buzz by an influencer of Dr. Pillay’s reputation, it’s worth considering the study to which Dr. Pillay is referring: “Creating buzz: the neural correlates of effective message propagation,” (Falk et al., 2013). The article was published on April 8th. The next day, it was re-published on Bloomberg, and promoted on Harvard University’s main website. It was re-published on great neuro-tech blogs, such as *The Daily Neuron*, with a cool visual on connectivity that asked: “How do ideas spread? What messages will go viral on social media, and can this be predicted?” There were over 10,000 Google impressions to the HBR article within 24 hours. It had 25,000 impressions on April 15.

But what did the referenced study *actually say*? The question in the study seems clear enough: What distinguishes ideas or messages that appeal to others from ideas that do not appeal to the masses? The study attempts to examine whether there is some sort of brain-region basis underlying this question of “message communication,” using functional Magnetic Resonance Imaging (or fMRI).

The study has nothing to do with the Internet or online behavior, except for an accurate reference to the fact that “[n]ew media outlets have made the process of recommendation and idea propagation even more visible and explicit and have highlighted the importance of understanding how and why ideas spread (e.g., social-networking sites such as Facebook and Twitter promote individuals as ‘information DJs’).”



Instead, the study procedure involved message communicators (who pretended to be “interns” at a television studio) who viewed ideas for television pilots during an fMRI scanning session. The subjects considered whether they would pass the ideas on to message recipients (“producers”) for further consideration. After scanning, the interns gave video interviews about each pilot-show idea. The interviews (not the original pilot descriptions) were then shown to producers in a separate behavioral testing session. On the basis of only the videotaped interviews, producers indicated whether they would pass the idea on to other individuals. Following each idea description by the intern, the producers rated their intentions to further recommend the show idea on a scale from 1 (definitely would not) to five (definitely would recommend).

There were 11 women interns and eight men interns, the average age of which was 20.6 years. There were 57 women and 22 men producers, with an average age of 20.5 years. For each intern, the ratings were collected from four producers (for each intern) in order to get an aggregate index of how successful each intern was in propagating interest about each show. The authors tried to correlate the ratings with the neural measurements. They averaged all the ratings from the producers and examined whether a good rating (or “buzz” rating) was associated with so-called “reward processing” in the ventral striatum or with “mentalizing” in the temporo-parietal-cortex region and the dorso-medial prefrontal cortex region.

In addition, they examined the “intention effect” by using each intern’s intention to propagate each idea by examining which brain regions were increasingly active to ideas that interns expressed interest in propagating following exposure to each idea.

They also defined a “salesperson index”, which was the correlation between each intern’s set of intention ratings and the intention ratings made by the producers after viewing that



intern's video. There was a sizeable variation in this salesperson index, indicating that the interns widely varied in their ability to persuade the producers to share their views. The salesperson effect was exclusively associated the mentalizing network (temporo-parietal cortex junction).

The data presented indicated that a good so-called "buzz" rating by the producers occurred in association with neural activity in six brain regions, including the striatum (highest t value), the temporo-parietal junction ($t = 4.7$), the dorso-medial prefrontal cortex, the posterior cingulate cortex, and the brainstem.

The salesperson effect occurred in association with activity in the temporo-parietal junction ($t = 5.3$). The intention effect correlated with activity in 4 regions, including the superior frontal gyrus ($t = 4.7$), the pre-central gyrus ($t = 3.87$) and the posterior cingulate gyrus ($t = 3.6$).

As stated by the authors, the successful message propagation overlapped with the brain's reward system (the striatum).

The limitations of this study

First, the "buzz" rating by the producers was correlated to six brain regions, raising a question of whether one can seriously correlate any of the single regions with a "buzz" rating. In fact, the highest correlation of the "buzz" effect was with the striatum, a well-known center of the reward system with the highest concentration of brain dopamine (Seeman and Tinazzi, 2013; N. Seeman et al. 2011). The striatum, moreover, has multiple roles of cognition, sensation, motor pathways, and thought association (Kegeles et al., 2010), including a central role in normal and psychotic thinking (P. Seeman, 2013).



Second, the “intention” effect was correlated with activity in four brain regions, but here, too, localization in a specific brain region was not convincing. This is not surprising, considering that the prefrontal cortex is involved in a variety of human brain functions, including executive function, socialization, memory, and interaction with others.

Third, the so-called “salesperson effect” was primarily associated with activity in the temporo-parietal junction, a versatile region with multiple roles and intersections with many pathways in health and brain disease (Roiser et al., 2013; Murdaugh et al., 2014).

In addition, it is not clear whom the interns were talking to when they made their videos after the brain scanning. The interns were presumably addressing the producers who were not in the same room.

The preponderance of women in this study limits any general applicability to the general public. In my opinion, the generally favorable rapprochement that women have toward one another further undermines the relevance to men.

The focus on television shows further questions the general relevance this study may have for “getting the message out” online or offline.

Buyer, Beware

Briefly, there is absolutely nothing in this study to demonstrate the power of “neuroscience” in online applications of any sort, and, yet, “going viral” – the vernacular of the *Harvard Business Review* title – is Internet nomenclature, not neuroscience vernacular.

There are no guilty parties here. *Harvard Business Review* used an odd title for its blog, to be sure. The journal article was a study that found what it did. And Dr. Pillay accurately described the study’s limited findings.



Here's the problem: Business leaders so desperately want to understand how the brain works in order to improve their bottom line such that they will invest oodles of cash in the offerings of digital companies that claim to have neuroscientific validity. And an article about "going viral" in *Harvard Business Review* by a best-selling author and esteemed academic from Harvard will, by definition, go viral. The very fact that you are reading this article in *The Huffington Post*, a hugely influential global media outlet, will help the message of the study spread. That is because of how search engine rankings and algorithms work, not because of dopamine response. Caveat emptor.

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