PERSUASION

THE SCIENCE AND METHODS OF NEUROMARKETING

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Measuring Persuasion and Engagement: The Need of the Hour

Persuasion and Engagement have become the watchwords of advertising as marketers focus on grabbing the ever-thinning slice of the consumer's attention. With so many interesting ways to interact with media and methods to avoid ads, consumers spend less time in captive environments. It therefore becomes critical that we understand the level to which consumers are engaged and persuaded in the brief moments they interact with the brand, product, service, or show.

The Dilemma Confronting Chiefs of Marketing and Advertising

It is our belief that it is important to define the goals of measurement before we attempt to measure. Our proprietary extensive research with CMOs, CFOs, CEOs, and select board members (especially of audit committees of corporate boards) has yielded numerous insights into the true goals of effective measurement. Our research has determined that the four critical questions that the executive team and the board are trying to answer are as follows:

> What are the tangible, measurable, provable (Sarbanes Oxley - SOX - verifiable) KPI (Key Performance Indicators) of marketing and advertising effectiveness?
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> How can each of the KPIs be measured accurately and unambiguously so they can withstand audit and shareholder scrutiny?
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> How does each line item in the marketing and advertising budget contribute individually to each of the KPIs (if applicable)?
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> How does one measure/model/forecast/link the KPIs to financial returns accurately and reforecast them through the year?

Showing Clear Returns on Advertising, Marketing, and Messaging

Further research and cross validation with our executive user community reveals these marketplace needs that are not adequately fulfilled by surveys today.

Tangible, measurable, provable KPIs of marketing and advertising effectiveness are as follows:

- **Purchase Intent –** what is the consumer's "propensity to purchase"?
- **Purchase Immediacy –** how "soon" can we expect the consumer to buy
- **Brand Lift –** what is the increase in the "brand resonance" with the consumer?
- **Brand Extension –** what is the "level of acceptance and extension" to other attributes, categories, products, or other brands
- **Price Alignment –** what is the pricing "sweet-spot", and "envelope of reasonability" where the price is still acceptable to the consumer
- **Promotion Participation –** what is the "novelty index" of a promotion that invites participation

Unambiguous measurement of the KPIs requires us to measure consumer engagement in a manner that is not subject to linguistic, semantic, and interpretive errors. The most direct and accurate way to measure KPIs is directly at the brain where we can gather data before it is subject to cognitive reformulations and expressive biases.

Typical line items in a marketing or advertising budget are comprised of numerous investments, each of which has an associated contribution potential and time horizon associated. Neuroscientific measurement protocols have isolated the contribution potential of investments in each category to the applicable KPIs. That is to say, the protocol to measure the contribution of a given TV ad to Price Alignment is different than the protocol to measure the contribution of the TV ad to measure Attribute Attractivity. We have found typically that sharpening the focus of the line item in a marketing and advertising budget sets the stage for precise measurement of the KPI and therefore accurate computation of the business returns. Neuroscientific protocols today accurately measure the KPI contribution of each the following investments:

- TV advertising
- Radio advertising
- Print advertising
- Billboards and OOH advertising
- Live event advertising
- Internet banners and text advertising
- Interactive content
- Product placement

Traditional market mix modeling has linked investment levels and number of investments to incremental lifts in volume, price, and income. These models have traditionally been handicapped as the input parameters are not effectiveness based, but only investment intent based. The predictive accuracy and forecasting power of such models have been very limited. We have found that market mix models that utilize the KPIs based on direct measurements at the brain result in vastly superior predictive power, and vastly increased forecasting (both short term and longer term) capability. The next generation of elasticity computations is based on direct measurements at the brain.

Direct Measurements at the Brain

There are various ways of measuring the response of the brain to stimuli. The approaches vary in technique, time, cost, and accuracy. The major approaches to study human brain are detailed as follows:

Electroencephalography (EEG) is the measurement of electrical voltages from the brain. The EEG was independently discovered in animals by three 19th century experimentalists and Hans Berger (1929) first demonstrated that EEG could be recorded in humans. Because voltage is only defined with reference to two points in space, EEG requires the placement of at least two electrodes. The electrodes can range in size from microelectrodes with sub-millimeter contact area to the giant foil electrodes used occasionally by Hans Berger that covered some 70 cm^2 of the scalp. We

use the term "EEG" to refer to recordings from the scalp. Dramatic advances in computational abilities has resulted in an explosion of novel methods to analyze the human EEG. EEG measurement has come a long way since the days of Berger, and today we use "dense array" EEG comprised of 64 to 128 sensors to measure activity at the brain. Importantly, EEG provides a millisecond by millisecond measure of brain activity directly linked to the activity of neurons.

Electrocorticography (ECoG) is EEG taken directly from the cortex, usually the cortical surface. ECoG was first performed in humans during the 1930s in Germany and England. These are technically epipial recordings, since the pia is only a couple of cells thick and remains intact. ECoG recording is limited to unique clinical conditions and provides a rare window into human brain function.

Magnetoencephalography (MEG) is the measurement of brain magnetic fields, introduced circa 1970. MEG is typically done with sensors outside of the scalp in humans, although occasional MEG recordings have been done over the exposed cortex of animals. The MEG is an excellent research tool but in it's current state requires the person to not move during the entire analysis period compromising it's use as an effective tool to study natural behavior.

