Evidence from neuroscience suggests that we have different neural representations of memory for negative stimuli as compared to positive stimuli. However, both are better recalled than neutral stimuli. In the current study, we investigate whether we can transfer these findings to advertising research by scanning the brains of 22 subjects with fMRI while they make judgments about their ad liking of 30 print ads. We find different neural correlates for liked, disliked and neutral ads that offer interesting implications for advertising research. In addition, we show that the neural correlates of ad liking predict ad recall.

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SYMPOSIUM SUMMARY
From the Black Box to the Aquarium: How Brain Imaging Sheds ‘Light’ on the Underlying Mechanisms of How Marketing Actions Work
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EXTENDED ABSTRACTS
“The Good, the Bad and the Forgotten-An fMRI-study on Ad Liking and Ad Memory”
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Memory is a central construct in both, advertising research as well as in neuroscience. We know from research in advertising that affect-laden ads are likely to be better recalled and better recall is likely to correlate with ad effectiveness (Ray and Batra 1983; Ambler and Burne 1999). Researchers suggest that ad memory might be “the temporal link between ad input and buying occasions” (Ambler and Burne 1999, p. 27). Interestingly, based on conditioning theories most ads use positive affect-laden stimuli and only more recently marketers started also to use negative affect-laden stimuli such as for health marketing purposes (e.g., for lung cancer prevention). In neuroscience, research has shown that distinct brain areas encode positive affect-laden stimuli (e.g. parts of the Medial Prefrontal Cortex and the Striatum) and negative affect-laden stimuli (e.g. Insular, Amygdala). There is also evidence that affective (e.g. pleasant or aversive) events are better remembered than neutral events (Hamann et al. 1999). Research in neuroscience suggests that these emotional memory effects are mainly driven by attention.

In the current study we investigated whether ads that vary in ad liking elicit changes in brain activity that corresponds to areas shown to be involved in the processing of stimuli with different affective valence. In addition, we explored the existence of emotional memory effects and how these effects differ with affective valence of the ads.

We first conducted a pre-study to quasi-normalize 45 print ads by asking 160 subjects to judge their liking of the ads. Based on the results we classified 10 ads as liked, 10 as disliked and 10 as neutral. These 30 ads were then used as stimulus material in an fMRI study. We scanned brain activity of 22 healthy and right-handed subjects (12 males, aged between 24-34 years) while they judged their liking of the 30 print ads. Every 10 seconds a new ad was projected into the visual field of the subjects. The volunteers were asked to decide whether they like or dislike this ad by pressing one of the two corresponding buttons on a magnetic resonance compatible response box. The responses were recorded with the use of specific software. Immediately after scanning, we asked the subjects to fill out a questionnaire to sample their recall of the different ads.

We found that liked and disliked ads are processed in distinct neural networks. Liked ads induced increased activity changes in higher order visual areas, the fusiform face area (FFA), the ventromedial prefrontal cortex (VMPFC), the posterior cingulum (PCC) and the ventral striatum (VS), in particular the nucleus accumbens (NCC). Activity increases in higher order visual cortices may reflect increased visual attention during viewing the attractive visual material (Shimojo et al. 2003). The FFA has been characterized as an area specialized in face recognition and perception (Grill-Spector et al. 2004). This finding is interesting because indeed most of the liked ads contained faces whereas the disliked and neutral ads did not to that extend. The VMPFC is a region that plays a fundamental role in decision-making, especially in the context of preference and value representation (Bechara et al. 1999; Bechara 2004). Finally, our data suggests that exposure to attractive ads leads to increased cerebral blood flow in areas of the human reward system, in particular the VS/NCC (Knutson et al. 2000, O’Doherty et al. 2004). In contrast, disliked ads are accompanied with activity changes in the insular region. Activation in the insular is consistently seen in studies of pain and distress, hunger and thirst, autonomic arousal and unfairness (Sanfey et al. 2003). A recent study showed that excessive prices activated the insular prior to the purchase decision (Knutson et al. 2007). In addition, we found that disliked ads induce activity changes in areas associated with the motor cortex. The motor cortex consists of regions in the cerebral cortex involved in planning, control, and execution of voluntary motor functions. This finding might be due to the fact that our subjects responded quicker to aversive stimuli in order to make them disappear from screen.

