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Facial Behaviors and Emotional Reactions in Consumer Research

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Abstract

Gauging emotional reactions is a cornerstone of consumer research. The most common way emotions are assessed is self-report. But self-report is notoriously unreliable, and affected by many factors that confound their interpretation. Facial expressions are objective markers of emotional states, and are well grounded in decades of research. Yet, the research documenting the potential utility of facial expressions of emotion as a biometric marker in consumer research is limited. This study addresses this gap, presenting descriptive analyses of the facial expressions of emotion produced in typical consumer research. Surprisingly, the most prevalent expressions produced were disgust and social smiles; smile of true enjoyment were relatively rare. Additionally, expressions were generally of low intensity and very short durations. These findings demonstrate the potential utility for using facial expressions of emotion as markers in consumer research, and suggest that the emotional landscapes of consumers may be different than what is commonly thought.

Key words: Emotion, Facial expressions, Nonverbal behavior.

Conductas Faciales y Reacciones Emocionales en Investigación de Consumidores

Resumen

La medición de reacciones emocionales es piedra angular en investigación sobre consumidores. La manera más común en que las emociones son evaluadas es mediante auto-reportes. Sin embargo, los auto-reportes son notablemente poco confiables y son afectados por diversos factores que impiden su correcta interpretación. Las expresiones faciales son marcadores objetivos de estados emocionales, y están bien fundamentados y respaldados por décadas de investigación. Aún así, la investigación que documenta la utilidad potencial de las expresiones faciales como marcadores biométricos en investigación sobre consumo es limitada. Este estudio trata ese hueco, presentando análisis descriptivos de las expresiones faciales de emociones producidas en investigaciones típicas de consumo. Sorprendentemente, las expresiones más prevalentes producidas fueron de disgusto y sonrisas sociales; mientras que sonrisas de verdadera felicidad fueron relativamente raras. Adicionalmente, las expresiones fueron generalmente de baja intensidad y de corta duración. Estos hallazgos demuestran la utilidad potencial de expresiones faciales de emociones como marcadores en investigación de consumo, y sugieren que los panoramas emocionales de los consumidores pueden ser diferentes de lo que comúnmente se piensa.

Palabras clave: emoción, expresiones faciales, conducta no verbal.

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Gauging emotional reactions is a cornerstone of consumer research (Babin & Babin, 2001; Holbrook & Batra, 1987; Laros & Steenkamp, 2004; Oliver & Westbrook, 1993; Olney, Holbrook, & Batra, 1991; Sherman, Mathur, & Smith, 1998). Emotions are related not only to attitudes toward products, but actual behaviors related to those products (Olney et al., 1991), purchase intentions and perceived shopping value (Babin & Babin, 2001), and overall satisfaction (Oliver & Westbrook, 1993). The standard way of measuring emotion is simply by asking consumers to self-report about them, either orally in an interview or via standardized instruments (Batra & Holbrook, 1990; Holbrook & Batra, 1987, 1988; Richins, 1997). These methods generally center around two approaches. One involves measurement according to certain dimensions of subjective experience, such as pleasure-displeasure and arousal (Batra & Holbrook, 1990); these are generally based in studies documenting the dimensionality of affective experience conducted over 50 years ago (Osgood, Suci & Tannenbaum, 1957). A second method involves assessment of more discrete categories, such as anger, fear, joy, and so on (Laros & Steenkamp, 2004; Oliver & Westbrook, 1993); this approach is based on research suggesting that emotions are actually organized as natural phenomena that are discrete and distinct in their characteristics, including physiological response, expressive behavior, and cognitive correlates (Izard, 2007; Levenson, 1999; Panksepp, 2008b).

There are some limitations to self-report, however. Because emotions are transient phenomena that can change dynamically in a few seconds (or even in fractions of a second), it is unclear as to whether global assessments of self-reported subjective experiences, typically obtained before and/or after product engagement, can accurately capture the complexity of emotional experiences through which consumers cycle. Moreover, self-reports may be influenced by social construction, primacy or recency effects, demand characteristics, presentational styles, socially desirable responding, and acquiescence. These are particularly important given that much consumer research is conducted in face-to-face interviews, and consumers are typically compensated for their participation.

