Biosequitur

Neuromarketing and Biosequitur — Producing More Effective Creative Marketing by Understanding and Quantifying Discrete Psychological and Emotional Influences on Consumer Motivation

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January 2013

This white paper summarizes an independent study that sought to determine if neuromarketing research could be used to design quantitative methods for predicting and/or validating the effectiveness of creative advertising work.

Neuromarketing is a relatively new addition to the marketing vernacular and in its broadest sense it generally refers to any quantitative study that attempts to understand the discrete human psychological functions that guide, direct or influence the buying decisions of consumers.

Coined in the 1990s by a group of Harvard researchers interested in neurological research, neuromarketing quickly became a part of the cultural zeitgeist. It has evolved to include a wide range of marketing-related research disciplines from functional MRI and biofeedback studies to wordplay and body language evaluation techniques.

In 2010 Nathan Tothrow, a chief marketing officer with a background in creative design, became a full-time consultant in order to concentrate on self-funded neuromarketing research. At the direction of his advisor and project mentor Dr. Randall Hammer, a retired psychiatrist who specialized in autonomic nervous system disorders, he devoted almost two years to the study of physiology, behavioral biology and human emotions. He also consulted with professional polygraph examiners from the Charlotte Mecklenburg Police Department and Stoelting Equipment Company and received instruction on the process of administering the CQT and GKT polygraph exams.

As a result of this study, Tothrow designed and tested a process for quantitatively measuring the potential for visual stimuli to produce motivation in consumers. The process was based in part on previous research indicating that emotions evolved to direct our behavior toward actions that satisfied primitive reward centers in the brain.

Furthermore, two more theories—emotional specificity and vagal tone influence—seemed to indicate that it would be possible to map physiological affect to specific emotional states, thereby indicating which visual stimuli were more likely to produce motivating emotions by measuring the corresponding physiological reactions.

By the end of 2011 Tothrow had developed a testing program using polygraph equipment (for biometric recording) and modified statistical software to evaluate test subjects' reactions to television commercials. Facial expression recognition techniques were applied during a post-test interview where subjects were asked to describe their feelings about the test material. This self-reporting was compared and contrasted with the physiological profiles (demonstrating valenced emotional reactions) generated during the tests. The results indicated that emotional states could be identified by the physiological profiles and that these states seemed to exist independent of the conscious awareness of the subject. The testing process was named Biosequitur because it sought to make the connection between a consumer's emotional response to stimuli and final behavioral motivation.

Emotions and the Human Decision Making Process

Neurobiologists have suggested that emotions evolved as a mechanism for assisting humans in making the appropriate choices for survival and continuation of the species. They mediate the process of preparing our bodies for fight or flight (by increasing heart rate and blood flow) in times of danger and they are implicated in the positive sensations that accompany decisions benefitting the long term survival of ourselves and our offspring.

Early in our evolutionary lives goals were, relatively speaking, quite simple: survival, food, shelter and the survival of our genes through offspring. These simple goals were the extent of our early wants and needs and our primal brains developed an emotional process to help us make decisions that ultimately satisfied them. Neural *reward centers* became associated with those goals and triggered positive emotions when they were met satisfactorily.

As humans evolved—and developed a more complex cerebral cortex—our system of wants and needs became exceedingly complicated. A modern human, whose ancestors would have satisfied a critical reward center with a dry cave, might now require a six-bedroom house with a three-car garage to satisfy the same reward center. And with a variety of cultural and demographic factors influencing these reward center associations, it is easy to understand how different objects and experiences can generate different emotional responses across populations. But it also explains why consistent responses might be observed across similar cultures and demographics.

Theories abound as to whether emotions are triggered by outside stimuli or vice versa, but the consensus among researchers is that it is a complex process involving varying degrees of central nervous system stimulation, physiological reaction and cognitive appraisal and assessment.

Because emotions—both positive and negative—are closely integrated with physiological reactions, it is possible to detect individual emotions by monitoring the physiological manifestations most closely associated with certain emotional states. The primary physiological factors include heart rate, galvanic skin response (skin conductivity and resistance), blood flow (plethysmograph) and respiration (recorded thoracically and abdominally).

About *Biosequitur*

Biosequitur is a two-phase, multi-platform evaluation process using biometric feedback to record a targeted range of physiological functions from volunteer test subjects who view specially prepared materials. By comparing and contrasting the physiological (emotional) profiles obtained through the biometrics in phase one with the self-reported opinions provided in phase two, a skilled observer may uncover deep, emotional associations and/or opinions that a consumer might not have shared otherwise.

In the first phase of *Biosequitur* testing a subject is connected to an array of biometric acquisition modules that will record physiological functions including heart rate (HR), respiration (THR and ABR) and skin conductivity (GSR). The subject will then view the tested materials while specially modified software generates a valenced emotional profile to coincide with the timeline of the test materials.

