DEVELOPING STANDARDS FOR NEUROMARKETING RESEARCH:

THE "NEUROSTANDARDS COLLABORATION PROJECT" OF THE ADVERTISING RESEARCH FOUNDATION

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Background

In the past few years, a wide range of biometric and neuro-scientific methods are increasingly finding application in media, marketing, and advertising research in the United States and other countries. Many advertisers and media providers are clearly excited by the prospect of finding new methods that promise a better understanding of the emotional drivers of their content through methods that transcend verbally-dependent or other "traditional" response data.

Neuromarketing is not actually new: researchers have tried to apply biometric and neurological methods to advertising research for decades. However, a number of developments have dramatically increased interest in this kind of research.

- Advances in neurological science
- Technological advances in neuroscience methods
- Marketers' increased interest in consumers' emotional reactions to marketing messages and better measures of emotion, arousal, and implicit memory.
- A competitive marketplace in which more effective advertising and more accountability of marketing performance is demanded
- Growing evidence for successful applications of neuroscience methods to marketing

These factors and the promise of these new approaches has resulted in a large increase in "neuromarketing" -- vendors employing such methods as well as an increase in the kind methods and analysis techniques used in marketing studies. This has led to a problem for users: given the complexity of the science underlying these methods it is difficult for marketers to decide which approach is best for their objectives. Moreover, despite the promise of these new methods, there are still a number of questions associated with their application to different kinds of research objectives. Such questions include: Which of the various methods is optimal for a given marketing problem? Should neuromarketing methods be employed in addition to, or as substitute for established research methods? Further, in a competitive marketplace, some vendors make strong claims about the insights that can be gained from these methods, but they have few publications in peer-reviewed journals examined by independent experts or provided conclusive other evidence for the validity of their methods and data interpretations. This makes it difficult – even for those familiar with the science – to properly evaluate the claims of such vendors.

The Advertising Research Foundation (ARF) in New York was established by marketers and media companies 75 years ago. Today it has over than 400 members ranging from Fortune 500 companies to research firms and academics specializing in advertising effect, branding and other marketing research fields. It is the mission of the ARF to generate new insights on critical research issues and emerging trends in advertising, media behavior and research methods, and to provide industry leadership through information sharing, education, and standards. Consequently, after consultation with its members, the ARF developed a proposal to conduct a research review designed to meet the advertising industry's need with regard to the issues surrounding the application of neuro-science to marketing.

The objective of the "NeuroStandards Collaboration Project" (also called "Neuro 1.0" as we are planning to continue the project as "Neuro 2.0") is to provide useful insights for advertisers and marketers based on an independent review of neurological and biometric marketing methods, the science underlying those methods and the validity of the conclusions. Given the nature of the ARF, its membership, and its mission, the focus of the project is not on theoretical issues. The goal is to develop best practices in this new field that will help make these methods more valuable to the industry.

In short, the ARF project leaders invited vendors to take part in a research project and have expert reviewers assess if vendors' methods and interpretation of data conform to the established body of science and make recommendations to improve the value of neurological and biometric marketing research methods for the industry. The project was launched on September 28 during AdWeek 2010.

Project Design

The ARF invited vendors of neuromarketing research and ARF member companies, both marketers and media companies, to take part in the project. The vendors were asked to take part in a study that was designed by the ARF and the "Gold Sponsors". (There were also "Silver" sponsorships.) Marketers who joined the project as "Gold Sponsors" were asked to supply commercials to be tested in that study and they would be able to review the findings of their commercial with the participating vendors.

Research Suppliers. Eight vendors from across three continents agreed to take part in the project and conduct the study. These vendors incorporate a wide range of biologically-based methods including facial coding, biometrics, EEG, QEEG, SST and fMRI; as outlined in the chart. Here are their profiles, based on the vendors' descriptions of their methods and position in the research marketplace:

Gallup and Robinson's Continuous Emotional Response Analysis (CERA) is a "state-of-the-art" system that uses facial electromyography (fEMG) and other measures to assess emotional valence on a continuous basis. Based in Pennington, New Jersey, G&R does online and real-world traditional copy testing as well.

Innerscope has developed a wireless vest and proprietary software to measure and analyze audience engagement with media content using a range of biometric measures. Innerscope is based in Boston, MA and led by Dr. Carl Marci.

