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# A Neurophysiological Assessment of Consumers' Emotional Responses to Service Recovery Behaviors: The Impact of Ethnic Group and Gender Similarity

Christo Boshoff<sup>1</sup>

## Abstract

Service marketers are particularly interested in consumers' emotional response to service failure and recovery. However, efforts to measure emotional responses in these types of situations by means of post-encounter, self-report measures are far from satisfactory. In this study a neurophysiological approach is used to measure consumers' emotional responses during a service encounter. This approach enables one to assess the impact that the physical features (ethnicity and gender) of service providers can have on consumers' emotional responses to service recovery efforts throughout an entire service recovery interaction. It emerges that consumer responses to service recovery are characterized by both neutral (not statistically different from the baseline) and negative emotional responses as the service encounter unfolds. Individuals with high similarity to the service provider (in terms of gender and ethnicity) exhibit significantly more negative emotional responses than those with low similarity. However traditional measures of post-encounter satisfaction show no differences between high similarity and low similarity and consumers report fairly positive evaluations of the encounter. This discrepancy suggests that, in a situation where social desirability bias may play a role, consumers may exhibit negative emotional responses but may not report these negative responses. The results suggest a need to reconsider social identity theory and similarity-attraction theory in a service recovery situation because physical similarity between service provider and customer leads to significant negative emotional responses. Managerially, frontline service employees should be trained to ensure adequate sensitivity to potentially negative responses when the complainant is of the same gender and ethnicity as the service provider.

## Keywords

service recovery, neurophysiology, social identity theory, similarity attraction theory

## Introduction

Marketers are interested in consumers' physical features (mainly demographics) because they believe that different categories of people in a market often respond differently to marketing stimuli. Social psychologists are also interested in people's physical appearance but for a different reason. They point out that a person's physical appearance is generally the first piece of information available when meeting a stranger (Dion, Berscheid, and Walster 1972, p. 285). The physical features of others are therefore particularly influential in our assessment of others, and primacy has been shown to contribute to forming lasting impressions (Sousa 2000). One of the salient characteristics of strangers we meet is their category membership, examples of which are ethnicity and gender (Hogg and Vaughan 2008, p. 47).

Although a person's physical appearance is concrete and directly observable, it is frequently linked to traits such as honesty and sincerity, which are often based on nothing but inference (Park 1986). However, people sometimes misrepresent

people and events, with the result that social inferences are at times inaccurate. Since these inaccuracies can have serious consequences, social researchers are increasingly focusing on the role of feelings (affect, emotions, and mood) in the human decision-making process (Hogg and Vaughan 2008, p. 72). Although people will cognitively evaluate a situation, this evaluation is normally followed by both an affective and a physiological response. The affective component of such a response is largely automatic and can be described with one of two terms, either "harm" (resulting in avoidance behavior) or "benefit" (evoking approach behavior). These emotional responses influence thought, judgment, and subsequent behavior.

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Owing to the high level of human involvement in service delivery and consumption, service marketers are particularly interested in how consumers respond to physical stimuli (including the physical appearance of service providers), and how these stimuli influence judgment and subsequent behavior (Bitner 1990). A relatively recent area of interest is the role of emotions in situations that are particularly emotion laden: service failure, customer complaints, and service recovery (McCull-Kennedy et al. 2009; Tronvoll 2011). However, efforts to measure emotional responses in these types of situations by means of post-encounter, self-report measures are far from satisfactory.

This study overcomes the limitations of previous studies that relied almost exclusively on post-encounter, self-report approaches to measure consumers' emotional responses during the service encounter. Instead, a neurophysiological approach was used to assess the impact that physical features (the ethnic origin and gender) of service providers can have on consumers' emotional responses to service recovery efforts. Neurophysiological measurement avoids the bias that responses to sensitive issues such as ethnic origin and gender may contain and offers new perspectives on how consumers experience a service recovery situation.

Because neurophysiological measurement allows a temporal assessment of consumers' responses over time, it emerged that consumer responses to service recovery are characterized by both neutral (not statistically different from the baseline) and negative emotional responses as the service encounter unfolds (other methods only allow a single, static assessment). Specifically, similarity (in terms of ethnicity or gender) between the consumer and the employee results in much stronger negative emotions than when there is dissimilarity. More importantly, post-encounter satisfaction measures using a pencil-and-paper test (perceptual data) show no differences between high similarity and low similarity and consumers report fairly positive evaluations of the encounter. This discrepancy suggests that, in a situation where social desirability bias may play a role, a consumer may exhibit negative emotional responses but may not report these negative responses when answering a simple question such as "How satisfied would you be?" Based on these results, a careful reconsideration of social identity theory and similarity-attraction theory in a service recovery situation is called for because, physical similarity between service provider and customer leads to significant negative emotional responses. It appears as if such similarity may raise pre-encounter consumer expectations to unrealistic levels, and this may be the precursor leading to the negative emotional response when these expectations are not met.

### The Role of Emotions in Consumers' Response to Service Recovery

Research has shown that consumers, when exposed to marketing stimuli, exhibit a variety of different emotions that influence outcome variables such as word of mouth, customer

loyalty, and complaint behavior. However, the literature on emotional responses still reveals a number of caveats. Measurement has been a particularly thorny issue (Bagozzi, Gopinath, and Neyer 1999). Another source of criticism is the fact that the impact of negative emotions on service delivery has not been adequately investigated. This situation is a cause for concern, considering that many customers experience strong emotional reactions particularly in response to service failures and service recovery encounters (Smith and Bolton 2002, p. 7). Although some attempts have been made to measure consumers' emotional responses both in service encounters (Matilla and Enz 2002; Matilla, Grandey, and Fisk 2003) and in service recovery situations (DeWitt, Nguyen, and Marshall 2008; Schoefer and Diamantopolous 2008a, 2008b; Smith and Bolton 2002), they have all used post-encounter, self-report assessments on which the subsequent conclusions were based. In these studies consumers were asked to indicate the degree to which they feel they experienced each emotion on some ordinal response scale such as a Likert-type scale or a semantic differential scale. This approach, as several authors have pointed out, may be flawed (McCull-Kennedy and Smith 2006; Richins 1997). Even efforts to *deduce* emotional responses by observing customers' eye contact, smiling and thanking behavior (Matilla and Enz 2002), or based on responses to pictures (Grimm 2005) may have limitations as it relies on the rational interpretation of physical responses (Zaltman 2003, p. 38-39).

