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APPARENT MOTION VIA VISUAL ADAPTATION INFLUENCES THE DETECTION OF THREAT-RELATED FACIAL EXPRESSIONS

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ABSTRACT

Recent research has linked behavioral intentions and threat-related expressions. However, studies of motion are usually confounded with size. Therefore, in the current study, we used apparent motion (toward or away), by means of an optical illusion, to examine pure expressions of anger and fear and ambiguous expressions comprised of 50/50 facial blends of the anger and fear expressions. We hypothesized that anger would be more easily recognized from faces made to appear as if they were approaching an observer, whereas fear would be more easily recognized from faces made to appear as if they were withdrawing from an observer. The results for highly prototypical expressions of anger and fear are consistent with these predictions. Ambiguous expressions (blended 50% anger and 50% fear), however, were more frequently labeled as fear regardless of apparent motion (approach or avoidance). Together findings suggest that apparent motion, in the form of approach or avoidance, influence the detection of clearly expressed threat-related facial expressions.

TABLE OF CONTENTS

Abstract i

Introduction 1

Methods 6

Results 8

Discussion 10

References 14

Footnotes 17

Introduction

The human face is remarkably complex, yet infinitely revealing. For the human race, the face serves several important functions. It is a window to display our inner motivational states. It improves communication and enhances others' understanding of us and our intentions and the facial expressions we make are outward expressions of our internal states, typically our emotions (Fridlund, Ekman and Oster, 1987).

As humans, the ability to extract and interpret these social and behavior cues in an accurate, timely manner benefits our survival by allowing us to interact socially and respond accordingly in the face of potential threat (Baron-Cohen, 1995). Facial expressions are informative social cues that allow humans to respond appropriately to a social situation. Charles Darwin proposed that facial expressions are presented in their specific forms as a result of their functional value (1872/1997). Building upon this, Ekman and Friesen (1971) suggested that expression and perception and utilization of expression evolved as companions. One theory states that facial expressions may have primarily evolved to convey behavioral tendencies of the expresser (Fridlund, 1994). On the other hand, Ekman theorized that expressions are most directly associated with the experience of emotion. Nevertheless, most researchers acknowledge that one role of facial expressions is to convey basic behavioral intentions. Facial expressions are able to elicit forecasting of intentions and behavior of others, in turn, they have developed to be effective social cues. That said, it is probable that the context in which a facial expression is presented should affect the accuracy and timeliness of its decoding, whether or not it matches the expression's signal value. For example, an expression of fear in a non-threatening situation should communicate a different message than an expression of fear in a threatening situation. Zebrowitz (2006) suggested that stimuli presented in our environments provide behavioral clues

upon which we can act. Further research has supported this idea. One study examined the perception of facial expressions and found that it is moderated by the direction of eye gaze (Adams & Kleck, 2003, 2005). Adams and Kleck used eye gaze as a contextual cue that affected the perception of facial expressions. They found that participants were more accurate to detect the approach-related expressions of anger and joy when presented with direct gaze, which happens to be a signal of approach. In contrast, participants were more accurate to detect the avoidance-related expressions of fear and sadness when presented with averted eye gaze, which happens to be a signal of avoidance. In this example, the contextual cue of eye gaze lies within the face; however, contextual cues can also be represented by the environment surrounding the face, such as body language, visual cues, and auditory cues (Meeren, Hvan, Heijnsbergen, & de Gelder, 2005) verbal language (Barrett, Lindquist, & Gendron, 2007), and culture (Elfenbein & Ambady, 2002).

Another potential contextual cue is motion. Behavioral intentions and apparent motion of another person are important contextual cues that govern interactions between humans. Davidson and Hugdahl (1995) suggest that the most basic signals conveyed by facial expressions can be divided into the behavioral tendency to either approach or avoid. The distinction between approach and avoidance has focused on human tendency to approach pleasure and avoid pain, also known as psychological hedonism (Elliot & Covington, 2001).

