Neuromarketing – The Art and Science of Marketing and Neurosciences Enabled by IoT Technologies

Authors:
Christopher Arthmann
New Business Creation Lead
NEC Innovation Division
Christopher.Arthmann@necect.com

I-Ping Li
Innovation, Analytics and IoT Leader
Deloitte Consulting
ili@deloitte.com

INTRODUCTION

Imagine you had the ability to understand and influence human emotion – could you use this to increase sales at your company, identify the right advertisements or product mix? Advertisers, psychologists, hypnotists and top sales performers have long recognized the relationship between stimulating emotion and influencing action. While this unique skill has been in the hands of few, neuromarketing is a growing field of science and technology that looks to put it in the hands of many.

In today's retail environment, companies are facing an increasing shift in consumer decision-making and different buying habits – from the rapid growth of online purchasing to the practice of "showrooming" – where consumers browse products at a physical store and ultimately purchase online. These factors are forcing brands and retailers, to become better at measuring consumer emotions and enhancing their marketing efforts.

Retailers are aware of the critical need to understand consumer behavior. By understanding consumer behavior, retailers can ensure the right products are available at the right price and locations while incentivizing purchases through targeted promotions. When retailers lose touch with continuously shifting consumers' wants and needs, and are unable to adapt in a timely manner, the implications can be disastrous. The number of retailers that are closing 3500+ store locations [1] or have filed for bankruptcy [2] in this year alone tells that story.

Historically, traditional focus groups have been the "go to" method for marketers to understand consumer receptiveness to products and advertisements. However, focus groups have limitations – people don't always say what they feel or behave in a predictable manner. A person may say they eat kale salad for lunch 3 days a week and go mountain bike riding every other weekend, but in reality, they are skipping lunch every day and watching sports on television while throwing back a six pack of beer to fuel their team spirit. This behavior, and likely inaccuracies, poses quite a dilemma for retailers in focus group settings. As John Wanamaker, a department store owner said as far back in the 1800s: "Half the money I spend on advertising is wasted; the trouble is I don't know which half."

So how do retailers know what half works?

WILL THE ART OF NEUROSCIENCES PLEASE STEP UP

Created by Dr. Richard Bandler and Dr. John Grinder, Neuro Linguistic Programming (NLP) was developed to identify different types of verbal and nonverbal human

[1] "These 21 Retailers Are Closing 3,591 Stores -- Who Is Next?" Forbes, 3/20/2017

[2] "Retail bankruptcies march toward post-recession high" CNBC, 3/31/2017

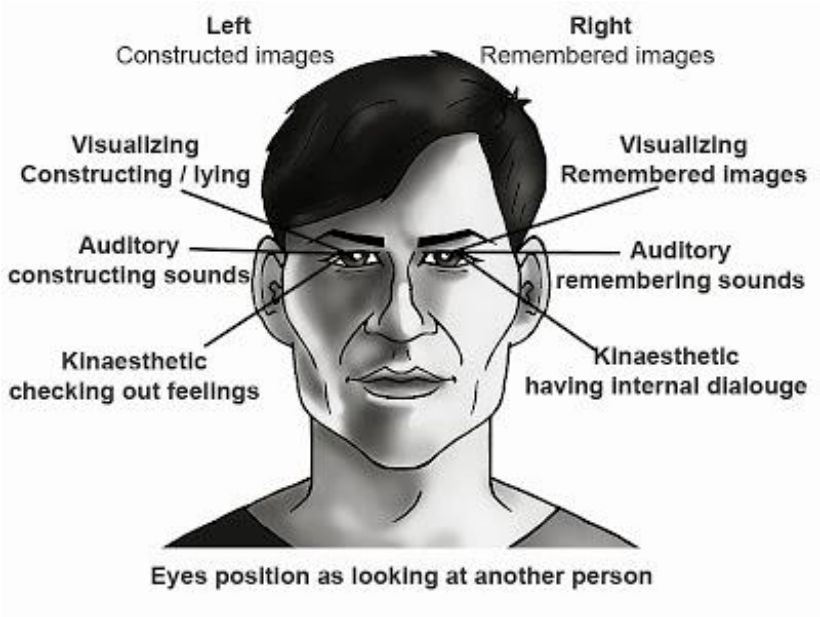

Illustration A: Neuro Linguistic Programming Eye Accessing Cues (Graphic courtesy narcicu.blogspot.com)