One way to address the limitations of self-report is to employ objective, behavioral measures of emotion. Fortunately, emotion research has produced a wealth of knowledge about the physiological correlates of emotion to provide many potentially useful tools (Davidson et al., 2002; LeDoux & Phelps, 2008; Levenson, 1999; Panksepp, 2008a). These include measurement of the Central Nervous System (CNS, mainly the brain); Autonomic Nervous System (ANS, including blood pressure, skin conductance, heart rate, and respiration); pupil dilation; gaze direction; and voice.

But physiological indices themselves are not without limitations. For example, there are no published data that indicate that behaviors such as gaze direction, pupil dilation, and body postures and orientation are indicative of specific emotional states beyond general positive v. negative orientation. Eye behaviors are notoriously confounded with cognitive, not emotional, activity. There are considerable data to indicate emotion specific responding in the CNS and ANS; but measurement of both requires invasive techniques that involve multiple leads on a participant, making them very aware of the measurement. Because emotions are

quick, they pose additional problems for measurement. The ANS, for instance, is typically slow to measure changes in states at the temporal resolution necessary for understanding fleeting emotional reactions. And while CNS responses may occur at the temporal resolution of transient emotions, we do not yet have adequate measurement systems that can be deployed in the typical research environment that can capture such fraction-of-a-second changes. Brain imaging, for example, requires use of very specialized equipment and participants lying still, which is very unnatural.

An alternative to these approaches is the use of facial expressions of emotion. Anger, contempt, disgust, fear, happiness, sadness, and surprise are universally expressed in the face (Matsumoto, Keltner, Shiota, Frank & O'Sullivan, 2008; Matsumoto & Willingham, 2006); thus they can be used to measure emotion in anyone in the world. They are correlated with physiological states (Ekman, Davidson & Friesen, 1990; Ekman, Levenson & Friesen, 1983), subjective experience (Rosenberg & Ekman, 1994), appraisal processes (Bonanno & Keltner, 1997; Keltner, Moffitt & Stouthamer-Loeber, 1995), and subsequent behaviors (Keltner et al., 1995; Matsumoto, Haan, Gary, Theodorou & Cooke-Carney, 1986). They typically last only for a few seconds (Ekman, 1993), and can change in a fraction of a second. They are windows to consumer's worlds of fleeting emotional states, and they can be measured using objective measurement systems that do not rely on self-report.

An additional advantage of these emotions is that they are discrete, and thus provide qualitatively distinct information about emotions than does a dimensional assessment (i.e., positive – negative). Anger, fear, and sadness, for example, are all "negative" emotions; but each has its own unique elicitor, physiological and behavioral correlates, and social meaning. Assessing discrete emotions in consumer research, in fact, may be more beneficial than a dimensional approach, and may provide more and more accurate information about consumer emotions than just positive and negative affect (Laros & Steenkamp, 2004).

Objective facial measurement can also distinguish between different types of smiles, most notably smiles of true enjoyment v. social or polite smiles. There are various behavioral markers that distinguish these smiles. The most commonly known one is the innervation of the muscle surrounding the eye (orbicularis oculi) in enjoyment smiles, which raises the cheeks, lowers the eye cover fold, gives the eyes a twinkling appearance, and sometimes produces crows feet wrinkles. Named after the French physiologist who discovered the innervations of this muscle in enjoyment smiles (Duchenne de Boulogne, 1862/1990), it is often called the Duchenne marker or Duchenne smiles. Social or polite smiles often occur without this muscle, and knowing this distinction can be very important in determining if consumers truly feel positive about a product or are just trying to be polite.

Several measurement systems exist to assess facial behavior. The Facial Action Coding System (FACS; Ekman & Friesen, 1978) is widely acknowledged as the most comprehensive system available. It identifies over 40 functionally independent muscle movements in the face (action units or AUs) that can occur at any one time. Each is identified through the appearance changes on the face it

produces, and each can be scaled in terms of its intensity of innervations, laterality, and timing (onset, apex, and offset). FACS coding can identify the muscles involved in any facial behavior, and specific facial configurations have been reliably identified with emotion signaling (Ekman & Friesen, 1975, 1978).