Among the six basic expressions thought to be universally decodable (Ekman et al., 1987), much research has focused on anger and fear because they have several fundamental characteristics in common. They are both negative valence, high arousal emotions that convey an imminent threat (Watson & Tellegen, 1985). They are both associated with very physical forms of approach-avoidance. Anger is distinctly associated with the survival-dependent approach, or

fight, behavior and fear is distinctly associated with avoidance, or flight, behaviors (Harmon-Jones & Allen, 1998; Harmon-Jones & Sigelman, 2001). These two emotions are associated with potential threat indicating that there is arguably a priority to process these underlying behavioral motivations in a timely and efficient manner. Given these overwhelming similarities between anger and fear, the two emotions are effectively indistinguishable, according to contemporary theories of emotion attribution based on factor analytic models (Watson & Tellegen, 1985). Furthermore, the facial characteristics associated with anger (lowered brows and narrowed eyes) and those associated with fear (raised brows and widened eyes) seem to be opposites. This is consistent with an underlying principle of expression production that Darwin proposed (1872/1997). Darwin said that physical opposites play the role of distinguishing behaviors that communicate contrasting meanings. Accordingly, anger elicits avoidance in an observer, while fear elicits approach (Marsh, Ambady, & Kleck, 2005). With regard to the person experiencing the emotion, anger is associated with approach and fear is associated with avoidance (Harmon-Jones & Allen, 1998; Harmon-Jones & Sigelman, 2001).

Evidence has shown that anger expressions elicit judgments of approach and that fear expressions elicit judgments of avoidance (Adams, Ambady, Macrae, & Kleck, 2006). Furthermore, Nelson, Adams, Stevenson, and Norton (2011) suggested that the apparent motion of a face approaching or withdrawing from an observer affects the identification of the displayed emotion. For that study, they presented neutral faces followed by larger or smaller faces of expression to simulate end states of approaching or withdrawing behavior and found that anger faces were detected more quickly with larger faces and fear faces were detected more quickly with smaller faces. However, apparent motion is also confounded with size, given they manipulated motion by manipulating the size of the stimuli. The current study addresses this

problem and extends the previous study by using adaptation spirals to simulate motion without actually changing the size of the faces.

Adaptive processes such as adaptation spirals can have dramatic effects on perception via perceptual aftereffects by altering the operating characteristics of a system in response to changing inputs. Viewing these adaptation spirals creates the optical illusion known as motion aftereffect. The motion aftereffect is experienced after viewing a moving visual stimulus for a length of time with stationary eyes. Then, fixating a stationary stimulus, that stimulus will appear to move in the opposite direction of the original moving stimulus. This is a result of neural adaptation, where neurons that code a certain movement reduce their responses with exposure to a continually moving stimulus. Neural adaptation also diminishes the spontaneous baseline activity of the same neurons when responding to a stationary stimulus (Barlow & Hill, 1963; Srinivasan & Dvorak, 1979). One theory regarding this phenomenon is that perception of stationary objects is coded as the equilibrium of the baseline responses of neurons that code all possible directions of motion. Consequently, neural adaptation of neurons stimulated by downward movement, for instance, decreases their baseline activity, and in turn tilts the equilibrium toward upward movement.

The resulting perceptual aftereffect, also known as the motion aftereffect, can alter the appearance of faces, affecting a person's judgments of identity, sex, race, expression, normality, attractiveness, and eye gaze direction (Rhodes & Jaquet, 2011). These aftereffects have been commonly used to examine the coding of simple visual attributes, such as facial perception; accordingly, they are dubbed "the psychologist's microelectrode" (Frisby, 1980). For instance, Rhodes and Jaquet (2011) used perceptual aftereffects of the face to study the role of adaptive mechanisms in forming visual representations of faces. However, the motion aftereffect has not

been used to examine motion's effect on threat-related facial expressions.