communications and examine internal and external human behaviors. [3] It was discovered, for example, that automatic, unconscious eye movements, or "eye accessing cues," are often accompanied by a particular thought processes and indicate the access and use of a particular part of the brain. (See Illustration A). NLP provides us an understanding and harnessing of internal (self) and external (outside self) communications to trigger emotion and influence behavioral change – the Promised Land for marketers. NLP principles also set the stage for the creation of neuromarketing and provide an opportunity to deliver more effective and automated outcomes when combined with Internet of Things (IoT) technologies.

Neuromarketing first introduced in the early 2000s, is a field that applies the principles of neuroscience to marketing research by studying consumers' sensorimotor, cognitive, and affective response to marketing stimuli. Neuromarketing is increasingly becoming a very useful tool in the field of marketing science in its ability to understand consumer sentiment. While neuromarketing doesn't explicitly expose all the reactions of a consumer to a marketer (See Illustration B), the use of human body

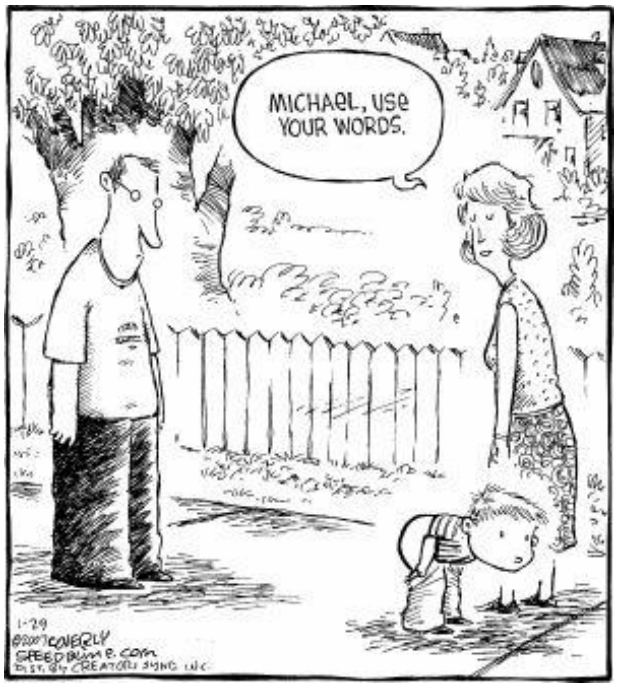

Illustration B: Body Language in Action

[3] Neuro-Linguistic Programming: A Tool for Developing Behavioral Skills and Competencies, The IUP Journal of Soft Skills, Vol. VI, No. 1, March 2012

language and non-verbal cues can reveal a lot. Supported and enabled by IoT technologies, Neuromarketing is redefining the way retailers market to consumers and understand their needs and desires and how best to efficiently evolve their retail operations and capture market share.

Neuromarketing looks to remove hidden biases to try and tap into customers at their subconscious level through a number of different types of IoT-enabled technologies. These technologies include:

- Functional magnetic resonance imaging (fMRI) – This measures changes in activity in deep parts of the brain known as the "pleasure center" based on measuring blood flow. For instance, if you use a part of your brain more, it requires more oxygen and more blood will flow to it which might determine your preference of a dress or color;
- Electroencephalography (EEG) and Steady State Topography (SST) – These measure electrical activity in specific regions of the brain. It measures a person's motivation and cognitive load (i.e., how much effort and thinking a customer needs to put into understanding an advertisement);
- Biometrics Sensors – These measure changes in one's physiological state. These sensors track heart rate, respiratory rate and galvanic skin response;
- Motion Tracking – This is the use of eye tracking to identify focal attention, and facial coding to categorize the physical expression of emotion – both in order to learn why consumers make the decisions they do;
- Big Data Analytics – The integration and analysis of disparate and unstructured data to understand patterns, correlations, relationships and develop predictions.