At least two studies in the consumer research field have attempted to utilize facial expressions as markers of transient emotional states, but both have methodological limitations. In one (Derbaix, 1995), coders were not certified in FACS or any other measurement system; instead, they merely were trained on what the full-face prototypes of each of the universal facial expressions of emotion looked like, and were asked to identify times when these occurred. Spontaneous facial expressions of emotion, however, are complex, include some degree of noise (Matsumoto, Olide, Schug, Willingham & Callan, 2009), and often occur very subtly or in partial expressions (i.e., in only parts of the face). Thus it is very likely that coders in Derbaix (1995) missed or miscoded many emotion signals.

The second study examined children's preferences for different tastes using facial expressions (Zeinstra, Koelen, Kok & de Graaf, 2009). The facial behaviors of the children were analyzed using FACS, but only by a single coder. There were no indices of interrater reliability for the coding or adjudication of the codes by experts. Moreover, the AUs that occurred were classified as either positive or negative, but not on any apparent empirical criteria. For example, AUs 1 and 2 – inner and outer frontalis, respectively – were both classified as negative. But there is no empirical evidence to suggest that AU 2 is associated with any negative emotion, and the combination of AUs 1+2 can be associated with surprise, a neutral emotion. Similar dubious classifications were made with many other AUs, raising questions concerning the validity of their findings.

We corrected for these limitations, and conducted a descriptive study to examine the possibility that facial expressions could be used as markers of transient emotional states in consumer research. Consumers participated in a variety of typical product research studies in which they engaged with concepts, products, or ads, and their facial behaviors were measured as they were engaged and in a subsequent immediate interview. We measured their facial behaviors using an objective measurement system, and classified their behaviors according to known categories of emotional states based on previous theoretical and empirical work. Below we present a descriptive analysis of the facial emotions to provide a glimpse into the emotional worlds of consumers as they engage in product research.

Method

Participant Consumers

The participants were 119 females recruited by a major consumer products company in the Midwest U.S. Collectively they participated in eight studies, which examined their reactions to products, concepts, usage, or television ads. The products came from four product categories: beauty care, personal grooming, household care, and health care. The consumers were compensated for their participation. Some participated individually; others in groups.

Facial Measurement and Classification

Although interviews generally lasted between one and two hours, we focused our analyses exclusively on the consumers' immediate reactions to the product, concept, or ad while they were actively engaged with it, and for a period of approximately 30 seconds after engagement while they were asked questions about how much they liked it. Thus the sampling window was typically a minute for each consumer. Their facial expressions were coded using an abbreviated version of the Facial Action Coding System (FACS; Ekman & Friesen, 1978). Coding was adapted to focus solely on those AUs theoretically or empirically related to emotion signaling (Matsumoto, et al., 2008). All expressions were coded by two certified FACS coders (one was Hwang; the other was blind to the hypotheses and purposes of the studies), and adjudicated by Matsumoto. Interrater reliability was .87 (across all studies).

Each AU was coded on a 5-point scale of intensity, A through E. A level intensity refers to trace intensity, in which the presence or absence of the AU is questionable; thus it was dropped from the coding procedures, and only AUs that occurred at least at B level (minimum threshold for recognition) were coded. For the purposes of this study, intermediary intensity levels BC, CD, and DE were also coded. To determine the intensity of an expression that consisted of a combination of AUs, the highest intensity associated with a target AU related to the emotion signal was considered the expression intensity. Each AU was also coded for laterality and symmetry (by assigning different intensity levels to the right and left, or in some cases top and bottom, of each AU).

AU combinations were then classified into one of eight expression categories: anger, contempt, disgust, fear, enjoyment smiles, sadness, surprise, and non-enjoyment smiles, based on AU combinations theoretically and empirically related to emotional expressions (Darwin, 1872; Ekman et al., 1990; Ekman & Friesen, 1971; Ekman, Friesen & Ancoli, 1980; Ekman, Friesen & Ellsworth, 1972; Ekman, Friesen & O'Sullivan, 1988; Ekman, Sorenson & Friesen, 1969; Tomkins, 1962, 1963). These AU combinations have been associated with emotion signaling in a wide range of studies involving actual expression production by participants from all parts of the world, not just westerners (Matsumoto et al., 2008), ensuring that the facial configurations predicted to be associated with emotion are not just "western" prototypes.