Current Study

For this study, we hypothesized that action tendencies of approach and avoidance are fundamentally associated with emotional expressions. As a result, these perceived motions should influence the detection of these expressions. In the study, we looked at changes in the apparent motion of faces without changing the actual size of the face, as opposed to increasing the size of the faces that are presented. In order to simulate apparent motion, we used opposite optical illusions to induce the approach and avoidance conditions. As explained previously, anger and fear were chosen as the expressions to be tested based on several characteristics. Anger and fear are diametric opposites only in terms of the behavioral intentions. However, they share aspects of emotionality that have been well researched to date, which allows for control for confounds that could potentially affect the study.

We predicted that pure, or highly prototypical, anger faces would be more accurately labeled when perceived to be approaching and that pure fear faces would be more accurately labeled when perceived to be withdrawing. Additionally, we predicted that ambiguous expressions that were blended 50% anger and 50% fear would more likely be identified as anger when perceived to be approaching and as fear when perceived to be withdrawing.

Methods

Participants

Participants consisted of 41 (20 male, 21 female) undergraduate students between the ages of 18 and 28 years (*M*=19.02; *SD*= 1.768). Participants were enrolled in introductory psychology courses and participated in the study to receive course credit that counted towards research requirements for the class.

Materials

Adaptation Spirals. In order to simulate apparent motion, or the approach and avoidance effects, two optical illusions were used. These illusions were taken from a website called "Visual Phenomena & Optical Illusions" (Bach, 2011). By fixating the eyes on the center of the illusion for a period of time, a motion aftereffect in vision is created in any static image that is viewed after the illusion. The two illusions used were identical but with opposite directions. The illusion with the spiral moving inward created the motion aftereffect used for approach condition, and the illusion with the spiral moving outward created the motion aftereffect used for the avoidance condition.

Pure Expressions. Anger and fear faces were taken from the Pictures of Facial Affect set (Ekman & Friesen, 1976) and the Montreal Set of Facial Displays of Emotion (MDFE; Beaupré, Cheung, & Hess, 2000). All faces from these sets were of individuals of European descent.

Blended Expressions. Using a morphing algorithm in Morph 2.5 software for Macintosh, ambiguous facial expressions were created by blending anger and fear faces (blended 50% anger, 50% fear) from aforementioned Pictures of Facial Affect (Ekman & Friesen, 1976) and MFDE (Beaupré et al., 2000). In order to ensure that the resulting blended faces represented plausible and valid expressions, the faces were then inspected by an expect trained in the Facial Action

Coding System (FACS; see Ekman & Friesen, 1976). These faces were rated for a previous study, during which they were all labeled as ambiguous, or equally likely to be either anger or fear.

Design and Procedure

The study was conducted and responses were collected on PC computers using E-Prime 2.0 software at a screen resolution of 1280 × 1024. Participants were seated approximately 4 feet from the computer screen.[1] The study was divided into 8 alternating blocks of approach and avoidance adaptation spirals. The adaptation spiral remained on the computer screen for 60 seconds. Immediately following each spiral, a set of 12 different stimuli was presented. These 12 faces were composed of 4 exemplar faces (2 male and 2 female), which appeared in each of the 3 conditions (anger/fear/blend) at a resolution of 237 × 305 pixels. The 12 faces for each block remained on the screen until the participant responded via mouse click. Participants indicated what emotion they saw by either clicking the left mouse button or right mouse button, indicating anger or fear, respectively. Accuracy and response time data were recorded for each trial. Participants were instructed to respond as quickly and as accurately as possible. Each consecutive block used 4 different exemplar faces in each of the conditions, resulting in 12 new stimuli. After each block, a mandatory 30 second break was set in place to counterbalance effects from the illusion from the previous block. After the mandatory break, participants were instructed to focus their attention on the center of the screen and begin the next block when ready. After 4 blocks, all 16 exemplar faces were used. The next 4 blocks were identical to the first 4 but with the opposite adaptation spiral. This resulted in all 16 exemplar faces appearing 1 time for each adaptation condition (approaching/avoiding) for a total of 48 trials for each adaptation condition and a total of 96 trials across all 8 blocks.

Results

The accuracies for pure expression and the labeling of blended expression conditions were analyzed separately.