When these tools are assembled and used together as integrated IoT technologies, they bring forth a unique capability to understand a consumer's sentiments to brands and advertising messages and help retailers meet or exceed shifting customer needs and expectations.

What Types of Technical Capabilities are Available?

Today, facial recording, tracking and matching trough video surveillance is widely used in law enforcement. Faces captured through video can be matched with a high degree of accuracy against existing photos. In addition to face matching of known persons, general demographic identification of unmatched persons is available. Examples of demographics available include age, gender and ethnicity.

While face matching and demographics provide descriptive identification, emerging capabilities exist around behavior detection. Technologies such as emotion, facial expressions, gesture, eye tracking, eye gaze and human tracking capture non-verbal behaviors while verbal behaviors are captured through audio with tonality and semantic analysis. As technologies such as artificial intelligence and machine learning continue to evolve, the ability to capture specific consumer behavior, for example picking up and putting down a product, will become more accurate. These types of capabilities provide retailers with the opportunity to systematically identify

shifting consumer preferences with depth and accuracy unavailable in the past.

Biometric sensors that track heart rate, respiratory rate and galvanic skin response are already available through wearable devices such as fitness trackers, smartwatches, rings and pendants. The costs of these devices continue to drop rapidly and are becoming increasingly mainstream in their use and adoption.

fMRI and EEG technologies are by far the most advanced and difficult to access. fMRI is costly at a rate up to $1,000 per hour to use while volunteer or consenting subjects need to lie completely still in a large machine while in a supine position. EEG is a cap of electrical sensors that a subject wears on their head. It allows for movement while electrodes measuring electrical waves produced by the brain track emotions such as happiness, sorrow, anger or excitement. However, unlike fMRI, EEG does not provide the ability to see deep parts of the brain where the pleasure center is located to fully understand how consumers are really responding to advertising messages.

Interestingly, the advancement of biometric tracking technologies and always-on sensors brings up the issue of fair use and consent to use, for what purposes? While consumers generally do not object to marketing and sales efforts targeted at them using information they knowingly and voluntarily provide, the idea of using personal information that was involuntarily obtained for marketing and sales efforts is a highly sensitive topic. Generally speaking, capturing consumer information in an openly public setting, such as age and gender, with no personal identifiable information associated is acceptable without consumer consent. But, brand risk remains and retailer action so far shows they air on the side of caution by using an opt-in model of obtaining explicit consent when using these types of sensing and biometric technologies.

APPLICATIONS OF NEUROMARKETING IN IOT RETAIL

In addition to augmenting existing applications in Retail, such as Loyalty/CRM (customer relationship management system), nueromarketing has the potential to help retailers address the very pressurized situation they are facing today with the consumer shift to online and the continuous need to maintain a physical footprint.

From a neuromarketing perspective, new capabilities provide retailers with an opportunity to right-size physical locations while meeting or exceeding customer expectations. Neuromarketing provides retailers an opportunity to enhance their marketing mix through improved measurement, deeper insights and timely action while improving the customer experience. As a basic example, today's retailers primarily use laser and thermoimaging (thermo) people-counting technology at store entry to count in-store traffic and alert staff of new consumers. Although these types of technologies provide effective measurement of people, their ability to measure a qualified buyer is limited. Thermo's ability to assess height as a classifier between adults and children is limited past a certain age, and it cannot provide nuanced information, such as women primarily shop with male shoppers during the week and with other females on weekends, when not shopping alone. These insights provide new, unrecognized, opportunities to elevate the customer

experience, increase loyalty and ultimately up-sell.