Expressions of anger, fear, sadness, and surprise can occur in either full or partial expressions. Full face expressions are those in which AUs related to the emotion occur both in the upper and lower parts of the face; in partial expressions, emotion AUs occur in either the upper or lower face. Thus these expressions were further classified as either full or partial. Contempt and disgust can be signaled by only a single AU, and thus were not differentiated. Likewise, there is only a single facial configuration associated with happiness (AUs 6 or 7 + 12) and social or polite smiles (AU 12); these were also not differentiated according to full or partial expressions.

Video was recorded at 30 fps, and the start and end time of each AU and expression was recorded to the frame. An expression duration variable was computed by taking the difference between the two, and expressed in seconds.

Data Management

Because we were interested in the breadth of the expressions produced, and not with null hypothesis significance testing, we assembled all of the FACS codes and emotion classifications across all consumers and studies into a single data set, with facial event as the unit of analysis. Because an individual contributed more than one facial event, the data set violates assumptions of independence of the data, and readers are cautioned to interpret the findings presented with this caveat. The final data set included 2,986 events and 8,102 FACS AUs; the variables included for each event were individual FACS AUs that were coded, emotion classification of the event, expression intensity, full or partial classification, and expression duration.

Results

Emotion Classifications

We computed the frequencies and percentages of the various emotion classifications produced in the data set, and non-enjoyment smiles. When two emotions occurred simultaneously in a blend, they were each counted in their respective single emotion categories. As seen in table 1, disgust, non-enjoyment smiles, anger, and contempt were the most frequently occurring expressions. Disgust, contempt, and anger accounted for 52.50% of all expressions, and it is interesting to speculate why they occurred so frequently. They may have occurred in relation to the products being tested or the research procedures themselves. For example, most consumers can probably articulate their preferences, but are not accustomed to articulating the reasons underlying those preferences, which serve as much of the basis for product research. Being forced to search for or even create such reasons may produce negative reactions.

Table 1
Frequencies, Percentages, and Durations of the Emotion Classifications

Emotion	Frequency	Percentage	Duration (s)	% of time the emotion blended with non-enjoyment smile
Disgust	828	28.18%	1.20	5.67%
Non-Enjoyment Smiles	780	26.55%	2.20	
Anger	456	15.50%	1.00	9.65%
Contempt	334	11.35%	1.10	2.10%
Fear	238	8.09%	1.40	9.66%
Surprise	199	6.76%	1.30	16.08%
Sadness	141	4.79%	1.10	16.31%
Enjoyment	106	3.60%	1.90	

Non-enjoyment smiles occurred much more frequently than enjoyment smiles (26.55% v. 3.60%). Given that non-enjoyment smiles are markers of politeness and not of true positive emotion, and given that most individuals don't differentiate between them when observing others, it is very possible that many of the non-enjoyment smiles were interpreted as signs of positive emotions toward the products being tested, which would have been an incorrect conclusion to draw.

In fact, enjoyment smiles were the least prevalent emotional expression coded, which was surprising given that the purpose of much consumer research is concerned with the elicitation of positive emotions (joy, delight) with products. Consumers may not be very happy when engaging in the research (high incidence of disgust, contempt, anger; low incidence of enjoyment smiles), but may want to appear pleasant and polite (high incidence of non-enjoyment smiles).

Expression Intensities

The vast majority of the expressions were at C level or below (92.47%). Given that B level intensity refers to the minimum threshold when an AU is identifiable, and C level intensity refers to a moderate intensity level, these findings indicate that most of the emotional expressions that occurred in the research were of low to moderate intensity. To examine intensity differences among the expressions, we converted the nominal expression intensity data into scalar data, using the following recodes: B = 2, BC = 3, C = 5, CD = 6, D = 8, DE = 9, E = 10. We then computed a one-way ANOVA on the scaled intensity data, using expression (8 levels – 7 emotions and non-enjoyment smiles) as the independent variable. There were moderately large intensity differences across expressions, $F(7, 1446) = 38.12$, $p < .001$, $\eta p2 = .156$. Scheffe analyses indicated that Enjoyment smiles were most intense, followed by Non-enjoyment smiles, fear, and anger, and then surprise, contempt, disgust, sadness.