In the next step of the data analysis, we generated recall scores and tested their correlation with different degrees of ad liking. As expected we found significant differences in ad recall between the three different ad-liking groups. We found that highly liked ads lead to the highest ad recall, followed by the disliked and, finally, the neutral ones.

Our findings offer important insights for advertising research and practice. One interesting finding is that there is a high correlation between ad liking and the use of faces in the ads. This preliminary finding calls for future research to better understand the role of faces, facial expressions and also eye gazes for ad liking, ad recall and ad memory. Then, our findings show that both, ad liking and ad disliking lead to increased ad recall as compared to neutral ads. In a next step it would be interesting to investigate how ad liking influences attitude towards the brand and brand preference. Do conditioning theories hold here that ads that trigger activation changes in areas encoding negative affect will have a negative impact on the attitude towards and preference for the advertised brand? An alternative scenario would be that positive spillover effects could be found based on contrasts effects. Taken together, this research contributes not only to a better understanding of how advertising affects consumers’ perception, affective encoding and memory, but also extend knowledge referring to the role of the emotion processing for memory effects that serve as basis for every day (economic) decision-making.

“Neural Correlates of Deception Detection: A BOLD Imaging Study”
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Although many definitions of deceptive or misleading advertising have been offered, most researchers agree that for an advertisement to be deceptive it must assert or imply something that is “objectively false” (e.g., Shimp and Preston 1981). However,
differences in interpretation and operationalization of advertising deceptiveness have resulted in substantial theoretical dispute and consequently, research effort (e.g., Russo et al. 1981). Unsurprisingly, much research in the past has been dedicated to features and attributes of advertisements that have a potential to mislead consumers (e.g., Armstrong et al. 1979; Barone et al. 2004; Burke et al. 1988; Shimp 1978). Burke and his colleagues (1988) for instance, investigated various message forms identified in past research as having the potential to deceive consumers by implying unrealistically high levels of brand attribute performance; their results showed that certain message forms in particular increased false brand attribute beliefs, affect, and purchase intentions. More recently, Darke and Ritchie (2007) have investigated short and long-term consequences of deceptive advertising on consumer perception and subsequent behavior and found that consumers engage in defensive stereotyping and direct negative affect towards subsequent, unrelated advertisements. Consequently, there are conflicting findings pertaining to the effect of deceptive advertising on affect and subsequently, on purchase intentions which may be explained by the mechanisms that guide deception detection. However, little evidence exists for what processes underlie consumer detection of deception in advertising even though such an insight has a potential of helping resolve a number of related theoretical arguments. Hence, the objective of the present work is twofold: first, we attempt to identify the neural correlates of deception detection using fMRI methodology, and second, we investigate the differences in consumer processing of varying levels of deceptive advertisements.

Although functional MRI methodology is relatively novel in consumer research (e.g., Yoon et al. 2006; Plassman et al. 2007), it has been used in the field of psychology to study deception effort (Kozel et al. 2004; Vendemia et al. 2006) and revealed complex processes in the anterior cingulate involving attention, working memory, and executive control. In the context of deceptive advertising, fMRI may be particularly informative as the traditional cognitive expectancy disconfirmation approach has often failed to reveal consistency in what individuals perceive as misleading information (Grunert and Dedler 1987). For instance, Shimp (1978) notes that inferences made from incomplete comparisons in advertisement messages differ among people; while some consumers assess a certain advertising message as deceptive, there are others who detect no deception when exposed to the same message. Hence, idiosyncrasies in cognitive structures involved in advertisement perception have made it largely impossible to investigate the processes underlying consumer detection of advertising deception via traditional behavioral methodology. Interpersonal deception detection research shows similar inconsistency in that primed knowledge for deception likelihood does not increase observers’ accuracy at detection (Toris and Depaulo 1984).