This study overcomes these limitations by focusing on consumers' emotional responses that are not controlled by the central nervous subsystems (as will be the case if a self-report type test is used). This method is known as neurophysiological measurement. Using it, one is able to enhance the validity of empirical results when the responses to a service situation are investigated, and in particular when such service situations may cause social desirability bias to arise. This observation-like approach to data collection allows the researcher to bypass the mind's "cognitive rationalizer" and to circumvent potentially inaccurate reports from consumers (LaBarbera and Tucciarone 1995, p. 37).

### The Role of Physical Stimuli in Service Marketing and Attitude Formation

Bitner's (1990, 1992) seminal work on the impact of physical surroundings showed that the physical appearance of service providers strongly influences customers' evaluations and perceptions. However, an important focus in this stream of research has not been on the role of physical features *per se*, but on the similarity between the physical characteristics of people in marketing roles/positions and those of consumers. Both social identity theory and similarity-attraction theory suggest that what consumers visually see during an interaction will impact their perceptions and subsequent evaluation of the encounter, dissatisfaction/satisfaction, and behavior (such as buying or not buying).

## Social Identity Theory and Similarity-Attraction Theory

Similarity-attraction theory proposes that individuals have a preference for, and evaluate more positively, those similar to themselves based on their personalized social category (Strauss, Barrick, and Connerly 2001). In other words, in a kind of stereotyping, people learn to anticipate how “they” will behave and how “I” should respond. Once social categorization occurs, the emphasis soon falls on how similar the in-group (“us”) is and how different “we” are from “them,” by assigning the prototypical characteristics of the category into which the person is classified (Ashford and Mael 1989, p. 21).

Similarity-attraction and social identity theory have at least one common feature: the relations among members of the in-group are much stronger than those with the out-group. This asymmetry is often the result of social categorization and stereotypes of the out-group that tend to lead to prejudice and even discrimination (Gaertner et al. 1993).

To summarize, the human brain, when encountering a stranger, organizes the available stimuli and information by categorizing the person (often based on stereotypical information) into a social category such as age, ethnicity, or gender (Hogg and Vaughan 2008, p. 65). In the present study, the role of physical stimuli in a service recovery situation is examined. More specifically, based on the social psychology theories of similarity-attraction and social identity theory, the question is addressed: are consumers more likely to respond positively to the service recovery efforts performed by service providers who are physically similar to themselves? Two physical features that play a prominent role in this respect—ethnic origin and gender—are the focus of this study.

## The Role of Ethnic Origin

The role of ethnic origin in attitude formation and decision making has been the focus of studies in disciplines such as psychology and sociology for decades (Smedley and Baton 1978) and more recently in marketing and advertising in particular (Taylor and Lee 1994; Wilkes and Valencia 1989). The results of these and other studies revealed two central themes: (1) there is a deeper processing of one’s racial in-group; and (2) the ethnic origin of both consumers and service providers impacts on consumers’ evaluation of their interaction with employees. However, whether this premise holds for emotional responses in a service recovery situation has not previously been investigated. Against this background, it is proposed that positive emotional responses are more likely when a service recovery is performed by a service provider who is of the same ethnic background as the customer. We therefore hypothesize:

*Hypothesis 1:* Positive emotional responses are more prevalent when a service recovery is performed by a service provider who is of the same ethnic background as the complaining customer.

## The Role of Gender

Although researchers have reported that gender often explains only limited amounts of variation in a range of dependent variables (Fischer and Arnold 1994), the extent to which gender differences have been reported in a variety of studies suggests that it is a variable that cannot be ignored in consumer behavior-related research, and in particular in service recovery research. McColl-Kennedy, Daus, and Sparks (2003), for instance, found that males and females differ in how they believe service recovery should be carried out, and that they differ in their emphasis on the different elements of a service recovery effort. The same applies to emotional responses. Males and females demonstrate different emotional responses to a range of stimuli, including those in service encounters (Matilla, Grandey, and Fisk 2003). For instance, Fischer et al. (2004, p. 87) have pointed out that females are more likely to demonstrate higher levels of sadness, fear, shame, and guilt than males, while the latter are more likely to show anger and hostility.

However, whether this contention also applies to emotional responses in a service recovery situation has never been investigated. Against this background it is proposed that positive emotional responses are more likely when a service recovery is performed by a service provider who is of the same gender as the customer, as similarity and social identity theory seem to suggest. We thus hypothesize that:

*Hypothesis 2:* Positive emotional responses are more prevalent when a service recovery is performed by a service provider who is of the same gender as the complaining customer.

*Hypothesis 3:* Positive emotional responses are more prevalent when a service recovery is performed by a service provider who is of both the same ethnic background and the same gender as the complaining customer than when both the ethnic background and the gender differ from those of the complaining customer.

## Methodology

Based first on our belief that self-report measures of emotional responses of emotions could be flawed, and second that the inconsistencies in reported results relating to sensitive topics such as ethnicity and gender could be attributed to respondents exhibiting social desirability bias when responding to researchers’ questions, the data to address the propositions were collected by means of a neurophysiology measurement approach. Specifically, brain activity (electroencephalography [EEG]), changes in skin conductance (galvanic skin response [GSR]), and facial muscle activity (electromyography [EMG]) were measured.

## Neurophysiology Measurement

Four dimensions of emotions are commonly described (Tronvoll 2011). These are arousal, valence, potency, and

intensity. Two of these dimensions are important in this study. Arousal relates to the customer's level of energy in response to a stimulus. The valence dimension refers to whether an event is perceived as positive, leading to positive emotions (pleasant), or negative, leading to negative emotions (unpleasant).