Full Face v. Partial Expressions

We cross-tabulated the frequencies of partial and full-face expressions by the four emotions for which this classification was meaningful (anger, fear, sadness, and surprise). Almost all (96.77%) of the expressions were classified as partial expressions.

Expression Duration

The mean duration across all expressions was 1.48 s, which is commensurate with the average lengths of expressions found in previous research (.5 - 4 s; Ekman, 1993). They ranged from as short as .03 second to as long as 27.10 s. The latter figure, however, was associated with non-enjoyment smiles. A one-way ANOVA on durations, using expressions (8 levels) as the independent variable, was significant, $F(7, 2364) = 22.99$, $p < .001$, $\eta p2 = .064$. Scheffe contrasts indicated that non-enjoyment smiles had the longest durations, followed by enjoyment smiles, and then all other emotions.

Blends Involving Non-Enjoyment Smiles

Of the total 780 times non-enjoyment smiles occurred in the entire data set, a not insubstantial number of times (176 or 22.54% of the time) they appeared blended with other emotional expressions, often to soften the expression or to convey the target emotions in a polite, socially appropriate manner. Thus we computed the percentage of time each of the emotions appeared together with a non-enjoyment smile (these analyses did not include enjoyment smiles, as enjoyment and non-enjoyment smiles cannot co-occur). Non-enjoyment smiles co-occurred with sadness and surprise 16% of the time, and with anger and fear almost 10% of the time.

Differences among Product Categories and Assessment Types

To examine whether there were differences in emotional expressions as a function of product category or assessment type, we computed an expression type (8 levels: seven emotions and non-enjoyment smiles) by product category (beauty care, personal grooming, household care, and healthcare) chi-square, as well as an expression type by assessment type (concepts, products, usage, advertising) chi-square. Neither was significant, $\chi^2(27, 2984) = 6.34$, ns; and $\chi^2(27, 3084) = 5.42$, ns, respectively. A plot of the percentage of each of the expression types across the product categories and assessment types suggested the existence of interesting expression profiles across the categories and assessments, highlighted by high frequencies of non-enjoyment smiles and disgust (see Figures 1a and 1b).

Figure 1a. Emotional profiles across product categories

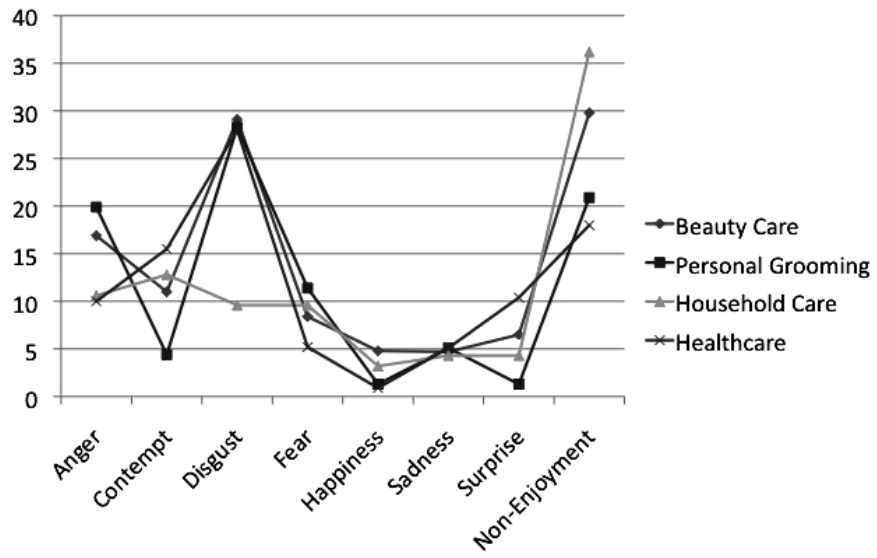

Figure 1a. Percentage graph of each of the expression types (anger, contempt, disgust, fear, happiness, sadness, surprise and non-enjoyment) across the product categories (beauty care, personal grooming, household care and healthcare).