Pure Expressions

For pure expressions, accuracy scores were submitted to a 2 (apparent motion) X 2 (emotion) repeated measures ANOVA. There were no main effects for apparent motion, $F(1,40) = 0.473$, $p = .496$, $\eta^2_p = .012$, or emotion $F(1,40) = 0.708$, $p = .405$, $\eta^2_p = .017$. Importantly, the hypothesized emotion by apparent motion interaction was significant, $F(1,40) = 4.426$, $p = .042$, $\eta^2_p = .100$. This was driven by a greater accuracy for fear faces withdrawing (M = .939) versus approaching (M = .913), $t(40) = 1.878$, p = .068, while the anger effect was nonsignificant, but in the hypothesized direction, with angry faces approaching (M = .942) versus withdrawing (M = .930), $t(40) = .928$, p = .359. (See Figure 1)

Blended Expressions

For the blended expressions, the approach and avoidance conditions were separately submitted to one-sample t-tests to examine whether emotion labels (0 = anger; 1 = fear) applied within each condition significantly varied from chance (i.e., .50). Contradicting our hypotheses, apparent motion had no impact on the labeling of blended expressions. Both the approach and avoidance conditions were significant, but both leaned towards fear. Approach faces were more frequently labeled as fear than anger (mean = .5549), $t(40) = 2.677$, $p = .011$, and avoidance faces were also more frequently labeled as fear than anger (mean = .5549), $t(40) = 2.757$, $p = .009$. (See Figure 2)