## EEG

A sizable body of knowledge, derived from studies that have explored the relationship between human emotions and motivation, concurs that two primary motivational systems determine human behavior (Harmon-Jones and Allen 1998; Ohme, Matukin, and Szczurko 2010). One system generates behavior that is based on an anticipated undesirable or negative outcome, more commonly known as avoidance behavior. The other anticipated outcome is regarded as positive or beneficial and is known as approach behavior (Zeithaml, Bitner, and Gremler 2006). Approach behavior is associated with positive emotions such as activation, engagement, interest, joy, and happiness, while avoidance behavior is associated with negative emotions such as disinterest, disengagement, sadness, fear, and disgust (Davidson 1993; Davidson et al. 1990; Fox 1991).

The proponents of contemporary neurophysiological technologies argue that this technology can not only distinguish between approach behavior and avoidance behavior but also serve as a link between what people say and what is actually on their minds. In a consumer behavior context, neurophysiology technologies are able to describe the association between attention, emotions, and arousal. In other words, EEG measures brain activity in response to exposure to some form of stimulus. An important advantage of using EEG is its high temporal resolution: EEG is capable of recording data in sub-millisecond intervals, while alternative methodologies, such as functional magnetic resonance imaging (fMRI), have a resolution time of several seconds (Ohme, Matukin, and Szczurko 2010). This high temporal resolution is of considerable benefit to marketers who—thanks to powerful computers and sophisticated data analysis programs such as MATLAB—can now detect changes in brain activity as a customer moves through a service encounter, viewing an advertisement or being exposed to different product packaging options.

In this study, frontal symmetry was measured by means of EEG, and specialized procedures and algorithms were used to control individual differences in the baseline cortical activation. The EEG measurement used 32 electrodes on each subject's scalp according to the 10–20 electrode placement system. The electrodes were placed in a bipolar fashion, as proposed by Fridlund and Cacioppo (1986). Brain signals were digitalized and preprocessed (independent component analysis [ICA] applied, smoothed, and downsampled) to 512 Hz. Artifact rejection was based on the physical properties of the registered signal as well as on statistical analysis within and between participants.

## GSR

GSR refers to a change in the electrical conductance of the skin, which is influenced by its moisture level. Electrical activity is produced by the activity of the eccrine (sweat) glands that are widely distributed throughout the human skin and are regulated by the autonomic nervous subsystems. Variations in galvanic skin conductance are the result of physiochemical changes and are therefore an indication of emotional arousal. Because humans have no control over their autonomic nervous systems, these electrodermal responses (as the glands dilate) are unbiased indications of activation or arousal in response to stimuli.

In this study, GSR was measured using 9-mm diameter Ag/AgCl electrodes placed on the distal phalanx of the forefinger and the middle finger of the left hand. Preprocessing included filtering and downsampling to 32 Hz. Differential analysis, wavelet transformation, and other mathematical and statistical tools were used to transform the signal. The GSR (arousal) measure has a base level of zero and so cannot be a negative value. The higher the index, the stronger the arousal the subject has experienced.

## EMG

Registration of facial microexpressions can be directly connected to emotional states (Dimberg and Petterson 2000; Larsen, Norris, and Cacioppo 2003). EMG measures minute changes in the electrical activity of muscles that reflect small, often unobservable muscle movements. The *corrugator supercilii* muscle runs over the brow (activation draws the brow together) to produce frowns; the *orbicularis oculi* muscle is under the eye; and the *zygomaticus major* on the cheek and draws the end of the mouth up and back. Facial EMG activity can detect muscular activity that is too subtle and too fleeting to be observable by the human eye (Cacioppo et al. 1986, p. 261) and the fact that facial EMG activity can differentiate between both the valence and the intensity of affective reactions has been empirically demonstrated (Cacioppo et al. 1986; Dimberg 1990).

It has been widely acknowledged that human smiles can be both voluntary and involuntary. The activation of both the *zygomaticus major* and the *orbicularis oculi* muscles has been shown to be associated with left-side frontal activation (Fox and Davidson 1988), spontaneously occurring during the emotion of enjoyment (Ekman, Davidson, and Friesen 1990, p. 342).

In short, facial EMG measures conscious and subconscious muscle movement in the face and can be interpreted as an expression of emotions (Larsen, Norris, and Cacioppo 2003) independent of cognitive activity (Dimberg, Thunberg, and Elmehed 2000). In this study, we follow the approach of Dimberg (1990) and his associates (Dimberg, Thunberg, and Elmehed 2000; Lundquist and Dimberg 1995) to measure muscle movement. They have proposed that the difference between *zygomaticus major* activity (social smile) and *corrugator*

supercilli activity (frown) suggests an emotional response. In lay terms, if corrugator supercilli activity is more dominant than zygomaticus major activity, it is indicative of a negative emotional response, while the opposite is also true.

In this study, EMG was recorded by miniature Ag/AgCl electrodes from the corrugator supercilli, zygomaticus major, and orbicularis oculi muscles on the left side of the face. Muscle activity signals were digitalized and preprocessed (filtered, smoothed, and downsampled) to 32 Hz. Muscle activity was evaluated both for the entire service recovery encounter (video clip) and for specific components of the service encounter (referred to as scenes in Appendix A).

### Research Design

The research design of this study can be described as a laboratory experiment, although the data were collected by means of electronic observation. Each subject was exposed to exactly the same scenarios in the form of a video clip illustrating a hypothetical service failure and recovery situation involving a travel agent. The only exception was the manipulation of the physical appearance of the travel agent (ethnicity and gender). The words used in the scenario (video clip) are provided in Appendix A. These words, expressed by the complaining customer, were scrolled across the screen to control for the influence of tone of voice. The nature of the service provider/customer interaction can be described thus: a prospective airline traveler complains to a travel agent about unreasonable financial penalties imposed on her, owing to an unanticipated need to cancel a booked transatlantic flight.

