

# Investigating the emotional responses to commercials using fMRI

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## Introduction:

This collaborative study explored the effects of emotions in advertising message processing using two distinct measurement techniques: AdSAM<sup>1</sup> and fMRI. AdSAM is a self-administered nonverbal, cross cultural, visual measure of emotional response. The comparison between the two techniques made it possible to examine the associations between self-reported emotional responses (pleasure, arousal, and dominance) and brain activities captured through neuroimaging. The data generated from the two techniques were analyzed along with the participants' attitudinal and behavioral responses including attitude toward ad, attitude toward brand, and purchase intention, to assess the association between emotional responses and message effectiveness.

Currently, there is only one published study in neuromarketing involving fMRI<sup>2</sup>. In this study, participants who preferred Pepsi during a blind taste test had a five times stronger response in the ventral putamen than those who preferred Coca-Cola. However, when the test was repeated with the brands identified, nearly all the participants said they preferred Coca-Cola. When the participants tasted Coca-Cola with the brand identified, both the ventral putamen and the medial prefrontal cortex – an area linked to our sense of self – lit up. The results suggested that the Coca-Cola brand was so attractive that it over-rode what the taste buds were telling the participants. Brand knowledge was found to bias preference decisions and recruit hippocampus, DLPCF, and midbrain. Using a similar approach, we hypothesized that the AdSAM responses obtained would guide the analysis of the neuroimaging data.

## Materials and Methods:

Twelve participants (6M, 6F, aged 24.8±2.1) viewed five commercials inside of the scanner in a block design paradigm created with E-Prime (Psychology Software Tools, Pittsburgh, PA). The functional paradigm consisted of six runs with each run except for the initial run being separated into three blocks: 1) a resting period, 2) a commercial, and 3) the ADSAM task, which consisted of three trials that rated pleasure, arousal, and dominance. The first and last runs consisted of public service announcements that endorsed teaching and anti-fur messages. Runs 2-4 consisted of commercials for common consumer beverages. After watching each advertisement, the participants were asked to convey their feelings in terms of pleasure (happy vs. sad), arousal (stimulated vs. bored), and dominance (“in control” vs. “cared for”) by selecting the most appropriate Self-Assessment Manikin (SAM) out of five possible choices. The responses and reaction times were recorded with a right-handed button response glove (IFIS, MRI Devices, Inc., Waukesha, WI). Surveys and Post-fMRI questionnaires were also given to explore additional possible correlations between the behavioral and imaging data collected.

A 3T head dedicated scanner (Siemens Allegra; Munich, Germany) was used to acquire T1 weighted 3D anatomical images with a MPRAGE sequence in the following dimensions: Matrix=256x256, TR=1.5s, TE=4.38ms, FA=8°, FOV=240mm, 160 slices, slice thickness = 1.1mm. Functional images were acquired with a gradient-echo EPI sequence sensitive to the BOLD signal in the following dimensions: Matrix=64x64, TR=3.0s, TE=30ms, FA=90°, FOV=240mm, 36 slices, slice thickness=3.8mm without gaps.

## Results:

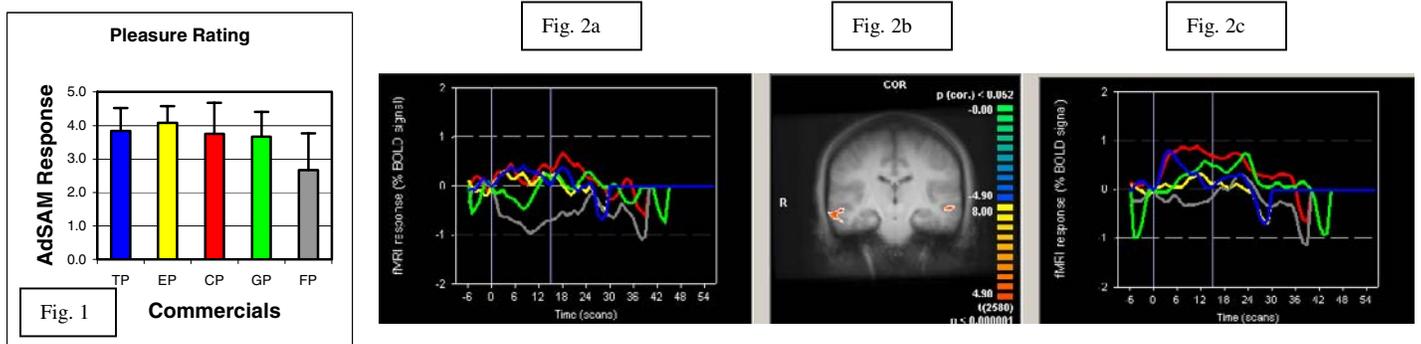
In both figures, each of the five commercials is represented by a different color (Teacher=blue, Evian=yellow, Coke=red, Gatorade=green, Fur=gray). Fig. 1 illustrates that the fur commercial is significantly lower than the other four commercials in terms of the pleasure rating scale. Fig. 2 contrasts the fur commercial (4X balanced) against the other four commercials. The ROI's shown in fig 2b include the bilateral middle temporal gyri: right at Tal (59,19,12) t=5.81 and left at Tal (-55,-19,-5) t=5.21. The graphs in fig. 2a & fig. 2c depict an increased BOLD signal in all four commercials relative to the Fur commercial block.

## Discussion:

The middle temporal gyrus contains some visual association cortex, as well as multimodal or heteromodal association cortex. The decreased neural activation found bilaterally in the GTm could suggest that the subjects were disengaged upon viewing the content of the Fur commercial relative to the other four stimuli. The AdSAM responses in the pleasure rating scale further support this conclusion. More advanced strategies of data analysis will be used to assess similar correlations in other dimensions, in other ROI's, and in the practical applications involving changes in consumer attitudes towards the purchasing the products.

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## Reference List

1. Morris, J.D., Woo, C., Geason, J.A. & Kim, J. The power of affect: Predicting intention. *Journal of Advertising Research* **42**, 7-17 (2002).
2. McClure, S.M. et al. Neural correlates of behavioral preference for culturally familiar drinks. *Neuron* **44**, 379-387 (2004).