A large number of companies already use neuromarketing techniques to measure consumer response to adverting and marketing campaigns on new or products in design, including The Weather Channel, Microsoft, Campbell Soup Company, Proctor & Gamble, Frito-Lay, Mercedes and Hyundai. Specific areas where neuromarketing techniques have been applied include the following:

- The Weather Channel used EEG, skin response and eye-tracking analysis results in an integrated manner to measure different promotional advertisements for a television show on their network. Their aim was to determine which of their test advertisements were most effective and why, to produce a final version of the advertisement. Attention, emotional engagement and memory retention were biometrically measured and scored for each advertisement. The end recommendation was highly regarded as the research provided clear, intuitive, quantitative and objective metrics to pinpoint advertisement effectiveness.[4]
- Brands such as Campbell's and Frito-Lay have been using integrated neuromarketing IoT technologies to re-imagine their packaging and shelf product placement. In focus group studies, consumers were asked to rate different types of product packages and placement using facial coding, eye tracking, virtual reality and sentiment analysis technologies to determine packaging redesign and presentation. Frito-Lay discovered that matte bags with pictures of potatoes did not trigger a negative response associated with guilt and snacking, whereas shiny bags with pictures of chips on them did. Within months, new bags were on store shelves replacing the previous shiny ones.[5]
- Auto manufacturers Mercedes and Hyundai both used integrated EEG and sentiment analysis in evaluating manufacturing design and prototypes in their vehicles. Mercedes recorded reactions to the position/style of car headlights that resembled human faces which was then tied to the reward center of the brain. In a similar study, Hyundai developed several design prototypes and measured reactions to different design features that would result in customer satisfaction and increased likelihood to purchase a car. Brainwaves were recorded as participants looked at different car exteriors such as lights, mirrors, grill, styling, and resulted in adjustments to exterior designs – all based on brainwave responses.[6] [7]

[4] Goodbye 'Growth Hacking.' Hello Neuromarketing., Entrepreneur, 06/09/2016

[5] Frito-Lay Tries to Enter the Minds (and Lunch Bags) of Women, New York Times, 02/24/2009

[6] Neuromarketing Hope and Hype: 5 Brands Conducting Brain Research, FastCompany, 09/15/2009

[7] The Future of Digital Business Innovation, Vincenzo Morabito, 03/05/2016

APPLICATIONS OF NEUROMARKETING IN IOT RETAIL OPERATIONS

More Efficient Focus Groups (Sit-at-Home Participants via Integrated IoT Technology)

Traditional focus groups have been used for many years to identify consumer sentiment toward products, promotions and pricing. Executing a focus group requires not only participant incentive and recruitment expenses, but costs for travel, accommodations and staff. Utilizing neuromarketing technologies, focus groups can now be executed through remote participation to reduce travel and accommodation expenses while capturing more accurate and effective consumer sentiment through the use of eye tracking and emotion detection. Also, the use of integrated IoT technologies such as web cameras and biometric sensors provide researchers the ability to identify eye movements, changes in facial expressions and associated emotions in a standardized, measurable approach.

Where the Eyes Are Looking (Eye Gaze Placement)

It is widely known and researched that advertisements with people and faces tend to attract longer and more focused attention from prospective buyers. Marketers have used pictures of cute babies gazing back from the advertisement to help increase sales of baby products. Neuromarketing researchers have discovered that when the baby's face is looking straight at the viewer, the viewer will actually focus on the baby's face at the expense of looking at the rest of the advertisement. However, if the baby was staring at the text or product in the advertisement, there was higher engagement for the viewer to look at the advertising content. [8]

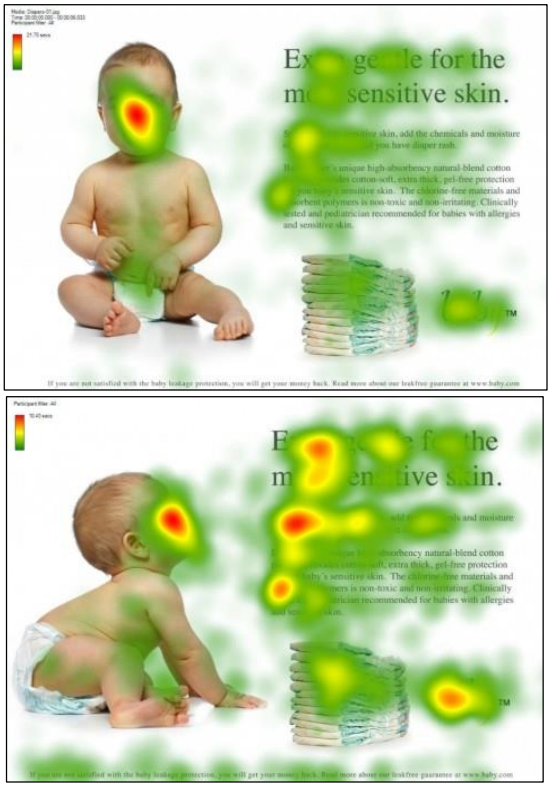

Illustration C: The heat maps show where eye focus was on each copy of the advertisement (Graphic courtesy neurosciencemarketing.com)