Positron emission tomography (PET) is a functional imaging technique to measure blood flow or other metabolic parameters, introduced in the 1970s. Because the metabolic and hemodynamic responses of the brain are slow (on the order of seconds), PET has a poor temporal resolution compared to electromagnetic measures of the brain's activity. Further, PET scanning requires injection or inhalation of a radioactive substance limiting it's usefulness to defined clinical and research applications.

Functional magnetic resonance imaging (fMRI) is a functional imaging technique introduced in the early 1990's. Typically, this involves measuring the blood oxygen level dependent (BOLD) signal, the physics of which is based on the differential magnetic effects of oxygenated vs. deoxygenated hemoglobin in the blood. Although fMRI boasts excellent spatial coverage and resolution, its temporal resolution is poor due to the relative sluggishness of hemodynamic responses. Small head movements (less than 3 mm) can impair fMRI recording providing the same limitations to naturalistic recordings seen in MEG and PET.

Continuous Measurements We have found that among all of the techniques listed, the only technique that enables us to accurately record direct brain response to the continuous presentation of stimuli such as an ad or a TV show is the EEG. The reasons are:

- It is non-intrusive, and entirely passive
- Its temporal resolution enables causal connections between continuous stimuli and responses
- It is scientifically robust
- It is fast
- It is low cost
- Consumers like it
- Recordings can be obtained in a naturalistic environment

Blending other Physiological Measures

Eye-tracking, facial movement, and psychological studies all measure the effects of the brain response or the consumer's expression of that response. Such methods are indirect methods and rely on an extensive array of survey and self reporting instruments that rarely measure what consumers directly felt. Measuring the brain response directly avoids errors in sampling, measurement, and observation. A comprehensive, science-driven solution to accurately measure and maximize advertising effectiveness comprises of these steps:

- Measure brain response to advertising in milliseconds measuring dense array, richly sampled electro-potentials from a variety of central nervous system, autonomic nervous system, and effector nervous system measurements and map the measurements into the Effectiveness Coordinate System (ECS)
- Compute Wear-out profiles for ads to determine shelf life and optimize media buy patterns
- Pinpoint precise cognitive focal points using eye tracking technology
- Provide further validation of emotional engagement with Galvanic Skin Response (GSR)

Direct Measurement of Advertising Effectiveness – Introducing the Effectiveness Coordinate System (ECS)

We can accurately describe the spatial location of an object through the use of the Cartesian Coordinate System, the X, Y, and the Z axes. A point or object is fully and completely described in space utilizing these coordinates. Motion of an object is completely described by merely adding the time dimension (X, Y, Z, t). It is then possible to describe trajectories of an object through space by a series of vectors in Cartesian space. The uniqueness of the Cartesian coordinate systems is that each of the coordinates lends itself to direct and accurate measurement.

The advertising Effectiveness Coordinate System is composed of a set of three directly measurable components (Attention, Emotional Engagement, and Memory Retention). It is possible to describe the instantaneous effectiveness of an ad by specifying its coordinates in the ECS. Furthermore, through the addition of the time dimension, it is possible to completely describe the evolution of an ad in the effectiveness space. We have found the ECS to be an accurate predictor of purchase intent, brand lift, brand extension, price alignment, attribute attractivity, click-through propensity, conversion propensity, and most importantly the contribution potential of the ad to the aforementioned Key Performance Indicators.

The definition of an ECS naturally brings with it the notion of "metric" or "distance", meaning it is now possible to compute the distance (in effectiveness space) between two ads. By analyzing a company's ads over a few years, it is possible to define natural clusters in the effectiveness space that defines the kind of ads that are most suited for a given product or service category, a given market or consumer segment, or given company. We can define constraints, and constraint boundaries where Effectiveness is desirable, and more importantly agencies and creative agents can identify what they must do to showcase movement in the effectiveness space.

Once the directly measured components are placed in the ECS, a variety of secondary and indirect measures such as awareness, persuasion, and novelty are easily and unambiguously computed algorithmically without human interpretive errors. Neuroscientific algorithms compute these and many other secondary derived measures continuously as the ad evolves along the ECS. We have found that these continuously computed metrics provide richer and deeper insights than overall cumulative metrics into what really works, where, and why.

Existing complex market mix models can be easily modified to include the elasticity associated with measured elements of the ECS. Neuroscience has pioneered the approaches to redesigning market mix models that optimize direct marketing spend by relating the volume, revenue, price, and income lift to the underlying elasticity associated with directly measured elements of the ECS. We have found such models utilizing directly measured elements to be vastly superior in their predictive capability than models that utilize interpretive and/or behavioral measures.

Tying it All Together: Effectiveness Metrics that Really Work

Measurements along the ECS are further augmented with measures of consumers' subconscious response to concepts, words, imagery, iconography, attributes, pricing, and promotions. These intuitive and deep responses are at the core of engagement and are rarely captured efficiently by survey and other self reporting instruments.

Neuroscientific algorithms analyze millions of data elements for a single 30 second spot to compute the aforementioned KPIs of effectiveness and identify the contribution potential of each targeted investment to the KPI target.

It is our firm belief that direct brain wave measurement offers richer and deeper insights than any other research technique available to market research professionals.