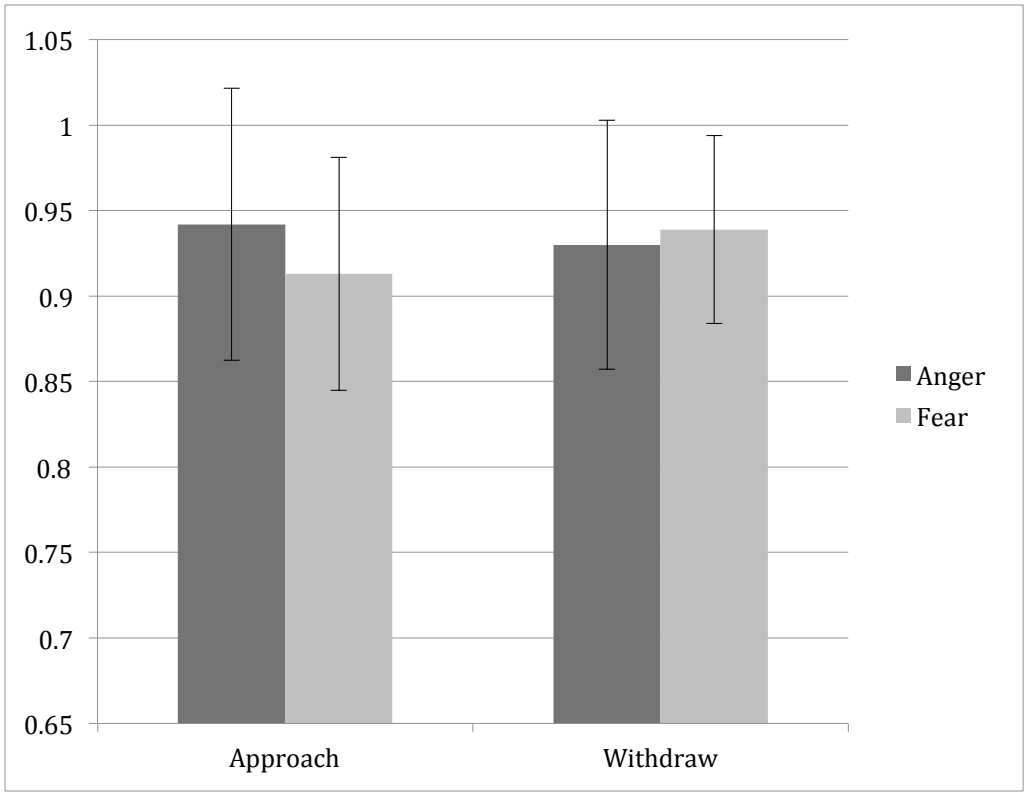

FIGURE 1 – Pure Expressions

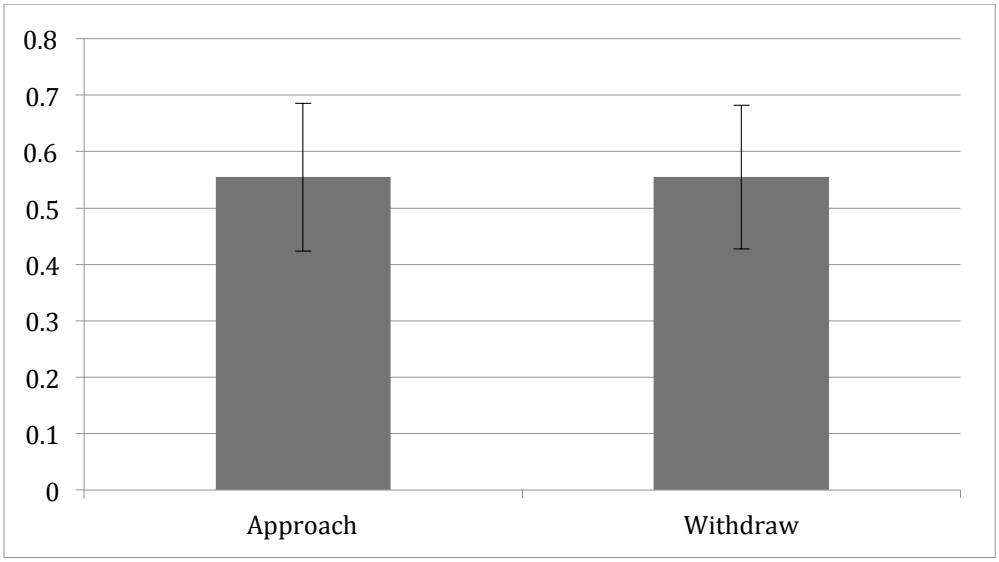

FIGURE 2 – Blended Expressions

Discussion

We found support for our hypothesis that pure anger faces are more accurately identified when perceived to be approaching and pure fear faces are more accurately identified when perceived to be withdrawing. This supports the idea that action tendencies are inherent associated with threat emotions given that approach and avoidance motion meaningfully contextualized the detection of anger and fear expressions. However, the results for the ambiguous faces were not consistent with the hypothesis. The blended 50% anger and 50% fear faces were more frequently labeled fear regardless of the apparent motion.

When comparing these findings to a previous examination of how facial expressions influence the efficiency of detecting approach-avoidance actions (Adams, Ambady, Macrae, & Kleck, 2006), we find that the results partially align. Adams et al. (2006) found that anger expressions enhanced the ability to process the approach of a face. This supports the notion that anger primes us to detect physical approach. However, in the same study, fear expressions did not seem to affect on the detection of either approach or withdrawal of a face. The lack of influence may be attributed to the idea that a withdrawing, scared person may not require the same immediacy of response for survival. LeDoux (1998) suggested that fear may initially trigger a freezing response.

While Adams et al. (2006) examined the identification of approach and withdrawal motions while presenting facial expressions, Nelson et al. (2011) examined emotions when apparent motion was either approaching or avoiding. The motivation behind the current study was to look at changes in the apparent motion of faces without actually changing the actual size of the face. Nelson et al. used faces that became larger or smaller to simulate motion but consequently had a confound of size. The current study addresses this confound of size and

controls for it. It demonstrates that integrated with facial expressions, approach and avoidance movement affect the identification of anger and fear expressions, respectively. Thus, fear alone may not necessarily elicit immediate avoiding behavior. However, when an expression is presented with approach or avoidance movements simultaneously, avoidance supports the expression of fear just as approach supports the expression of anger. These results partially replicate previous data (Nelson et al., 2011). The current study also adds to the evidence that perception of approach and avoidance behaviors, in fact, does directly influence the detection of threat-related emotional emotions. This supports theories that basic behavioral tendencies are a vital aspect of what is conveyed by emotional expressions (Fridlund, 1994; Frijda, 1995).

