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A Non-Scientist's Guide to the Neuromarketing Toolkit

Marketers need to understand the strengths and weaknesses of the six main tools of neuromarketing.

Any political pollster will tell you that answers can never be better than the questions that prompted them. The same is true in marketing research. Badly planned consumer surveys and focus groups will yield information that is useless at best, misleading and possibly detrimental at worst.

Neuromarketing – which uses advanced technology to measure involuntary human response such as brain region activation – is designed to glean a deeper and purer picture of consumer preference than people will willingly give companies. But choosing the wrong technological tools for the job can be just as damaging as **a focus group gone awry**.

You don't have to be a neuroscientist to grasp the basic neuromarketing toolkit. There are six commonly used technologies, each with its own strengths and weaknesses.

Most popular neuromarketing techniques

1. *Functional magnetic resonance imaging (fMRI)* measures blood oxygenation in the brain. Changes in blood oxygenation correlate with changes in neural activity. An fMRI scanner can thus pinpoint where a change in neural activity occurs when a consumer, for example, evaluates willingness-to-pay (WTP) for a product. However, fMRI is limited in how fast it can capture the underlying information processing when consumers compute their WTP (< 2-3 seconds). Also, fMRI requires consumers to lie down on a scanner bed that slides into a relatively narrow tunnel. This type of research can only be conducted in a proper lab environment.

Over the last 30 years, scientists and researchers have developed publicly available databases detailing the neural signatures of marketing variables such as "value", "emotion" and "motivation". Equipped with such knowledge, one can test whether exposure to new products or ads triggers brain activity in such pre-defined regions of interest.

fMRI machines can sometimes provide robust results with a relatively small sample size. In our lab experiments, for example, we asked participants to sip several wines through a tube from within an fMRI scanner, and told them what the wines supposedly cost. The exact same wine triggered vastly different neural reactions based on whether participants believed it was expensive or affordable. In other words, we found that neurological responses were more aligned with pricing cues than with the actual experience of consuming the wines.

2. *Electroencephalography (EEG)* records changes in brain activity nanosecond by nanosecond, via sensors affixed to the scalp. EEG signals are represented by different frequencies (e.g. alpha waves) and components (e.g. N200, a negative response peaking at 200 milliseconds), reflecting different characteristics such as memory processing, attention and emotional engagement. EEG can trace very fast neural activity (~ one millisecond) in real time.

An important drawback is that EEG only measures signals from the surface of the brain. With the more commonly used headsets, these signals cannot be traced back to the brain regions that generate them. In addition, there are differing schools of thought on how to interpret EEG signals. Some research considers that beta and gamma band oscillations indicate consumer preferences, while others suggest specific components such as N200 are more salient.

Among other applications, EEG has been used to optimise video ads. Through EEG, Cheetos discovered that **an edgy commercial showing anti-social behaviour** was a secret crowd-pleaser, though focus group members did not want to admit liking the commercial for fear of being judged.

3. *Functional near-infrared spectroscopy (fNIRS)* uses light that penetrates the scalp and brain tissue (up to two to three centimetres) and is then absorbed by the blood due to changes in neural activity. Differences in absorption are employed to trace changes in regional neural activity of the cortex relatively fast (~100 milliseconds). With its limited penetrative power, fNIRS can pick up activity of the surface cortex associated with attention, valuation and cognitive control, but cannot study deeper brain regions linked with memories, motivation and emotions.

KatoBrain Co., a Japanese company, worked with the Central Nippon Expressway Company to assess drivers' experiences with fNIRS. They found that vehicle deceleration (vs. acceleration) required more voluntary eye movement and put more strain on the brain's executive functions. On this basis, municipalities could implement traffic signs and warnings to reduce the risk of accidents caused by sudden deceleration.

4. *Eye-tracking* devices can measure consumers' visual attention. For example, a lab at Clemson University in the United States **simulates a supermarket environment** where study participants can browse the aisles as they would at a real store, while wearing eye-tracking spectacles that capture which products catch their eye and how they visually engage with branded packaging.

Bonnier News, a Swedish media firm, and **Neurons Inc.** used eye-tracking to explore how consumer perception of an ad changes based on how it is presented. The research demonstrated large differences across platforms, including:

- Ads are more likely to be seen in print than on mobile, and least likely on a desktop browser – but once seen the platform makes no emotional difference
- Bigger banner ads on websites attract more attention, and longer videos are more likely to be remembered
- Eye-tracking responses were highly predictive of ad memory measured two weeks later.

5. *Skin conductance response (SCR)* captures changes in the skin's electrical resistance stemming from increased engagement and arousal, as reflected in sweat gland activity. It can pick up relatively slow changes (~ 4 seconds), but not whether this feeling is positive or negative.

Using SCR and eye-tracking, Italian digital marketing company **The Sixth W** tested two ways for customers to queue at a movie theatre's concession stand. It found consumers were more drawn to unhealthy food – and more likely to purchase unhealthy snacks – when there was a single long queue rather than shorter, counter-specific queues.

6. *Facial affect recording (FAR)* analyses facial muscle configurations to recognise different basic emotions such as anger, disgust, fear, happiness, sadness and surprise. The goal is to extract consumer thoughts and sentiments that may otherwise go unexpressed. For example, in his book ***Emotionomics***, Dan Hill describes how his firm used facial coding techniques to interpret the micro-expressions that flitted across people's faces as they watched advertisements. According to our experience with this software, it reliably captures how positive or negative an emotion is, but it is less adept at distinguishing and decoding different negative emotions.

Of the above six, the ones most used by companies are eye-tracking, followed by EEG, SCR and FAR, **our 2015 industry survey** found. Still, the adoption of fMRI is expected to increase in the near future, as more organisations realise its potential and collaborate further with neuromarketing firms.

No silver bullet, but combined approaches

The choice to use neuromarketing – and which neurometric to adopt – largely depends on the question or problem that you want to resolve. We do not think of the above neuromarketing techniques as replacing traditional methods, but rather as a complement. For example, if you want to change some features of your product and alter prices accordingly, then survey-based conjoint analysis should be your chosen method. For online or offline store optimisation, combining neuromarketing research with field experiments and A/B testing has yielded good results.

According to a report from the **Association of National Advertisers** in the US, 60 percent of marketers believe in this complementary approach. However, isolating and quantifying neuromarketing's impact remains a challenge. Then again, marketers able to do so reported revenue increases of 16 percent, or US$80 million, on average.

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