Four hypothetical service failure/service recovery scenarios were created in the form of video clips lasting slightly more than 2 minutes each. One featured a White male travel agent, one featured a White female travel agent, one featured a Black male travel agent, and one featured a Black female travel agent.

A within-subject design was used, and each participant viewed all four scenarios. All four scenarios (including distracters) were counterbalanced and presented in random order. The only task expected of the subjects was to watch the stimuli presented on the screen. Buffer assignments (a cognitively engaging task—e.g., fragments of the STroop test) were used. Within-subject designs are common in these types of studies (Hazzlet and Hazzlet 1999), and all subjects were exposed to the stimuli individually.

Before being exposed to each scenario, a baseline was measured for 30 seconds. Before the test started, the subjects were told that they had to pretend that they were the customer in the scenario.

### The Sample

The data were collected by a commercial market research firm. The group of 64 subjects consisted of 16 White males, 16 White females, 16 Black males, and 16 Black females. The sample size compares favorably with others that have done similar studies (Cacioppo et al. 1986—28 subjects; Ekman,

Davidson, and Friesen 1990—37 subjects; and Hazzlet and Hazzlet 1999—49 subjects). The subjects were all aged between 26 and 45 years and had dealt with a travel agent at least once before.

To control for the possible influence of the tone of interaction between service provider and customer during the interaction, all scenes were designed to be neutral (not really confrontational) and business like. The scenes can be described in the following terms. Scene 1: Welcome (greetings, offer to help); Scene 2: Active listening by travel agent as customer complains; Scene 3: Explanation of airline rules by travel agent; Scene 4: Listening; Scene 5: Data verification and problem solving; and Scene 6: Recovery: accepting responsibility, explanation, resolution and apology.

### Data Analysis Procedures

The data were analyzed using repeated measures analysis of variance (ANOVA) and paired sample *t* tests. Adjustments for Type 1 errors ( $\alpha$ ) were made by applying Bonferroni's correction in order to account for multiple comparisons.

The baseline was normalized for each person individually immediately before exposure to each scenario, as recommended by Harmon-Jones (in press), following a 30-second resting state. The baseline is thus recorded from this resting state before exposure to the scenario. The order of exposure to the different scenarios was randomized and equally distributed in the analyzed groups.

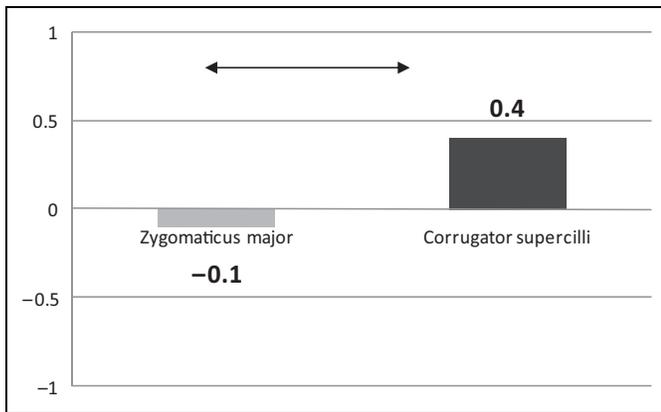
The facial muscle index measure was calculated by subtracting the corrugator supercilli activity from the zygomaticus major activity to generate either positive reactions (above zero) or negative reactions (below zero). The sign of the index measure is thus also an indication of valence.

### Results

In this study, the results related to brain activity (EEG) and skin conductance (GSR) are reported in tabular form. It must be kept in mind that these measures are relative: they are compared with a baseline measure. In the case of EEG, this resting state is known as resting frontal asymmetry. Facial muscle assessments are reported graphically.

For the whole sample and irrespective of the ethnicity and gender of the service provider, frontal asymmetry (brain activity) and arousal (GSR) did not differ significantly from the baseline (for descriptive purposes referred to as a neutral response in this study). In other words, given the relatively mild confrontational nature of the travel agent action, there is no real evidence of either approach or avoidance behavior (EEG = 0.09), while arousal remained fairly constant at mild levels (GSR = 2.39). The result of the facial muscle assessment is shown in Figure 1.

Figure 1 illustrates the results of the facial muscle activity (EMG) of the entire sample using the methodology proposed by Dimberg (1990), Lundquist and Dimberg (1995), and Dimberg, Thunberg, and Elmehed (2000). The scores for



**Figure 1.** Facial muscle assessment (electromyography [EMG]).  
↔ = significant difference between the two muscles' activity,  $p < .05$ .

**Table 1.** Analyses per Scene: Entire Sample

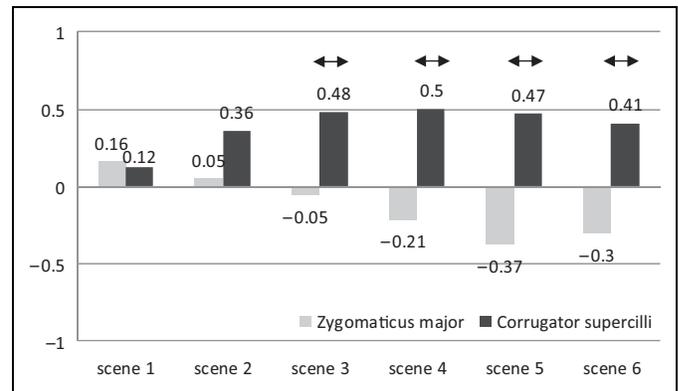
Scenes	Frontal Asymmetry (EEG)	Arousal (GSR)
Scene 1—Welcome	0.04	2.90
Scene 2—Active listening	0.09	2.16
Scene 3—Explanation	0.03	2.14
Scene 4—Active listening	0.25*	1.94
Scene 5—Problem solving	0.08	1.98
Scene 6—Recovery	0.12	2.69

Note. EEG = electroencephalography; GSR = galvanic skin response. \*Significant reaction compared with baseline (resting state),  $p < .05$ .

zygomaticus major and corrugator supercilli are recorded and statistically compared. The results demonstrate that corrugator supercilli is more active than the zygomaticus major muscle,  $t(52) = 2.477, p < .05$ , which indicates a negative emotional response. Thus, when exposed to a service recovery situation, the facial muscles suggest a negative emotional response (see Figure 1).