Mindlab International is based in Sussex, UK and led by Dr. David Lewis-Hodgson. Their method relies on a variety of research tools including Quantified Electro-Encephalography (QEEG) to explore brain activity associated with media content.

MSW/LABoratory & Co uses EEG and biometric measures for testing marketing communication and brand analysis at the unconscious level. With R&D operations based in Poland, it is led by Dr. Rafal Ohme. In the United States LAB collaborates with MSW Research.

NeuroCompass relies on advanced fMRI technology and proprietary algorithms to predict consumer preference. It is based in Palo Alto, California.

Neuro-Insight is based in Melbourne, Australia and led by Dr. Richard Silberstein. Neuro-Insight uses a patented modification of EEG technology using a helmet and visor-based system called Steady-State Topography (SST).

Sands Research is based in El Paso, Texas and led by Dr. Steve Sands. Sands Research is a fully vertically integrated research firm that has developed their own end-to-end hardware and software solutions for EEG research.

Sensory Logic is based in Minneapolis and led by Dan Hill. Their method relies on a combination of research tools including eye gaze and facial coding to build emotional profiles responses to media and marketing communication.

Sponsors. The NeuroStandards project is supported by eight brand Gold Sponsors; they are: American Express, Campbell Soup, Clorox, Colgate-Palmolive, General Motors, Hershey's, Miller Coors, JP Morgan Chase. There are four media Gold Sponsors, all major television networks: ESPN, MTV, NBC, and Turner; and four Silver Sponsors: Dentsu (agency), Publicis Group/StarCom (agency), A&E (TV network), and Warner Brothers (media company).

NeuroStandards study. The ARF NeuroStandards team, in collaboration with the Gold Sponsors, designed a study that would allow for a comparison of the various vendors' methods and research reports. The vendors were asked to sample 18-49 year olds (the main "target demo" in US television) and try to match the Census regarding sample composition. As they were asked to use the design and the procedures they would normally use in a study of this type, they could choose the sample size.

The eight vendors were provided with the same stimulus materials – eight commercials (one from each Gold Sponsor advertiser) and a 30-minute episode of the "The George Lopez" show (a situation comedy) that they could use to embed the commercials, if that was part of their methodology. As said, it was important to the project that there was standardization, but also that vendors would conduct a "typical" study and provide the same kind of report they would when a company employed them to do research to assess commercials.

Because of the involvement of Gold Sponsors from various a businesses, the research study was able to assess commercials for a variety of product categories, including credit cars, cars, and toothpaste). However, as the study was designed to compare methods and findings, it was clear that it would not necessarily reveal optimal insights about each of the brands' commercials.

(It would have defeated the purpose of the project if different studies had been conducted that were tailored to the specific objectives of each brand.) Still, vendors were given an original creative brief and a list of learning objectives from the advertisers, as in a typical study of this kind. Further, the advertisers asked that specific findings about the commercials would not be shared with their competitors. Still, despite those limitations and, even though the project's focus was on the methodology, the sponsors found the findings about their commercials valuable.

The eight vendors were told that reviewers would assess research design, the data collection process (including sample size), documentation of the procedures, the presentation and interpretation of results, and assess all aspects of the research in light of "accepted scientific facts". Most vendors conducted the research in November 2010.

Expert Review Process. Following the project launch, while research suppliers collected and analyzed data and developed reports, Dr. Duane Varan, Professor and Executive Director of the Audience research Labs at Murdoch University, Perth, Australia, recruited a panel of Expert Reviewers and a Review Panel.

1) The expert reviewers were chosen because of their special expertise in the specific methods used by the various vendors. (For example, Electroencephalography (EEG) experts looked at EEG reports, Functional Magnetic Resonance Imaging (fMRI) experts looked at fMRI reports.) They were: Bob Barry, University of Wollongong, Australia; Rajeev Batra, University of Michigan; Steve Bellman, Murdoch University, Australia; Mark Frank, University of Buffalo; Bill Gehring, University of Michigan; Scott Huettel, Duke University; Steve Luck, University of Texas; Russel Poldrack, University of Texas; Rob Potter, University of Indiana; Leonard N Reid, University; David Stewart, University of California Riverside; Dawn Sweet, Iowa State University.

The Expert Reviewers assisted the Senior Review Panel in evaluating all submissions, an interactive process that involved continuing dialog with each of the research suppliers.