Phase two consists of disconnecting the biometric modules and interviewing the subject about his or her opinions regarding the testing material. The interviewer incorporates facial expression recognition techniques to assist in validating the self-reported responses and to help detect the presence of any *Othello errors* (response to stimuli not associated with the test materials). By interpreting emotional responses associated with answers to questions about the materials, the interviewer can draw more accurate conclusions as to the true response of the subject.

In practice, this process has been used to uncover associations or impressions that might not have surfaced during the conventional focus group or interview scenario. In several instances, a subject's emotional profile has indicated an acute emotional response that might have gone unnoticed otherwise. Prompted by the biofeedback data, the interviewer was able to redirect the questioning to uncover discrete emotional responses to the test data.

Applications for *Biosequitur*

As *Biosequitur* is a process designed to elicit genuine emotional impressions from test subjects, its potential for effective application in industry ranges from marketing and branding to motion picture trailer testing. Extended applications can include but are not limited to:

Brand and Advertising Development
User Interface (UI) Testing and Evaluation
Political Speech and Public Relations Theme Testing
Motion Picture and Entertainment Testing
General User Experience (UX) Testing

The valenced emotion information provided by *Biosequitur* is valuable marketing information in itself. But it's the interjection of this data into the interview process and the deeper insights it yields that is the greatest reward. Validating overt reactions and eliciting in-depth conversation about more discrete impressions gives the tested materials' authors more actionable feedback about its potential for consumer impact. Plus, having such broadly applicable feedback from each individual means that far fewer trials are necessary to obtain actionable data on the effectiveness of the test material.

Future Opportunities and Sustainability

Biosequitur is a product in the new and evolving field of neuromarketing. As such, it is difficult to perform an accurate sustainability analysis except to evaluate its constituent technologies and the potential for other technologies to become viable in the market.

The acquisition of physiological data is performed using various electrical resistance sensors and transducers translating impulses into electronic signals that are interpreted by the system software. Dramatic advances in the engineering of these systems is not expected over the next five years. However, the relatively recent introduction of *Bluetooth* technology has made possible the use of wireless connections between the computer and the sensors which has greatly improved the range of subject mobility and comfort.

Greater technological advances may be expected, however, in the area of facial expression recognition. *Biosequitur* is primarily a process for applying biometric data to evaluate the effectiveness of various test materials. Many researchers in the field of facial recognition and observation believe that higher-resolution video cameras and specialized software available in the next several years will make it possible to automate the process of identifying emotional affect in subjects. This would eliminate the need for an interviewer specially trained in facial expression recognition. However it is unlikely that automated facial expression recognition would provide the full depth and breadth of information available through the physiological monitoring of test subjects.

Another area where advances are likely would be in the research being done on emotional specificity and vagal tone. As investigators move closer to identifying each distinct emotion by its physiological signature we will learn more about which emotional configurations are stimulating the vagas nerve and activating deep sensations of trust. This is the information that will be of the greatest value to marketers interested in building strong brand associations with their targeted consumers.

Summary

As a neuromarketing research tool, *Biosequitur* holds considerable promise as an effective method for extracting valid data on the potential motivational impact of a variety of marketing media.

A frequent challenge for the marketing researcher is to accurately gather data reflecting the potential effectiveness of marketing messages designed to generate a desired action within a consumer group. Traditional methods for predicting the effectiveness of these messages—focus groups, surveys, etc.—are subject to biases from cognitively filtered responses, both consciously and subconsciously.

On some occasions a subject may have cause to be consciously deceitful about a response. This can be for a number of reasons including a marked dissatisfaction with the method of presentation, such as a dislike for a focus group presenter or a lengthy or complicated survey. A subject might also have cause for hiding opinions from others as a result of various individual and group psychological factors.

There are also instances where a subject might be deceitful without conscious awareness. Research has demonstrated that the human brain has a remarkable capacity for rationalization without cognitive involvement. Also, considering the brain's ability to store and react to emotional stimuli without conscious awareness, there is the possibility a subject may misrepresent an opinion without conscious will.

In almost all of these cases of deceit or misrepresentation, whether conscious or subconscious in origin, it is likely that understanding the true emotional state of the subject would communicate a more accurate assessment of response to outside stimuli. The *Biosequitur* process is designed to read emotional response and, with the understanding that emotion is potentially a strong source of motivation to action (an even greater source than cognitive motivation), provide a reasonably accurate assessment of the potential for the tested stimuli to produce the desired action in the subject's corresponding demographic.

It is within reason to expect that neuromarketing tools such as *Biosequitur* may also be used to test general imagery and messaging in order to provide creative professionals with vital information on which design elements can be expected to generate the desired emotional responses within targeted demographic groups.

Ultimately, neuromarketing tools will offer creative agencies the ability to provide their clients with two very valuable goals: First, there is quantitative validation of what has always been a very difficult-to-measure qualitative process. Second, by eliminating the research biases that drive costly multiple research trials, they will provide both cost and time savings by generating data with better confidence intervals in fewer trials.