To utilize the temporal benefits that the millisecond-by-millisecond data collection of neurophysiological measurement offers, the data were then analyzed in terms of each scene in the hypothetical scenario, as described in Table 1. Table 1 shows that, for the whole sample, the neural activity measure—frontal asymmetry (EEG)—is only significant (0.25,  $p < .05$ ) during Scene 4, active listening. The emotional response during this recovery behavior scene (the travel agent listening attentively to the complaining customer) reveals that respondents “engage” with the stimuli because the travel agent’s response in this scene is important to them. This response suggests approach behavior. So, by actively listening, the service provider is able to engage the complaining customer, as measured by brain activity. None of the other scenes (service recovery behaviors or activities) was able to elicit either approach or avoidance behavior.

The GSR measure (Table 1) did not show any significant deviation from the baseline during any of the scenes. There were fairly constant levels throughout, and it can therefore be described as neutral.



**Figure 2.** Facial muscle activity during each scene (EMG).  
↔ = significant difference between the muscles,  $p < .05$ .

Figure 2 depicts the facial muscle activity as recorded during each scene of the service recovery interaction. The scores for zygomaticus major and corrugator supercilli in each scene were again statistically compared. The results demonstrate that corrugator supercilli is more active than the zygomaticus major muscle ( $p < .05$ ) during scenes 3, 4, 5, and 6, indicating negative emotions. Table 2 provides a statistical comparison of these difference scores (index scores).

From Table 2 it appears that, after the first two scenes (which elicited neutral responses), negative emotional responses characterize service failure and recovery situations, irrespective of the recovery behaviors exhibited by service providers. It is noticeable that the final scene—during which the service recovery takes place, and which includes behaviors such as accepting responsibility, resolution, explanation, and apology—has produced very high scores of negative expression.

The next phase in the data analysis process was to analyze the data in the context of ethnic and gender criteria to address Hypotheses 1, 2, and 3.

Table 3 shows the results (EEG and GSR) when the gender and ethnicity of both the service provider and the subject are taken into consideration. Table 3 suggests that the service recovery efforts of all service providers, irrespective of ethnicity or gender, do not illicit approach or avoidance behavior among subjects, while arousal did not deviate significantly from the baseline and remained fairly constant.

Figure 3 depicts the facial muscle activity (EMG) when the subjects viewed the service recovery efforts of travel agents who were similar to themselves in terms of gender and ethnicity. Figure 3 shows that the corrugator supercilli muscle is significantly more active than the zygomaticus major muscle ( $p < .05$ ), indicating negative emotions, *only* when respondents are evaluating the travel agent who is of the same ethnicity and gender as themselves.

In other words, when the service provider is of the same gender as the subject, strong negative facial expressions occur (higher corrugator supercilli activation over the zygomaticus major: 0.43 vs.  $-0.22, t(50) = 2.689, p < .05$ ). At the same

**Table 2.** Comparison of facial muscle activity: Entire Sample (EMG)

Scene	t Value	Significance Level <sup>a</sup>	Conclusion
1. Welcome	-1.03	$p > .05$	Neutral emotion
2. Active listening	-1.44	$p > .05$	Neutral emotion
3. Explanation	-2.33	$p < .05$	Negative emotion
4. Active listening	-2.87	$p < .05$	Negative emotion
5. Data verification	-3.28	$p < .05$	Negative emotion
6. Recovery	-3.88	$p < .05$	Negative emotion

Note. <sup>a</sup> Degrees of freedom = 35 in all cases.

**Table 3.** Main Effects: The Influence of Ethnicity and Gender on Brain Activity (EEG) and Galvanic Skin Response (GSR)

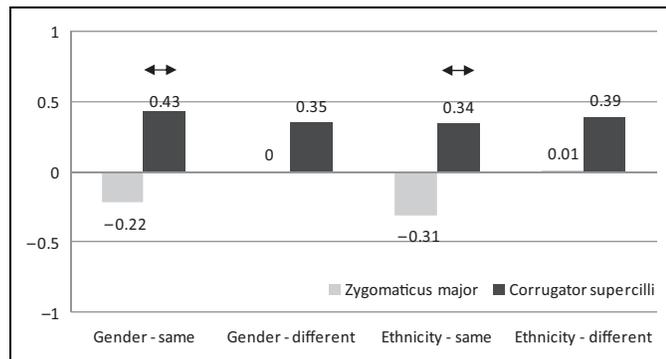
Demographics of Travel Agent		Frontal Asymmetry (EEG)	Arousal (GSR)
Gender	Same	0.06	2.38
	Different	0.10	2.30
Ethnicity	Same	0.07	2.01
	Different	0.16	2.64

Note. EEG = electroencephalography; GSR = galvanic skin response. \*Significant reaction compared with the baseline,  $p < .05$ .

**Table 4.** Interaction Effects: The Impact of Ethnicity and Gender on Brain Activity (EEG) and Skin Conductance (GSR)

Demographics of Travel Agent	Frontal Asymmetry (EEG)	Arousal (GSR)
Same gender, same ethnicity	-0.07	1.94
Same gender, different ethnicity	0.24	2.71
Different gender, same ethnicity	0.16	2.07
Different gender, different ethnicity	0.04	2.54

Note. EEG = electroencephalography; GSR = galvanic skin response. \*Significant reaction compared with the baseline,  $p < .05$ .