Figure 1b. Emotional profiles across assessment types

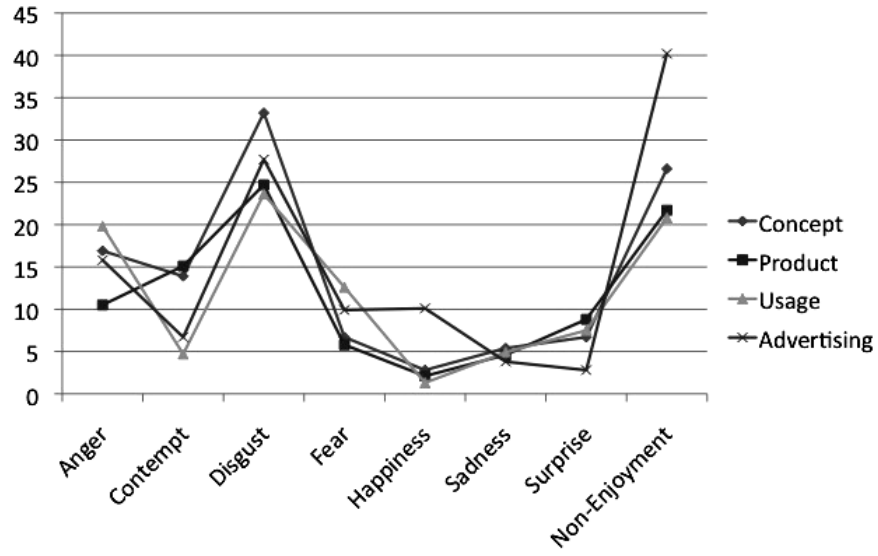

*Figure 1b***.** Percentage graph of each of the expression types (anger, contempt, disgust, fear, happiness, sadness, surprise and non-enjoyment) across the assessment types (concept, product, usage and advertising).

Discussion

Facial measurement provided a valuable means of gaining insight into the world of consumer emotions. The emotion classifications produced went far beyond simple pleasant-unpleasant valenced views of emotion; instead, facial measurement produced potentially important information concerning specific, discrete emotions, including anger, contempt, and disgust. Such specificity is potentially interesting, and future research examining the role and function of emotion in consumer research may be able to leverage knowledge about emotion specific functions when observing discrete emotion signals.

Consumers were not simply automatons who either liked or disliked products, as they displayed all of the seven universal emotional expressions and non-enjoyment smiles. They are varied individuals who come to the research with a myriad of life experiences, reactions, and biases. They animate their verbal reports and color their experiences with different emotions. Consumer researchers who want to capture the emotions of consumers toward products have a tough job, as they need to navigate, parse, and make sense of a complex emotional web that consumers weave about products.

The expressions that occurred were very subtle, being of low to moderate intensity, occurring only in part of the face and generally for only 1 or 2 seconds. If researchers wish to leverage the information about emotions displayed by faces, they need to start with the assumption that the displays will not be full-face, high intensity prototypes of universal facial expressions of emotion typically reported

and studied in the literature. Indeed, the same emotion can be displayed in a variety of ways, some not obvious to the naïve observer, and these subtle expressions need to be taken into account when looking for emotions in the face.

Positive emotions of true enjoyment were sparse, while the relative frequency of negative emotions such as anger, contempt, and disgust was large, calling into question a common view of consumer research as one of maximizing pleasure and enjoyment. Instead, the findings strongly suggest that engagement with consumer products is not so much about being happy by maximizing pleasure, but gaining satisfaction from minimizing displeasure. In fact, many common household products (e.g., diapers, household cleaners, shampoo) are created as much for avoiding or eliminating negative emotions (e.g., associated with filth) as they are to produce a positive feeling. Thus it makes sense that negative emotions are displayed as frequently as they were in our samples when discussing common household products.