The Senior Review Panel consisted of scientists with expertise in neuroscience methods and neuromarketing:

- Patrick Barwise, Emeritus Professor of Management and Marketing, London Business School;
- Christopher Chabris, Assistant Professor of Psychology at Union College in Schenectady, New York, Adjunct Assistant Professor of Neurology at Albany Medical College, and a Research Affiliate at the MIT Center for Collective Intelligence.
- Annie Lang, professor of Telecommunications and Cognitive Science at Indiana University
- René Weber, Associate Professor in the Department of Communication and Cognitive Science Program at the University of California, Santa Barbara.

NeuroStandards Retreat and ReThink Conference. On January 12-14, 2011 at Campbell Soup Headquarters in Camden, New Jersey, Review Panel members, research vendors, gold brand sponsors, gold media sponsors, silver sponsors and ARF personnel gathered to discuss significant insights and key findings from the NeuroStandards Collaboration project.

The main purpose of the retreat was to discuss the vendors' reports with the sponsors and the Review Panel. At the retreat, each vendor presented an overview of their findings to the entire cohort and each research vendor had the opportunity to meet individually with both the expert review panel and each sponsor, where they were asked questions about their methods and their applications. The expert reviews, extensive discussions and the spirit of collaboration that was very evident at the retreat led to a number of insights. A report on the Project, including the Retreat and preliminary insights, was presented at Re:think 2011, the ARF 75th Anniversary Annual Convention, in March. Also at the conference a panel of vendors discussed how neuromarketing research can produce new insights for advertising, branding, and other marketing research projects, which biometric and neurological methods are best suited for specific research objectives, and the advantages and disadvantages of these methods compared to traditional research methodologies. Best practice recommendations for both users of this research as well as vendors were also discussed.

Developing Standards for NeuroMarketing Research Methods

As described, the Project was designed to allow for an independent review by academic subject matter experts (the "Expert Reviewers") and three scientists with expertise in neuroscience methods and market research, the "Senior Review Panel". All these scientists followed a guide that identified the various aspects of the research that were deemed important both from a science and a marketing perspective. In the opinion of the ARF, the vendors, and sponsors, this process – an independent scientific review – is the right way to move this field forward, develop standards, and help the users of neuromarketing research to use these tools more effectively.

An analysis of all the reviews as well of the discussion topics suggests that they fall into two groups. First, the experts addressed issues surrounding the various neurological methods, the science underlying the methods, the pros and cons of the different methods, and challenges arising from the attempt to measure brain activity accurately and arrive at scientifically valid insights. The second group of issues applies more or less to all methods represented in this project. In fact, these of issues are likely to be relevant in every research project, no matter what the method:

- Sample size and composition
- Research design
- Data collection procedures (including quality and training of staff)
- Documentation of methods and research protocols
- Validation of measures and constructs
- Information on statistical significance
- Reporting of findings

On might say, these are the "basics", they are not unique to neuromarketing research. At the same time, there is no reason to pay *less* attention to these issues because neuromarketing research is somehow "different". We raise this point, because we have found some users of neuromarketing research did not pay much attention to these issues, and we have seen reports in this field that, for example, ignored the question whether the findings were statistically significant. In the opinion of the ARF, one important learning from this project is that the focus on the "new"- the application of neuroscience to marketing research – should not distract from issues such as sampling, statistical significance, and clear documentation of methods. Best practices in this field, as in any other, should include these considerations. They are as important as the issues germane to the various neuroscience methods and procedures. In short,

- Sample size and composition are important considerations since they have to be appropriate for the research issue at hand and samples should been drawn in a way that maximizes the opportunity to obtain a representative sample with low refusal rates. Both sample size and sampling methods present challenges for biometric and neurological researchers that tend to work with smaller sample sizes than "traditional" quantitative market research methods. Sampling challenges can be overcome, but they should be addressed and discussed with the vendor. As in all other studies, the sample should be designed according to the specific objectives of the research project at hand. In some cases, a study with 20 subjects may be adequate, especially if the data are used to generate hypotheses and new insights, but are not interpreted as quantitative. In other cases, where differences between consumer segments and quantitative insights are important, a larger sample is needed and saving on sample cost is likely to be the wrong strategy.

- In addition to sample size and sample composition there are a number of other design features that can make the difference between a study that produces reliable and valid new insights and one that raises more questions that it answers. The scientists recommend employing more experimental research designs in neuro marketing studies.