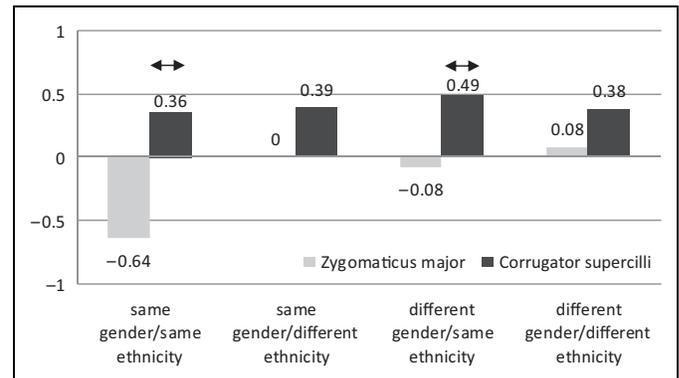


**Figure 3.** Main effects: the influence of ethnicity and gender on facial muscle activity.  $\leftrightarrow$  = significant difference between the muscles' activity,  $p < .05$ .

time, in the case of gender difference, neither positive nor negative reactions are observed (no significant difference between the muscle activity,  $p > .05$ ). It is clear that subjects were more likely to experience negative emotions toward a travel agent of the same gender as themselves.

A similar situation emerges when the same-ethnicity evaluations are considered (Figure 3). In other words, when the service provider is of the same ethnicity as the subject, we again observe a tendency to express negative reactions (higher corrugator supercilli activation over the zygomaticus major: 0.34 vs. -0.31,  $t(48) = 2.861, p < .05$ ); but this pattern (negative expression) is not present when the service provider is of a different ethnicity than the subject (no significant difference between the muscles activity,  $p > .05$ ).

This finding is not consistent with social identity and similar attraction theory. Based on these results, considering the main



**Figure 4.** Facial muscle activity: interaction of ethnicity and gender.  $\leftrightarrow$  = significant difference between the muscles,  $p < .05$ .

effects of ethnicity and gender, there is thus no support for either Hypothesis 1 or 2.

The third hypothesis posits that the most positive emotional responses should emerge when a service recovery is performed by a service provider who is of *both* the same ethnic background and the same gender as the customer, compared with the situation when both ethnic background and gender differ from those of the customer. Both the EEG and GSR measures reported in Table 4 show that the activation of the brain and the skin response measures do not differ significantly from the baseline (resting state).

The analysis of the facial muscle activity is reported in Figure 4. Figure 4 graphically represents a comparison of facial muscle activity when there is an interaction between ethnicity and gender. The most negative emotional responses emerged when the service providers were of the same ethnicity and gender as the subject (highest difference between corrugator

supercilli activation over the zygomaticus major: 0.36 vs.  $-0.64$ ,  $t(50) = 3.134$ ,  $p < .05$ ).

Further analysis shows that the subjects also react particularly negatively—higher corrugator supercilli activation than zygomaticus major (0.49 vs.  $-0.08$ ,  $t(50) = 2.311$ ,  $p < .05$ )—when the service provider was the opposite gender but of the same ethnicity. In other words, the subjects seem to have the most negative emotional response to same ethnicity travel agents.

To summarize, when the subjects cannot control their responses, the most negative responses are exhibited for those who are similar to themselves. This is in direct contrast to what social identity and similarity-attraction theories suggest. The results summarized in Table 4 and Figure 4 thus do not provide support for Hypothesis 3.

### *Post-Encounter, Self-Report Satisfaction with the Service Encounter*

After the subjects had viewed the scenarios, they were asked to rate their satisfaction with the travel agent's service recovery effort with a 4-item satisfaction instrument (Cronbach's  $\alpha .874$ ) adapted from Voss, Parasuraman, and Grewal (1998). The 4 items (I am happy with the way the travel agent handled my complaint; The travel agent did what he or she could to solve my problem; My complaint was not handled well (r); I am pleased with the way my complaint was handled) were linked to a 7-point Likert-type scale, where a higher score indicated a higher level of satisfaction. The results were subjects rating a same-gender, same-ethnicity travel agent—mean score 4.88; subjects rating a different gender, same-ethnicity travel agent—mean score 4.75; subjects rating a same-gender, different ethnicity travel agent—mean score 4.72; and subjects rating a different gender, different ethnicity travel agent—mean score 4.88. An ANOVA detected no statistically significant differences among the four conditions,  $F = 0.172$ ,  $df = 3$ ,  $p > .05$ . In other words, when asked to rate satisfaction using a self-report measure, all the subjects—irrespective of the physical features of the service provider—rated the service provider almost identically. More importantly, on the conscious and verbal level they appear to be fairly satisfied (all above 4.70 on the 7-point scale).

Although it must be acknowledged that the overall self-report assessment is not a conscious effort to be dishonest, using neurophysiological measurement we know that this global assessment is not the full picture. Instead, when answering such simple questions they report different responses than they exhibit physiologically. In addition, there is enough evidence in the psychology literature (Hogg and Vaughan 2008, p. 46-47) that a single event in a long interaction can dominate the overall assessment they report (e.g., primacy or latency effect).

It is against this background that we propose that neurophysiological measurement is a methodology that can add considerable value in situations where emotions may influence judgments, and in particular where there is a possibility for social desirability bias.

## **Discussion**

In circumstances when emotional responses to controversial or sensitive issues are investigated, social desirability bias is a source of concern, in particular when self-report tests are used. In addition, self-reports are sometimes questionable because they are retrospective in nature and rely on the person's post-encounter cognitive interpretation of his or her own mental or behavioral responses (Cacioppo 2002, p. 823).

The measurement of neurophysiological responses allows the researcher to bypass the mind's cognitive rationalizer and circumvent potentially inaccurate reports from consumers (LaBarbera and Tucciarone 1995, p. 37). Neuroscience is based on the premise that our observation of biological, cognitive, and social phenomena will enhance our understanding of the human mind, its response to stimuli, and the behavior it dictates. Thus, an advantage of using a neurophysiological approach to measure consumer responses to what can be described as sensitive issues—such as ethnic origin—is the avoidance of social desirability bias.