Measuring Promotions and Product Awareness through a Smile (Facial Coding and Sentiment Analysis)

A major benefit of e-commerce is the ability to track consumer receptiveness and interest toward promotions and tied to shopping cart transactions. Neuroscience has shown that we do not necessarily need to peer into people's brains to understand how they are feeling – a given look on their face can be just as revealing. When the

[8] Baby Pictures Really Do Grab Our Attention, Neurosciencemarketing.com, 08/13/2014

visibility of a product, price and promotion is put in front of a user (a web camera (for online transactions) or video capture (for in-person offers)), facial sentiment analysis can monitor a consumer's face to measure any tiny movements in a person's face.

When applied with Artificial Intelligence (AI) and video analytics, facial coding can measure subtle, sometimes subconscious reactions to stimuli in the retail/buying setting and can be used to understand how consumers are feeling. With further analytics, the facial coding can then predict what may follow a given facial response. For example, Microsoft's Cognitive Services emotion recognition provides insights not only into what is available today, but wider ranging opportunities to harness both verbal and nonverbal communications through semantic analysis, analysis of tonality and more, as well as emotion recognition through video. [9]

Individual, Event-Driven Promotions (Personalized Marketing)

Today, promotions are executed in a physical retail store based on historical information of product and offered to a broad audience. With facial identification, retail marketers are now able to identify in-store shoppers in real time and offer promotions via digital signage, mobile and more, based upon shopper profile and associated loyalty status. Where loyalty cards provide incentives at check out, personalized promotions through facial identification enable retail marketers to provide proactive incentives at the right time and place. Combined with real time analysis of inventory turnover, historical buying habits and in-store sales projections,