- While quality of data collection procedures is an important issue in all research, it is absolutely essential in this field where scientific knowledge and training is the key to accurate and valid measurements. Reviewers stressed this issue in connection with every method and every vendor. Each method has complexities and measurement challenges that need to be dealt with under the supervision of very skilled, well trained people.

- Documentation of methods and research protocols is important in neuromarketing as in reports about surveys and other studies. The user of the research should pay attention n how the data were collected, what scales and which coding procedures were used, how unreliable respondents were identified and dealt with, and similar aspects that document the methods and help the user of the data understand the research process and also identify possible problem areas that affect how the data should be interpreted. Given the complexities and the neuromarketing research and the science behind it, research protocols and clarity about what was done are essential.

- As this is a relatively new field, neuromarketing research requires careful validation of methods and constructs used in studies, for example, terms like "engagement" and "attention" should be carefully examined and validated, even if they seem clear at first glance. Different vendors sometimes use the same terms for different kinds of measures. Moreover, as neuroscience and marketing are both established disciplines, they define and use concepts and constructs in specific, but not necessarily identical ways. As a result, when neuroscientist and marketers are starting to work together, a discussion about the terms, about what is being measured, and about validity is important to avoid misunderstandings and confusion. The scientist recommend that users of the neuromarketing research ask about the concepts used by the vendor and do not automatically assume they mean the same thing as in marketing. Also, they think it is important to ask vendors about the scientific basis of the concepts and measures used and they point out that those derived from neuroscience maybe a bit harder to grasp, but they have the advantage of having their validity established through neuroscience theory and research. They applauded those vendors who have invested in validation

through peer-reviewed publications, but expressed reservations about concepts and measures that are not rooted in neuroscience research. The vendors who took part in the Project did not disagree, but they emphasized that they have found solid correlations between their conclusions and their clients' success metrics. In other words, some neuromarketers have developed measures that have high correlations with marketplace outcomes, even though neurological science does not yet provide a clear foundation for the interpretation of such measures. The vendors argue that success in the marketplace, useful and predictive findings are a legitimate form of validation.

- Unless research is intended to be purely qualitative, that is, if results are meant to provide direction and new hypotheses, but not quantitative results, statistical testing is not required. However, all quantitative research findings, no matter what the method, require statistical tests. As neuromarketing research is typically positioned as quantitative, users of such research should look for statistical analysis of the findings in order to be able to distinguish between statistically significant findings, directional data (not significant but evidence for a consistent pattern), and differences between data points that are not significant.

- Every user of any kind of research reports looks for an accurate, clear presentation of relevant findings and new insights. Reports on findings from neuromarketing studies have to overcome two unique obstacles to achieve this goal. First, as they are based on complex science that most users of the research cannot fully understand, it is more difficult to achieve clarity and communicate the information than in traditional marketing research reports. The Senior Review Panel pointed to a second obstacle to accurate and clear reporting in this area: Some vendors have marketed their neuromarketing research as providing science-based insights into the "subconscious" in a way that suggests the absence of any uncertainty or element of interpretation. The scientists pointed to the irony of such a marketing strategy: Real science is characterized by ambiguity and some degree of uncertainty. (That's why we report statistical error margins.)   Unfortunately, overclaiming has led some to dismiss the entire field of neuromarketing as "hype". Also, this has revived concerns about neuroscience research being able to manipulate consumers.

Given these circumstances, the reviewers as well as the ARF think that it is important to clearly distinguish between science-based findings and interpretation in reports on neuromarketing research. This serves the providers as well as the users of the research. At the same time, it is worth remembering that interpretation of data is not only a legitimate and necessary, but also a crucially important element of a research report: it is very rare for research findings to be useful to the marketer without interpretation. Further, scientists and the vendor are in agreement that neuromarketing methods should be used in combination with other methods to increase the validity and reliability of findings and support the interpretation of the data.

Regarding the specific issues surrounding the various biometric and neurological research methods used by the vendors who took part in the "Neuro 1.0" project, a consistent theme in the comments by the scientists who reviewed the studies, but also in discussions with vendors, was that each method has advantages and disadvantages and that a decision on which method is optimal for potential users of this kind of research depends on a large number of factors, ranging from research objectives to financial considerations. For example:

- Biometric methods are among the easiest to administer, can employ larger samples, and biometric studies are much less expensive than, for example, fMRI research. Biometric measures, such as eye tracking, skin conductivity, and heart rate can assess visual attention and arousal/emotional intensity with great accuracy on a continuous basis and, thereby, provide more detailed assessments than traditional measures.