The notion that threat expressions signal the basic behavioral intentions of approach and avoidance was the foundation of the shared signal hypothesis that Adams and Kleck (2003, 2005) put forth in their work examining the role of eye gaze direction on emotion perception. They hypothesized that, when combined, social cues linked to threat that share the same underlying signal value of approach/avoidance facilitate the processing efficiency of that emotion. Their study ran participants through speeded reaction time tasks and self-reported perception of emotional intensity. Direct gaze was found to facilitate processing efficiency and accuracy and increase the perceived intensity of facially communicated approach-oriented motions of anger and joy. In contrast, averted gaze was found to facilitate facially communicated, avoidance-oriented emotions of fear and sadness. Similar studies have replicated and extended these findings (Sander, Grandjean, Kaiser, Wehrle, and Scherer, 2007; Adams & Franklin, 2009; Fox, Mathews, Calder, & Yiend, 2007). The findings in the above studies align with the approach/avoidance hypothesis; however, none examined specifically the direct influence of approach/avoidance behaviors in anger and fear detection.

Although we found support for our first hypothesis regarding pure facial expressions, our findings for the ambiguous expressions did not align with the other hypothesis. There was a main effect of fear labels for the blended faces. This may be a result of the adaptive spirals not creating a motion aftereffect strong enough to bias the emotion label of the ambiguous expressions. This would align with the fact that the ambiguous blended faces were labeled as fear more often that anger in both approach and avoidance conditions. Nelson et al. (2011) also found a similar main effect with a bias towards fear for the ambiguous expressions. The similar findings between the two studies may suggest that, perhaps, the motion aftereffect endures for a longer time with anger and a shorter time with fear, as a result of an incongruent signal value of the expressions themselves. Another theory that may explain this main effect of fear labels is that a reciprocal effect is taking place for the pure expressions. More specifically, it is possible that the pure emotional states of anger and fear are priming observers to experience the visual adaptation of approach and avoidance, respectively, for an extended period of time. In contrast, the ambiguous emotional states offer no clear recognition, which, in turn, downplays the visual adaptation. Future research must be conducted to examine the particular timing and effects of approach and avoidance adaptation spirals on anger and fear expressions on individual participants.

Another insight gleaned from the current study relates to the distance from the participants' eyes to the computer monitor. During our pilot that utilized chinrests to standardize the distance (approximately 2 ft), there were no significant findings. Participants were not better at identifying either anger or fear in both approach and avoidance conditions. However, when chinrests were removed and participants' eyes were approximately 4 ft from the computer monitor, the findings for pure expressions lined up with the hypothesis. Future research is

necessary to examine the role that distance plays in visual adaptation and the motion aftereffect.

Ultimately, our study adds to the pool of evidence that face cues are processed in an interactive manner. The interactive processing of threat cues means that one cue is able to provide contextual clues about other facial cues. As a result, potential threat is conveyed to an observer. Most researchers agree that a primary role of facial expressions is conveying basic behavioral intentions. Facial expressions allow forecasting of intentions and behavior of others, and thus they have developed to be effective social cues among humans. Behavioral intentions and apparent motion of another person are also important contextual cues that govern interactions between humans. The results of our study suggest that a face moving towards or away affects our perception of that person's emotional expressions and, consequently, the behavioral tendencies of that person.

References

Adams, R. B., Jr. & Franklin, R. G., Jr. (2009). Influence of emotional expression on the processing of gaze direction. *Motivation and Emotion, 33*, 106-112.

Adams, R. B., Jr., & Kleck, R. E. (2003). Perceived gaze direction and the processing of facial displays of emotion. *Psychological Science, 14*, 644-647.

Adams, R. B., Jr., & Kleck, R. E. (2005). Effects of direct and averted gaze on the perception of facially communicated emotion. *Emotion, 5*, 3-11.