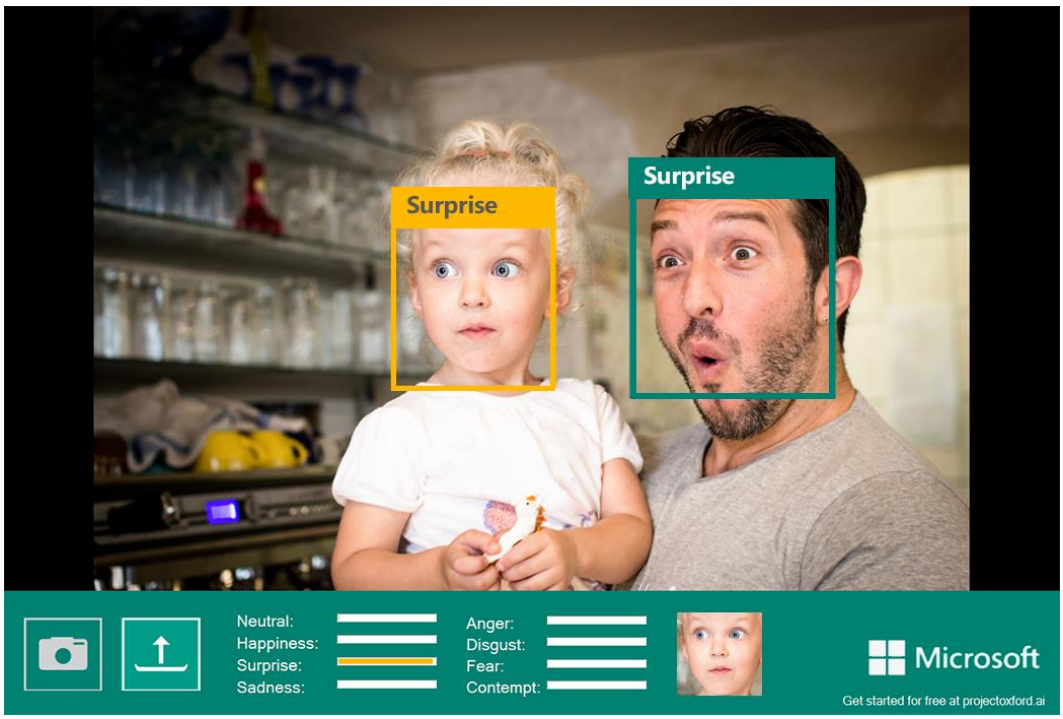

Illustration D: Microsoft Cognitive Services Emotion Recognition. (Graphic courtesy Microsoft)

[9] Neuromarketing Hope and Hype: 5 Brands Conducting Brain Research, FastCompany, 09/15/2009

retailers are now able to offer real time, personalized discounts, bundled promotions and more.

NEC, Microsoft and Brierley+Partners, a Dallas based loyalty/CRM provider, demonstrated this capability at IoT Solutions World Congress in 2016. The solution leveraged Brierly+Partners loyalty database and big data, combined with NEC's video analytics (face matching & demographics) and the Microsoft Azure IoT suite to deliver personalized, event driven promotions for opt-in and opt-out participants.

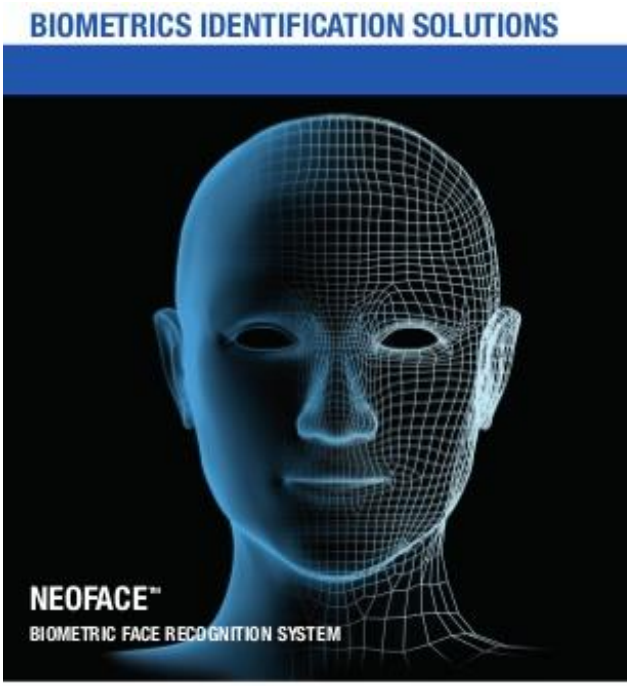

Illustration E: Computer processing of NEC's face matching recognition system. (Graphic courtesy NEC)

IN THE FUTURE…

The field of Neuromarketing has grown significantly over the last decade and continues to grow in usage. With sophistication, advancement, portability and reduction in cost of IoT-enabled technologies, we will continue to see progress and innovations originating from neuromarketing techniques. "Always on" sensors and devices may one day enable real time tracking and feedback with nearly everything we interact within the retail shopping experience, to the benefit of consumers and product manufactures.

Neuromarketing has the potential to proactively influence brand association and customer loyalty by measuring consumer behavior in real time, as well as field testing nonverbal and verbal responses to new products, advertisements promotions and pricing. In the long term, whether you see neuromarketing as the art of measuring consumer emotions, or a science in measuring marketing effectiveness, there is little doubt that all retailers will want the unbeatable truth of our subconscious mind regardless of what emotion, sentiment or engagement we are feeling.

Christopher Arthmann is New Business Creation Lead for NEC's Innovation Division.

I-Ping Li is an innovation and technology evangelist, and a seasoned technology strategy and delivery practice leader at Deloitte Consulting.

I-Ping and Chris serve as the Industrial Internet Consortium Retail Operations Task Group Co-Chairs. You can follow them on twitter @nec_iot and @ipingli, respectively.

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