Into the Mind of the Seller:
Using Neurophysiological Tools to Understand Sales Techniques

Adriane B. Randolph
Kennesaw State University
arandolph@kennesaw.edu

A. Leila Borders
Kennesaw State University
aborder4@kennesaw.edu

Terry W. Loe
Kennesaw State University
tloe@kennesaw.edu

Abstract

Neurophysiological recording techniques are helping provide marketers and salespeople with an increased understanding of their targeted customers. Such tools are also providing information systems researchers more insight to their end-users. These techniques may also be used introspectively to help researchers learn more about their own techniques. Here we look to help salespeople have an increased understanding of their selling methods by looking through their eyes instead of through the eyes of the customer. A preliminary study is presented using electroencephalography of three sales experts while watching the first moments of a video of a sales pitch to understand mental processing during the approach phase. Follow on work is described and considerations for interpreting data in light of individual differences.

1. Introduction

To compete in today’s economy, firms must be able to break out of commodity status. As power continues to shift to customers, and the massive increase in product selection abounds, selling goods, services, and ideas better than the competition is an important part of marketing communications activities and critical to a firm’s business strategy. To this end, personal selling is a direct attempt to influence and motivate customers to purchase by identifying their needs and providing solutions to those needs. It is important to note that of the various types of marketing communications with customers, personal selling allows for personalization of the business exchange and empathy, which enable long-term, and loyal relationships to develop between buyers and sellers. Notwithstanding the fact that companies that focus on customer service gain six percent market share per year [1].

As a selling tool, technology is becoming increasingly advantageous as it eases administrative burdens and arms salespeople with valuable information about products, companies, and the customers. In particular, neurophysiological recording techniques are helping provide salespeople with an increased understanding of their targeted customers, where such methods are thought to uncover a person’s true thoughts and feelings [2].

The related field of Neuro-Information Systems (IS) has recently evolved by examining how neuroscience methods can inform information systems and human-computer interaction (HCI) [3, 4]. Researchers are using neurophysiological tools to better understand end-users of systems and their thought-processes when making complex decisions [5, 6]. However, researchers and salespeople alike may use these techniques not only on their test populations but on themselves to better understand their own methods.

Here we present a preliminary study that demonstrates how neurophysiological tools may be self-directed at the salesperson to understand his/her mental processing. We apply these methods in the context of sales where a person may utilize computer-based training to watch videos and learn more about selling techniques.

2. Neurophysiological Tools to Understand Human Mental States

Non-invasive techniques for recording neural activations involve sensors placed on the skin’s surface for signal acquisition instead of using surgically-implanted electrodes. The most common of these approaches is the use of EEG, a bio-recording technique that measures electrical activity of the brain collected from scalp electrodes. Used for years in the medical community, EEG is now moving from the clinical setting into the real world to control computers with the human mind [7] and to better understand human mental processes in organizational contexts.

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settings [8, 9]. Other approaches include the use of functional magnetic resonance imaging (fMRI) as a non-invasive method for measuring oxygenated blood volume using a powerful, magnetized probe that can reflect activity throughout the brain and functional near-infrared (fNIR) which also measures oxygenated blood volume in the brain but using near-infrared light reflections [10].

EEG use has a growing presence in areas of business like marketing, economics, and now information systems [3]. Such techniques are being used to gauge people’s deeper reactions to various stimuli and understand their decision-making processes [2, 9, 11]. The resulting measures are seen as more indicative of the true feelings of humans because activation in certain regions of the brain may suggest the person’s unfiltered, emotional responses [12]. Further, such brain imaging information coupled with surveys and observational data provide a richer context within which researchers may better understand human behavior and decision-making [13].

There are a number of brain signals that may be recorded and interpreted using EEG with varying significance depending on the region of the brain from which they were recorded. Specifically, EEG of the frontal lobe (i.e., the front-most part of the brain) indicates varying thoughts related to judgment, engagement, attention, and emotion [14]. Like and dislike of a stimulus may be determined from EEG asymmetry where higher activations in the left hemisphere indicate like and higher activations in the right hemisphere indicate dislike [12]. In addition, the brain generates waves in different frequency ranges which indicate different thought patterns. For example, alpha (8-13 Hz) represents a relaxed state of mind, beta (13-30 Hz) represents active thinking or concentration, and gamma (30Hz+) represents cross-modal processing [15].

It is possible to record and analyze the amplitude of various signals generated in a particular area of the brain. One technique used for EEG analysis is to calculate the difference in signal properties between idle and active imagery within the region of the brain of interest. The proportional difference in signal properties is measured by an R-squared value and indicates signal strength or the degree of modulation a person may induce. Participant performance is then measured according to the difference between the distribution of amplitudes when the person was attempting a trial or engaged in an active task versus when he/she was at rest. The R-squared value is calculated as the proportion of total variance due to the difference between states [16].

### 3. Pilot Study

This preliminary study explored what could be discovered from EEG recordings of individuals when they watched the first three minutes of a recorded sales pitch during a national sales competition. The first minutes of interaction between salesperson and customer encompass what is termed the approach phase.