Adams, R. B., Jr., Ambady, N., Macrae, C. N., & Kleck, R. E. (2006). Emotional expressions forecast approach-avoidance behavior. *Motivation and Emotion*, *30*, 177-186.

Bach, Michael. (2011). *Visual Phenomena & Optical Illusions*. Retrieved from http://www.michaelbach.de/ot/mot_adapt/index.html

Barlow, H. B., & Hill, R. M. (1963). Evidence for a physiological explanation of the waterfall illusion. *Nature, 200,* 1345-1347.

Baron-Cohen, S. (1995). Theory of mind and face-processing: How do they interact in development and psychopathology. In D. Cicchetti & D. Cohen (Eds.), *Developmental Psychopathology* (Vol. 1, pp. 343–356). New York, NY: John Wiley & Sons.

Barrett, L. F., Lindquist, K. A., & Gendron, M. (2007). Language as context for the perception of emotion. *Trends in Cognitive Sciences, 11,* 327-332.

Beaupré, M. G., Cheung, N., & Hess, U. (2000). The Montreal Set of Facial Displays of Emotion. Unpublished stimulus set.

Darwin, C. (1872/1997). *The expression of the emotions in man and animals.* New York, NY: Oxford University Press.

Davidson, R. J., & Hugdahl, K. (1995). *Brain asymmetry*. Cambridge, MA: MIT Press.

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

Ekman, P., & Friesen, W. V. (1976). *Pictures of facial affect.* Palo Alto, CA: Consulting Psychologists Press.

Ekman, P., Friesen, W. V., O'Sullivan, M., Chan, A., Diacoyanni- Tarlatzis, I., Heider, K., et al. (1987). Universals and cultural differences in the judgments of facial expressions of emotion. *Journal of Personality and Social Psychology, 53,* 712–717.

Elfenbein, H. A., & Ambady, N. (2002). On the universality and cultural specificity of emotion recognition: A meta-analysis. *Psychological Bulletin, 128,* 203-235.

Elliot, A. J., & Covington, M. V. (2001). Approach and avoidance motivation. *Educational Psychology Review*, *13*, 73-92.

Fox, E., Mathews, A., Calder, A., & Yiend, J. (2007). Anxiety and sensitivity to gaze direction in emotionally expressive faces. *Emotion, 7*, 478-486.

Fridlund, A. J. (1994). *Human facial expression: An evolutionary view.* San Diego, CA: Academic Press.

Fridlund, A. J., Ekman, P., & Oster, H. (1987). Facial expressions of emotion. In A. Siegman & S. Feldstein (Eds.), *Nonverbal behavior and communication* (pp.143-224). Hillsdale, New Jersey: Erlbaum.

Frijda, N. H. (1995). Expression, emotion, neither, or both? *Cognition and Emotion, 9,* 617–635.

Frisby, J. P. (1980). *Seeing: Illusion, mind and brain.* Oxford, UK: Oxford University Press.

Harmon-Jones, E., & Allen, J. J. (1998). Anger and frontal brain activity: EEG asymmetry consistent with approach motivation despite negative affective valence. *Journal of Personality and Social Psychology, 74*, 1310-1316.

Harmon-Jones, E., & Sigelman, J. (2001). State anger and prefrontal brain activity: Evidence that insult-related relative left-prefrontal activation is associated with experienced anger and aggression. *Journal of Personality and Social Psychology, 80*, 797-803.

LeDoux, J. E. (1998). *The emotional brain*. New York: Touchstone.

Marsh, A. A., Ambady, N., & Kleck, R. E. (2005). The effects of fear and anger facial expressions on approach- and avoidance-related behaviors. *Emotion, 5,* 119–124.

Meeren, H. J. M., van Heijnsbergen, C. C. R. J., de Gelder, B. (2005). Rapid perceptual integration of facial expression and emotional body language. *Proceedings of the National Academy of Sciences, 102,* 16518-16523.