In order to explore the neural functions underlying deception detection, college students (N=25) viewed 15 advertisements for new products that varied in their level of perceived deception potential (as determined by pretesting). Each advertisement was assigned to one of three categories (based on pretesting with college students (N=180) from the same population as the subsequent imaging study): low deception potential, mildly deceptive, and highly deceptive. The advertisements consisted of a product picture and descriptive paragraphs similar to a catalog format and were viewed for 50 seconds each.

Broadly described, we observe an inverted-u effect of neural activity where greater processing resources are expended for products that seem moderately deceptive compared to products that have either low or high potential for deception. Based on results from Darke and Ritchie (2007), we predict and find that neural activity associated with comparative processes and hypothesis-testing will be greater in conditions of moderate deception than in low deception conditions as suspicion will not be active in low deception conditions. In comparing processing between moderate and high deception conditions, neural activity associated with highly deceptive advertisements shows truncated processing resulting from the discounting of invalid messages (Schul et al. 1996; Schul et al. 2004). Additionally, prior research suggests that affective processing should also be greater in conditions of higher deception (Darke and Ritchie 2007).

Neural processing evidence from this fMRI study suggests that individuals have quick attentional responses to potentially deceptive claims in accord with behavioral theories of marketplace “defensive” vigilance and biological theories of threat surveillance. Further, the pattern of neural activation suggests an early two-stage process in which heightened attention is first preferentially directed toward highly deceptive material but that this attention shifts as processing of highly deceptive material is truncated and increased attention and belief reasoning is directed toward believable and moderately deceptive material. We interpret these data as indicating a potential risk of moderately deceptive material in that such claims generate prolonged attention as well as expanded comparative processing similar to that garnered by believable claims. While our data do not speak to resulting biases, if a potentially deceptive claim is simultaneously being evaluated for credibility and relative benefit, this would provide a situation in which individual’s credibility judgments may be colored by evaluations of relative benefit.

This research contributes to the existing literatures on deception by describing the brain’s early processing response to potentially deceptive information and by examining this process within the domain of marketplace deception. We find neural evidence that supports recent consumer theories of “defensive surveillance” (Darke & Ritchie 2007) and is in accord with broader conceptualizations of persuasion knowledge in the marketplace (Friestad & Wright 1994). Like recent fMRI research on belief reasoning, we find that activation in BA 7 (Goel & Dolan 2003) and BA 40 (Sommer et al. 2007) is associated with the larger deception detection process. Our findings distinguish between claims that vary in perceived deceptiveness. Importantly we identify “stage 1” visual attention differences that suggest preferential initial processing of highly deceptive claims as well as subsequent “stage 2” processing differences that suggest preferential processing of moderately deceptive and believable claims.


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In order to be successful, it is imperative that salespeople immerse themselves into the nuances of the customer’s organization and pay special attention to subtle cues communicated by customers. By doing so, salespeople can put themselves into the shoes of the members of the buying center and mentally simulate what customers indicate or say they want, and why they want to buy. Following recent developments in neuroscience, we term such processes, interpersonal mentalizing and define it as the activity of inferring another person’s beliefs, desires, risk preferences, intentions, and other mental states or events (Frith and Frith 2003). The
ability to engage in interpersonal mentalizing and read the mind of
the customer has some affinity to the adaptive selling concept (e.g.,
Spiro and Weitz 1990); and the functioning of the drivers of
adaptation in selling interactions, in turn, rests on assumptions
about, and processes going on, in the mind of salespeople. Yet
research to date has utilized methods based only on verbal self-
reports.

Our goal is to study brain processes of salespeople who score
high versus low on interpersonal mentalizing processes. The neu-
roscience literature suggests that interpersonal mentalizing is a
hardwired brain process that occurs spontaneously and largely
unconsciously in social encounters and is centralized in a distinct
network of brain regions: the most consistently activated regions
with mentalizing tasks are the medial prefrontal cortex (MPFC),
left and right temporo-parietal junctions (TPJ), and left and right
temporal poles (TP). Based on a growing body of evidence, we
hypothesize that those who are high (versus low) in interpersonal
mentalizing skills display greater coordinated activation of all
modules implicated in this network.