#### 3.1. Participants

Three able-bodied, non-student participants (2 male and 1 female) aged 40-60 were recorded on the campus of a large university in the southeastern part of the United States. All individuals voluntarily participated and received no compensation.

- Participant A – male, faculty member, director of a sales center.
- Participant B – female, faculty member, member of a sales center’s leadership team.
- Participant C – male, industry partner, sales specialist.

#### 3.2. Experimental Procedure

Each person was fitted with a standard electrode cap for recording eight channels of EEG using the BioSemi Active Two bioamplifier system connected to a PC (http://www.cor-techsolutions.com/Products/Physiological-data-acquisition/Systems/ActiveTwo.aspx). The electrode cap was configured according to the widely used 10-20 system of electrode placement [17]. Placement of the cap allowed for the recording of brain activations over the frontal lobe sampled at 256 Hz using active electrodes with a Common Average Reference (CAR). The eight recorded channels were: Fp1, Fp2, F3, F4, Fz, C3, C4, and Cz, where electrodes starting with “F” cover the frontal lobe as shown in Figure 1.

Once fitted with the electrode cap, participants sat still with their eyes open approximately three feet in front of a 21-inch LCD computer monitor. The monitor displayed a video clip lasting three minutes in duration of the initial approach used in a sales pitch. A woman was portrayed introducing herself to her male client and setting the scene for a software product that she would be presenting. The video was recorded during the National Collegiate Sales Competition held annually at Kennesaw State University. During this competition, students and faculty have the opportunity to hone their sales skills in a highly competitive environment and thus are incented to present at their best (www.ncsc-ksu.org).
4. Results

Recordings from the eight channels of scalp electrodes were analyzed offline. Participant performance was measured according to the difference between the distribution of EEG amplitudes when the person was watching the video clip versus when he/she was at rest. Activation plots of EEG frequencies across all recorded channels were generated using a MATLAB plug-in and interpreted by a trained technician. The frequencies with the highest amplitude values were pinpointed and submitted for topological plotting. Figure 2 presents topological illustrations of neural activations across each participant’s strongest frequency.

From the illustrations, we can quickly see a difference between the three participants. Participant A generated highest activations in the frontal lobe at 28 Hz, the beta range indicating active thinking and concentration. This participant was actively engaged, judging, and processing what was going on in the video. Participant B generated highest activations across the left hemisphere of the frontal lobe at 22 Hz, also in the beta range. Higher activation in the left hemisphere indicates liking of the stimulus. Participant C generated highest activations across the right hemisphere of the frontal lobe at 10 Hz, the alpha range indicating a calm, relaxed state. Higher activation in the right hemisphere indicates dislike of the stimulus.

For this pilot study, further details about individual differences between participants were not captured for analysis. In addition, specific techniques used in the video were not coded.

5. Discussion

Although a preliminary study, the results illustrate interesting differences in neural activations between the three participants which may be explained by differences in their individual profiles as found in related work regarding brain-computer interfaces [18]. For example, Participant C may have exhibited what may be characterized as boredom by exhibiting higher levels of alpha or these higher levels of alpha may be attributed to him being such an expert in the field; this person actively engages in selling techniques and provides sales coaching on a daily basis in practice. It seems that experts exhibit higher levels of alpha when judging areas specific to
Thus, it is possible that the topological plot is reflecting Participant C’s level of practical expertise when viewing the sales video. The Sales Center Director, Participant A, had a different perspective when viewing the video because he was seeking to actively glean more information to determine if there was relevance to the sales competition, the study itself, and to his classes on sales. After the recording concluded, he shared that he was processing the video on multiple levels. This complex mental processing is supported by his topological plot where there did not appear to be a discernment of like/dislike from hemispheric asymmetry but instead higher cognitive load with greater activation taking place in the front-most part of the brain.

Participant B self-reported to be a supportive faculty member who actively engages in coaching sales students. Perhaps she perceived the person in the video to be correctly exhibiting skills taught in sales classes thus reflected in greater activation over the left hemisphere. She also appeared to be actively engaged and processing the video with her highest neural activations taking place in the beta range.

6. Conclusions

We present a preliminary study for how neurophysiological tools may be used to help salespeople have an increased understanding of their selling methods by looking through their eyes instead of through the eyes of the customer. Encephalographic recordings were made while three sales experts watched the first moments of a video of a sales pitch in an effort to better understand their mental processing during the approach phase.

The three participants each had unique expertise regarding sales and similarly exhibited differences in their neural activations when watching the same video under the same experimental conditions. However, without statistical analysis of a larger sample size coupled with a more formal survey, we cannot say with certainty what characteristics link most closely with the neural activations presented here. The results do seem to indicate the need to consider individual differences when interpreting and extending findings.

Further, this work provides encouragement for more research to understand the differences between individuals, perceptions, and the impacts on selling techniques. This knowledge may be integrated into design considerations for computer-based training on sales that incorporates video to help model various techniques. Ultimately, this work lays a foundation for future study in an area termed neuro-sales and highlights considerations for future study design.

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8. References


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