To be sure, smiles occurred rather frequently, but most of these were non-enjoyment smiles. These were signs of desiring to appear pleasant or sociable, and not signs of true enjoyment. They may have occurred because of the very social nature of the interviews, and because of the relatively high frequency of negative emotions. That is, consumers likely expressed their negative emotions to the interviewers, who were essentially strangers, together with non-enjoyment smiles to appear to be pleasant and non-offensive. Interestingly, naïve observers may not be able to tell the difference between enjoyment and non-enjoyment smiles, which may lead some product researchers to believe unwittingly that consumer participants had more positive reactions than they actually did. Thus it becomes very important for researchers to be able to distinguish smiles of true enjoyment from the polite, social smile, if they want to get an accurate read of consumer reactions.

These findings beg the question of what the source of the various observed expressons was. Expressions tell us that an emotion is occurring, but they don't tell us what they are referring to. Consumers may have had those reactions toward products, or toward the interviewers, or the procedures, or the very fact that they were in the study. Consumers may have also been displaying their emotions referentially, while talking with the interviewer about their previous or hypothesized future experiences with other products. Future studies examining the linkage between the nonverbal behaviors (i.e., facial expressions of emotion) and the specific verbal statements produced at the same time will be able to identify potential sources of the consumers' emotions, thereby providing further insights into the world of consumer affect.

References

Babin, B. J., & Babin, L. (2001). Seeking something different? A model of schema typicality, consumer affect, purchase intentions and perceived shopping value. *Journal of Business Research, 54*(2), 89-96.

Batra, R., & Holbrook, M. B. (1990). Developing a typology of affective responses to advertising. *Psychology and Marketing, 7*(1), 11-25.

Bonanno, G. A., & Keltner, D. (1997). Facial expressions of emotion and the course of conjugal bereavement. *Journal of Abnormal Psychology, 106*, 126-137.

Darwin, C. (1872). *The expression of emotion in man and animals*. New York: Oxford University Press.

Davidson, R. J., Lewis, D. A., Alloy, L. B., Amaral, D. G., Bush, G., Cohen, J. D., et al. (2002). Neural and behavioral substrates of mood and mood regulation. *Biological Psychiatry, 52*(6), 478-502.

Derbaix, C. M. (1995). The impact of affective reactions on attitudes toward the advertisement and the brand: A step toward ecological validity. *Journal of Marketing Research, 32*, 470-479.

Duchenne de Boulogne, G. B. (1862/1990). *The mechanism of human facial expression*. New York: Cambridge University Press.

Ekman, P. (1993). Facial expression and emotion. *American Psychologist, 48*(4), 384-392.

Ekman, P., Davidson, R. J., & Friesen, W. V. (1990). The Duchenne smile: Emotional expression and brain physiology: II. *Journal of Personality & Social Psychology, 58*(2), 342-353.

Ekman, P., & Friesen, W. V. (1971). Constants across culture in the face and emotion. *Journal of Personality and Social Psychology, 17*, 124-129.

Ekman, P., & Friesen, W. V. (1975). *Unmasking the face: A guide to recognizing the emotions from facial cues*. Englewood Cliffs, NJ: Prentice Hall.

Ekman, P., & Friesen, W. V. (1978). *Facial action coding system: Investigator's guide*. Palo Alto, Calif.: Consulting Psychologists Press.

Ekman, P., Friesen, W. V., & Ancoli, S. (1980). Facial signs of emotional experience. *Journal of Personality and Social Psychology, 39*, 1125-1134.

Ekman, P., Friesen, W. V., & Ellsworth, P. (1972). *Emotion in the human face: guide-lines for research and an integration of findings*. New York: Pergamon Press.

Ekman, P., Friesen, W. V., & O'Sullivan, M. (1988). Smiles when lying. *Journal of Personality & Social Psychology, 54*(3), 414-420.

Ekman, P., Levenson, R. W., & Friesen, W. V. (1983). Autonomic nervous system activity distinguishes among emotions. *Science, 221*(4616), 1208-1210.

Ekman, P., Sorenson, E. R., & Friesen, W. V. (1969). Pancultural elements in facial displays of emotion. *Science, 164*(3875), 86-88.

Holbrook, M. B., & Batra, R. (1987). Mediators of consumer responses to advertising. *Journal of Consumer Research, 14*, 404-420.

Holbrook, M. B., & Batra, R. (1988). Toward a standardized emotional profile (SEP) useful in measuring responses to the nonverbal components of advertising. In S. Hecker & D. W. Steward (Eds.), *Nonverbal communication in advertising* (pp. 95-109). Lexington, MA: Lexington Books/D. C. heath and Company.