We investigated the role of mentalizing in personal selling in
four studies. In the first study, a paper and pencil measure that
operationalized interpersonal mentalizing concepts in a selling
context was designed and administered to 132 salespeople. We
refer to the measure as the salesperson theory of mind (SToM) scale
in order to stress the context-specific aspects of our measure and
differentiate it from a generalized theory of mind (ToM) scale
which we use to test criterion-related validity. The results showed
that salespeople exhibit different degrees of interpersonal
mentalizing which can be represented in four distinct, but related,
dimensions, and further the measures of SToM achieve convergent,
discriminant, and criterion-related validity. Moreover, high versus
low scorers on the SToM-scale are relatively more adaptive in
selling situations, are better able to take the perspective of custom-
ers, and show less fear of being evaluated negatively in selling
situations. Study 2 replicated findings of Study 1 and also showed
that the four dimensions of SToM relate significantly with perfor-
ance. The performance measures were then validated on a new
sample of high and low performers.

Study 3 examined the construct validity of measures of SToM
by use of the MTMM matrix and CFA and also tested nomological
validity. The measures showed high trait variance, low error
variance, and very low method variance. Performance was found to be
driven largely by SToM: rapport building influenced performance
indirectly through social anxiety and the other three dimensions of
SToM influenced performance directly.

Study 4 used functional magnetic resonance imaging (fMRI)
to discover whether different functioning of brain regions provide
evidence for individual differences in the ability to mentalize
interpersonally, and in addition provide evidence that the four
dimensions of SToM discriminate between high and low mentalizers.
We tested the hypothesis that high (vs. low) interpersonal mentalizers
display relatively greater activations of specific regions of the brain
(i.e., the MPFC, TPJ, TP) that have been consistently reported in the
literature to be associated with mentalizing tasks.

Twenty participants (10 high and 10 low scorers on the SToM-
scale) were recruited for the fMRI study. The fMRI protocol
consisted of three experimental conditions: Interpersonal mentalizing
(IM), Process, or Unlinked sentences. Participants listened to five
stories of each type presented in a counterbalanced manner while
lying supine in a full-body 3.0 T GE scanner; and functional images
were acquired. In the IM condition, participants listened to stories
and were instructed to imagine the intentionality of the people
interacting with each other in the story. In the process condition,
they thought about how people operate according to well-estab-
lished scripts. The IM and process conditions were designed to be
different at a subtle level; whereas the IM condition explicitly
required interpersonal mentalizing, the process condition did not.
Finally, in the unlinked sentences condition, participants listened to
a series of sentences that did not form a coherent story. Each story
was followed by a question that the participant was instructed to
answer silently to oneself. The process and unlinked sentences
conditions served as control conditions.

Our results were largely consistent with our hypothesis: the
high (vs. low) scorers on the SToM scale showed more activity
during the mentalizing task in the MPFC and TPJ regions of the
brain, but this effect was much weaker in the TP regions, and was
nonexistent when we compared the interpersonal mentalizing task
with the unlinked sentences task. A closer inspection of the data
shows that the TP regions were in fact activated highly in both the
high and low mentalizing groups of salesperson participants. To the
extent that such activation in the TP regions relates to the formation
and use of mental scripts (e.g., Frith and Frith 2003, p. 465), we
speculate that both high and low scoring salespersons equally use
script-based thinking. It thus appears that only for salespersons high
in interpersonal mentalizing is the entire network consisting of the
MPFC, TPJ, and TP fully activated, whereas for persons low in
interpersonal mentalizing, only part of the network, the TP, is
activated. Hence we find evidence suggesting that salespeople
differ in their utilization of the mentalizing network, and that these
differences have considerable behavioral correlates. We explore
possible explanations for the differences in brain activity between
high and low mentalizers. Finally, implications of our findings for
the selection and training of salespersons are considered.

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