Nelson, A. J., Adams, R. B., Jr., Stevenson M. T., Norton, M. I. (2011). Approach-avoidance oriented movements influence the decoding of threat-related facial expressions. *Manuscript in preparation*.

Rhodes, G. & Jaquet, E. (2011). Aftereffects reveal that adaptive face-coding mechanisms are selective for race and sex. In R.A. Adams Jr, N. Ambady, K. Nakayama & S. Shimojo (Eds). *The Science of Social Vision*. New York: Oxford University Press.

Sander, D., Grandjean, D., Kaiser, S., Wehrle, T., & Scherer, K. R. (2007). Interaction effects of perceived gaze direction and dynamic facial expression: Evidence for appraisal theories of emotion. *European Journal of Cognitive Psychology, 19*, 470-480.

Srinivasan, M. V., & Dvorak, D. R. (1979). The waterfall illusion in an insect visual system. *Vision Research, 19*, 1435-1437.

Watson, D., & Tellegen, A. (1985). Toward a consensual structure of mood. *Psychological Bulletin, 98*, 219-235.

Zebrowitz, L. A. (2006). Finally, faces find favor. *Social Cognition, 24*, 657-701.

Footnotes

[1] We ran an initial pilot using preset chinrests in order to standardize the participants' distance from the computer screen. The distance between the chinrest and the monitor was approximately 2 feet, and this shorter distance seemed to skew the results.

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· Schreyer Honors College Academic Excellence Scholarship
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RELEVANT WORK EXPERIENCE / LEADERSHIP

MTV Networks, New York, NY
Summer Associate, Digital Research
June 2011 – August 2011
· Selected as 1 out of 11 students to participate in a highly competitive training program focused on digital media
· Analyzed and compiled research on new digital trends such as mobile apps and streaming video to support in-house developments
· Conceived and developed a business idea and framework for a new pro-social crowd-funding initiative called NickStart
· Led a 4 person team for presentation of NickStart business plan and successfully pitched to Chief Executives at Viacom resulting in Nickelodeon's undertaking of the crowd-funding idea

IMS Health, Plymouth Meeting, PA
Intern, Global Marketing
May 2010 – August 2010
· Devised and implemented search engine optimization (SEO) for IMS website, resulting in first page organic search results
· Researched and developed a competitive insights database of over 1000 competitors (assessing products/services, key personnel, financials, SWOT analyses) for internal use
· Analyzed and compared marketing research findings regarding online behavior for 6 different pharma segments

· Raised internal awareness to IMS executives by writing NewScripts articles about current and pressing topics in the pharmaceutical industry and their effects on IMS

Penn State Marketing Association
Managing Director, Marketing Research
April 2010 – May 2011
· Promoted to the 16 student Executive Board in a 518 student organization
· Assessed skill sets of a 40 member division to determine efficient team assembly and leader appointment
· Led weekly division meetings and designed and oversaw progress and completion of 5 division projects
· Supervised a 15 person for AMA Case Competition and finished 3rd among 107 schools nationwide

Senior Executive Associate, Marketing Research
August 2009 – May 2010
· Supervised a 4 person team and employed marketing research techniques to determine initiatives for reaching students
· Collaborated with student government to assess and provide ideal media service for Penn State
· Moderated focus groups and designed questionnaires for 3 clients to analyze brand awareness among students, resulting in identification of brand issues within student population

Google AdWords Online Marketing Challenge
Campaign Manager
January 2010 – May 2010
· Devised and implemented search engine marketing campaign for laser eye surgery clinic
· Monitored and analyzed impressions and click-through rate daily to optimize keywords, text ads, and maximum cost-per-click in order to stay within budget of $200
· Competed in the Google Online Marketing Challenge

Social Vision and Interpersonal Perception Lab
Research Assistant
September 2008 – Present
· Examined individual differences in social perception and timing of responses to eye gaze and expression cues with anxiety
· Ran studies including dot-probes and analyzed results using SPSS; achieved certification in IRB training/protocols

ACTIVITIES

Student Red Cross Club
On-Site Coordinator
January 2008 – December 2009