- For the measurement of emotional valence many neuroscientists regard fMRI as the "gold standard" as it measures deep inside the brain where emotions originate and are processed. With its high special resolution fMRI allows, for example, to directly measure the release of dopamine that indicates desire, "wanting" and advocates of fMRI argue that such direct measures are more valid than measures taken closer to the surface and that this approach is ideal to uncover emotions hidden from traditional methods or distorted by social desirability. But these advantages of fMRI research come at a price – both literally and figuratively. Because of the cost of the equipment and administration of this method, it is the most expensive per respondent and uses small sample sizes. Accurate fMRI measurement requires both top notch equipment and scientists to carry out the measurement and analyze the data. Also, fMRI has lower temporal resolution than EEG or SST. However, if the marketer suspects that other methods do not tell the whole story and the goal is to generate new insights and a deeper understanding, that is, qualitative insights, fMRI can be very valuable. Especially when making the right decisions has big financial implications, a well designed and carefully executed fMRI study, as part of a large research effort, could be a very good investment.

- EEG (Electroencephalography) is a widely used method to obtain continuous data on brain activity and is now used by many vendors to explore reactions to marketing communications with high temporal resolution. EEG is primarily used to assess the intensity and direction of emotional reactions to specific elements of commercials and promotional messages to provide recommendations as to which elements do or do not support the desired outcome. There is some debate about the pros and cons of EEG compared to other methods, such as fMRI. Supporters of fMRI stress the limited spatial resolution of EEG which makes identifying specific emotions more difficult and point to "noise" in

EEG signal. EEG researchers stress the high granularity and temporal resolution of their data which make it possible to pin-point reactions with the kind of detail that conventional method rarely achieve. "SST" (Steady State Topography) was developed to address some of the measurement issues associated with EEG; the reviewers feel that SST provides a good solution to a number of those issues. At the same time, the scientists warn against ignoring the complexity of the human brain and its reactions to complex stimuli such as a TV commercial: The technical resolution of EEG and SST measures is impressive (milliseconds), but the brain's reactions are likely to be slower and they vary and reactions to specific scenes in a commercial may be affected by anticipation, etc. As said, interpretation is required in these studies as in all others and, in many cases, the client may provide as valuable input as the EEG scientist. The reviewers also suggest that marketers discuss with vendors how the various data points are analyzed and how those metrics have been validated.

- Another frequently used method is facial coding, primarily to measure emotional valence and to understand which kind of emotional reactions are triggered by exposure. Proponents argue that facial coding does achieve that objective, despite the fact that no brain activity is measured, because research, the work of Paul Ekman, has established that changes in facial expressions reflect emotion and that facial expressions are more likely to reveal true feelings than paper-and pencil methods. Compared to many other methods, facial coding is less invasive, the viewing situation is more "natural" as respondents can even watch at home. Facial coding has been used for well over a decade in marketing and many other fields. So-called "facial electromyography" (fEMG) is more recent. It measures electrical impulses generated when facial expressions change. It does not requite human coders and can pick up very small changes in facial expressions, but is more invasive.

Summary

In sum, all methods have pros and cons, there are no simple answers to questions like "Which method is best?" or "Which vendor should I use?" But that conclusion itself is, in the opinion of the ARF, an important insight: This project has clearly demonstrated that there are no simplistic shortcuts to the successful use of neuromarketing research; there is no "one size fits all". Rather, the project has shown how complex the issues are and identified a number of steps that users of the research and vendors can take to achieve better results and further advance this field.

It is important to stress that the complexity of the issues and the questions raised by the scientists should not be misinterpreted as discouraging the use of neuromarketing research. In the opinion of the ARF, there is ample evidence that despite the limitations outlined here and the need for more neuro science-based validation regarding a number of measures and concepts, neuromarketing research can uncover important and valuable new insights, from quantitative data to new hypotheses. This project and this report are designed to provide information that can help apply neurological and biological methods to marketing communication issues more effectively. Many ARF members, as well as sponsors and vendors, have since then expressed their opinion that this "Neuro" project is helping neuromarketing research produce more valuable insights for advertising, branding, and other marketing research projects. We are convinced that a continuation of this kind of research and the exchange of ideas and insights will help advance this field and benefit users as well as vendors.