Furthermore, self-report tests and observations—and thus the cognitive interpretation of emotional responses—are one-dimensional attempts that cannot detect the subtleties of varying emotional responses over a period of time, such as during a service encounter. These methods can at best only classify a service encounter as positive, neutral, or negative as a single measure. Using these data collection methods, it is thus not possible to say whether the emotional states of those involved in an interaction actually changed during the duration of the interaction. In addition, the temporal assessment of a neurophysiological measurement allows us to tell when emotional responses change from, say, neutral to negative or to positive.

It is therefore not surprising that almost all earlier studies that have tried to measure emotional states in service recovery encounters have revealed that respondents reported "negative" emotions. The results of this study suggest that this is a highly simplistic conclusion: we now know that emotional states change over time or during a service encounter. The methodology used in this study overcomes the limitations of earlier work on emotional responses in service recovery situations, and in particular those related to the physical characteristics of both service providers and service customers.

## **The Contribution of this Study**

### *Theoretical Contribution*

This study's findings are somewhat inconsistent with what has been published in the literature, based exclusively on self-report tests (McCull-Kennedy et al. 2009) and observation of emotions (Matilla and Enz 2002). The analyses suggest that a service failure/recovery encounter is characterized by *both* neutral and negative emotional responses from consumers. Thus the assumption of only negative emotional responses in a service failure/recovery situation is not necessarily true. One has to accept, however, that the intensity of the emotion will be

influenced by the nature of the stimulus that induced the emotion (McCull-Kennedy and Smith 2006).

At first glance the findings of this study appear to contradict similarity-attraction and social identity theory in a service recovery context. A service recovery action performed by someone who is of the same ethnicity and/or gender does not elicit a more positive emotion than when the service provider is from a different ethnicity and gender, as these two theories suggest. In fact, same-gender and same-ethnicity service providers elicit particularly negative emotional responses. These findings demonstrate that the value of these theories in a situation characterized by complaints, unhappiness, and negativity needs to be reconsidered.

This reconsideration needs to focus on the role of expectations in customer evaluations. The findings concerning negative reactions to same-gender and same-ethnicity providers seem to suggest that people may have higher expectations of those who are similar to themselves. These higher pre-encounter expectations seem to lead to more negative emotional responses to service providers similar to themselves when these higher expectations are not confirmed than when employees differ from them physically.

It is possible that there may be more subtle forces at play in service recovery situations. Although not directly examined in this study it can be that social identity theory and similarity-attraction theory may be accurate in predicting that customers *initially* prefer to deal with service providers who are similar to themselves, because they believe that these service providers are likely to give them the “best possible deal,” and they may feel more comfortable when expressing their needs and expectations. For instance, the welcome scenes in each scenario of same-gender, same-ethnicity travel agents all revealed neutral or positive responses. Initially facing someone of the same-gender and -ethnic origin may heighten expectations of a satisfactory outcome later. However, once the interactions started it is a different story. Same-gender, same-ethnicity travel agents produced very negative emotional responses during the subsequent service failure and recovery scenes of each scenario. This negative response to same-gender, same-ethnicity service providers may suggest that people like to deal with people similar to themselves as long as things are going to plan; but if their heightened expectations are not confirmed, they respond particularly negatively. This perspective could also explain the inconsistent findings related to similarity theory in the literature, as the role of *changing* expectations during a customer-service provider encounter has not previously been adequately captured in similarity-attraction-type research.

### Methodological Contribution

Despite economic theories that are still based on the premise of the analytical “rational man,” we know that people often make decisions based on intuition, emotions, and aggregated feelings, rather than on cold, calculated reasoning (LaBarbera and Tucciarone 1995, p. 34). Marketers in particular often observe (e.g., through database analyses of the contents of shopping

baskets or data mining analyses) the irrational buying decisions of consumers. One reason for this unpredictable behavior, pointed out by psychologists such as Uleman and Bargh (1989) and Zaltman (2003), is that a fair amount of mental processing is unconscious. In other words, consumers often think in an automated manner, and many motivations and behaviors are not consciously “controlled.” Due to the influence of these unconscious processes, consumers themselves are often not even aware of the reasons for some of their reactions.

The most important advantage of neurophysiological observation is that subjects do not know that their feelings are being measured, and they are unable to adjust their responses at will. The methodology offers an important advantage to researchers when attitudes toward sensitive topics—and in particular those where prejudice can play a role—are under investigation, and where there is the risk that people may respond in a way that is socially desirable (Greenwald and Banaji 1995). Neurophysiological measurement also overcomes problems such as respondents’ inability to recall past events or behaviors.

The methodological contribution of this study is therefore multifaceted. First, it overcomes the obvious limitations of post-encounter, self-report measures of emotions. More importantly, given that both neurological and physiological measures were taken, it offers three different measures of physiological responses to different service recovery behaviors.

The second methodological contribution is the fact that neurophysiological measures track emotional responses every millisecond during a service encounter that, in this study, lasted longer than 2 minutes (see Appendix A). This level of detail allows the researcher to assess whether individual actions taken by a service provider (such as smiling) or specific tactics (providing an explanation) impact the aggrieved customer’s emotional response. None of the approaches used in past research to assess consumers’ emotional responses in general, and in a service delivery or service recovery situation in particular, are able to generate this level of detail.

The findings reported here suggest implications for both the research conducted by service managers and for future training considerations.

### Managerial Contribution

It can be argued that understanding your customers better than competitors can offer managers not only a significant competitive advantage but one that may be difficult to copy—certainly over the short to medium term. But as some authors have pointed out, although much of modern business has been reengineered in recent years (communication, social media, improved sustainability in production and marketing, to name but a few), how we try to understand consumers have not changed (Zaltman 2003). As Zaltman (2003) points out, most traditional research methods address at a rather superficial level what consumers think about what managers think consumers are thinking about. But we know that consumer decision

making is not independent of their biological responses. Neurophysiological research is a relatively new research technique that offers service managers the opportunity to investigate what lies deeper in the human mind than the rational and the logical. This is particularly important if one considers that consumer decision making is influenced by both unconscious thoughts and feelings and conscious ones. In other words, we call on service managers to augment their traditional research efforts with insights from the unconscious mind.