Izard, C. E. (2007). Basic emotions, natural kinds, emotion schemas, and a new paradigm. *Perspectives on Psychological Science, 2*(3), 260-280.

Keltner, D., Moffitt, T., & Stouthamer-Loeber, M. (1995). Facial expressions of emotion and psychopathology in adolescent boys. *Journal of Abnormal Psychology, 104*, 644-652.

Laros, F. J. M., & Steenkamp, J.-B. E. M. (2004). Emotions in consumer behavior: A hierarchical approach. *Journal of Business Research, 58*(10), 1437-1445.

LeDoux, J. E., & Phelps, E. A. (2008). Emotional networks in the brain. In M. Lewis, J. M. Haviland-Jones & L. Feldman Barrett (Eds.), *Handbook of Emotions* (3rd ed., pp. 159-179). New York: The Guilford Press.

Levenson, R. W. (1999). The intrapersonal functions of emotion. *Cognition and Emotion, 13*(5), 481-504.

Matsumoto, D., Haan, N., Gary, Y., Theodorou, P., & Cooke-Carney, C. (1986). Preschoolers' moral actions and emotions in Prisoner's Dilemma. *Developmental Psychology, 22*(5), 663-670.

Matsumoto, D., Keltner, D., Shiota, M. N., Frank, M. G., & O'Sullivan, M. (2008). What's in a face? Facial expressions as signals of discrete emotions. In M. Lewis, J. M. Haviland & L. Feldman Barrett (Eds.), *Handbook of emotions* (pp. 211-234). New York: Guilford Press.

Matsumoto, D., Olide, A., Schug, J., Willingham, B., & Callan, M. (2009). Cross-Cultural Judgments of Spontaneous Facial Expressions of Emotion. *Journal of Nonverbal Behavior, 33*, 213-238.

Matsumoto, D., & Willingham, B. (2006). The thrill of victory and the agony of defeat: Spontaneous expressions of medal winners at the 2004 Athens Olympic Games. *Journal of Personality and Social Psychology, 91*(3), 568-581.

Oliver, R. L., & Westbrook, R. A. (1993). Profiles of consumer emotions and satisfaction. *Journal of Consumer Satisfaction, Dissatisfaction, and Complaining Behavior, 6*, 12-27.

Olney, T. J., Holbrook, M. B., & Batra, R. (1991). Consumer responses to advertising; The effects of ad content, emotions, and attitude toward the ad on viewing time. *Journal of Consumer Research, 17*, 440-453.

Osgood, C. E., Suci, G. J., & Tannenbaum, P. H. (1957). *The measurement of meaning*. Chicago: University of Illinois Press.

Panksepp, J. (2008a). The affective brain and core consciousness: How does neural activity generate emotional feelings? In M. Lewis, J. M. Haviland-Jones & L. Feldman Barrett (Eds.), *Handbook of Emotions* (3rd ed., pp. 47-67). New York: The Guilford Press.

Panksepp, J. (2008b). Cognitive conceptualism: Where have all the affects gone? *Perspectives on Psychological Science, 3*(4), 305-308.

Richins, M. L. (1997). Measuring emotions in the consumption experience. *Journal of Consumer Research, 24*, 127-146.

Rosenberg, E. L., & Ekman, P. (1994). Coherence between expressive and experiential systems in emotion. *Cognition & Emotion, 8*(3), 201-229.

Sherman, E., Mathur, A., & Smith, R. B. (1998). Store environment and consumer purchase behavior: Mediating role of consumer emotions. *Psychology and Marketing, 14*(4), 361-378.

Tomkins, S. S. (1962). *Affect, imagery, and consciousness* (Vol. 1: The positive affects). New York: Springer.

Tomkins, S. S. (1963). *Affect, imagery, and consciousness* (Vol. 2: The negative affects). New York: Springer.

Zeinstra, G. G., Koelen, M. A., Kok, F. J., & de Graaf, C. (2009). Facial exressions in school-aged children are a good indicator of 'dislikes', but not of 'likes'. *Food Quality and Preference, 20*, 620-624.