Because neurophysiological measurement is “independent” of concerns about issues such as the validity of measurement scales, measurement properties, interpretation issues, and the like (driving much of the measurement invariance concerns in the literature), it offers managers an opportunity to bypass these methodological concerns in cross-cultural research in particular. In other words, if service managers are concerned that different cultural groups (or any other groups for that matter) in a market may respond to service encounters differently, but fear that their more traditional measures could produce biased and misleading results due to measurement concerns, neurophysiological measurement may overcome these concerns.

Calls for service managers to focus their training efforts on aspects such as the interpersonal and communication skills of the incumbents, or training them to customize their service recovery responses, as proposed by McColl-Kennedy et al. (2003), are clearly important. However, these efforts have to be refined to ensure adequate sensitivity to potentially negative responses when the complainant is of the same gender and ethnicity as the service provider. Another theme of such training should be that the frontline service provider must be made aware that a customer may subconsciously have much higher expectations of them to solve their service-related problems when both service provider and complaining customer share the same physical features such as ethnicity and gender. In these situations, the skillful management of expectations will be valuable.

Emotional responses sometimes elicit physical responses that are observable. Examples include perspiration, shortness of breath, and a changed tone of voice, to name a few. Service providers need to be trained how to detect these telltale signs of emotional responses as early as possible to prevent severe emotional outbursts such as physical expressions of anger and even customer rage.

Another proposed preventative theme in training service providers is based on the concept of emotional contagion (Howard and Gengler 2001). If a complaining customer walks up to a service provider to lodge a complaint and the service provider appears to be calm and collected or even in a good mood, the customer will in all probability “mimic” the service provider’s behavior. If a service provider thus has to deal with a complaining customer with the same physical features as themselves they need to be made aware that a calm, unemotional demeanor can prevent a negative emotional response from a complaining customer.

### Limitations of the Study

Most studies using observation as a means of collecting data suffer from the limitation of a limited sample size that can be

questioned on the basis of representivity and limited statistical power. The study reported here is no exception. Unfortunately the prohibitive cost of neurophysiological measurement made the involvement of a larger, more representative sample impossible. In terms of statistical power, the developers of the techniques used in this study have considerable empirical evidence that confirms that the results converge satisfactorily when the sample size studied reach about 40 subjects (Ohme et al. 2009). In this study the sample size was 64—comfortably exceeding this suggested minimum sample size. A further limitation of the study is that it did not permit the use of any control mechanisms such as the testing of manipulations, nor were competing hypotheses tested.

### Future Studies

Given that emotional responses are always focused on a target, future studies could investigate alternative targets. Comparing responses to service recovery by managers versus those performed by frontline staff is one example. Another avenue of potential future studies would be comparing effective (or successful) service recoveries with ineffective (unsuccessful) ones. Given the importance of “first impressions” in human assessments, how service providers initially respond to a customer complaint (ranging from dismissive to accommodating to patronizing) could possibly influence how customers respond to service recovery. Studying the impact of a service providers’ initial response to a complaint would yield important managerial insights.

Considering that this study used a relatively mild confrontational situation (explaining the relatively low arousal EEG and GSR scores) that was resolved fairly quickly, future studies could examine emotional responses to a service recovery encounter that is of a more confrontational nature. Service recovery situations where a service firm denies responsibility for the service failure for instance, or one where more extreme emotional responses such as anger or rage may result, will be fruitful avenues of future study.

Finally, an important line of future enquiry could be frontline employees’ emotional responses to customer complaints. Understanding what upsets frontline employees and how their emotional responses may prevent successful service recovery will add considerably to our understanding of frontline employees’ behavior in service failure situations. Studies of this nature will assist managers to not only identify situations that elicit negative emotional responses among frontline employees but allow them to better manage and even possibly prevent burnout among these employees.

## Appendix A

### The Scenario

Shot of travel agent store front

SCENE 1: Greetings and invitation to help

**Travel Agent:** Good afternoon

**Customer:** Good afternoon

**Travel Agent:** How can I help you today?

#### SCENE 2: Active listening

**Customer:** Well, I booked a ticket to the USA through your travel agency 8 weeks ago, and have since had unexpected personal problems which have forced me to cancel my travel plans. I am no longer able to make the trip as I had planned. Yesterday, when I learned of these problems, I contacted this agency by telephone to inform you of my plans to cancel my airplane ticket. I spoke to one of your colleagues, who told me that I would be refunded only 400 Euros of the 800 Euros that I paid for the ticket, due to cancellation fees. This is a ridiculous penalty of 50% and I do not believe that it is fair for your agency to charge me such a large cancellation fee.

#### SCENE 3: Explanation

**Travel Agent:** There are certain charges such as processing and ticket handling fees which our agency and the airlines levy for the cancellation of airline tickets. A substantial part of every cancellation fee is not under our control, but is set by the respective airlines. However, the amount that you mention does seem excessive. Let me check your booking and cancellation details on my computer. When were you due to leave?

#### SCENE 4: Active listening

**Customer:** I was due to leave from Warsaw on 1 September arriving in New York on 2 September. My return date is 21 September.

#### SCENE 5: Data verification

**Travel agent:** Can I please see your ticket?

Customer hands over ticket

Travel agent turns to the computer

15 Seconds later:

It seems that you were given the wrong information yesterday

[SCENE 6: Accepting responsibility]. You will only be charged 100 Euros for your cancellation, and not the large amount that you were previously told. [SCENE 6: Resolution]. Your cancellation fell within the stipulated allowable cancellation period and the airline will not be charging you. The amount that you will be charged is levied to cover ticket-processing costs. [SCENE 6: Apology]. I am extremely sorry for any trouble that this mistake might have caused. I also hope that when you travel overseas in the future you will make use of our services again.

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## Bio

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