

MOTIVATIONAL ORIENTATION: MANIPULATION  
THROUGH FILMS OF AFFECTIVE EXPRESSION

by

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## ABSTRACT

In two studies we examined whether people can “catch” the motivations and emotions expressed by another person. In the Study 1, participants viewed three videos of an individual demonstrating fear, excitement, and neutral reactions while electromyography (EMG) was recorded. After each video, they completed a manikin task where they approached or avoided positive or negative pictures. Participants showed less corrugator activity—associated with negative emotional stimuli and negative mood state—after viewing the excitement video condition. Participants were faster to approach positive pictures after the excitement video than after the fear video. In contrast, participants were faster to approach negative pictures after the fear video than after the excitement video. In study two, participants watched the same videos and then rated their response to the positive and negative pictures used in Study 1. Here, we found that the videos consistently affected the participants to respond complimentary to the pictures.

## LIST OF ABBREVIATIONS AND SYMBOLS

$M$	Mean: the sum of a set of measurements divided by the number of measurements in the set
$p$	Probability associated with the occurrence under the null hypothesis of a value as extreme as or more extreme than the observed value
$F$	Computed value of Analysis of Variance (ANOVA) test
$\eta^2_p$	Measure of effect size for use in ANOVA called partial eta-squared
$SD$	Standard Deviation: value of variation from the mean
$t$	Computed value of $t$ test
$<$	Less than
$>$	Greater than
$=$	Equal to

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## INTRODUCTION

Contemporary views of emotions suggest that they evolved to serve an adaptive purpose. Emotions indicate the degree to which the environment is meeting our needs and expectations (Carver & Scheier, 1998), and prepare us to engage in responses to obtain our goals (Hajcak, Molnar, George, Bolger, Koola, Nahas, 2007). Previous studies also have demonstrated that emotions serve as action dispositions, prompting an organism to respond to important stimuli (Lang, 1995; Lang, Bradley & Cuthbert, 2008). Given that emotions might play a role in effective interactions with one's surroundings, it should occasionally be useful to adopt the emotions and motivations of others who share these surroundings (de Waal, 2008; Hatfield, Cacioppo, & Rapson, 1993). For instance, observing fearful emotions of a peer in a shared environment may prompt an individual to respond toward nearby danger in a behaviorally appropriate manner. This process of "catching" the emotions of others is often referred to as emotional contagion (Gutsell & Inzlicht, 2012; Preston & de Waal, 2002; see also Gutsell & Inzlicht, 2010). In previous work, it is often assumed that emotional contagion is adaptive because it accompanied by motivational shifts that drive relevant behavior (e.g. running away) (De Gelder, Snyder, Greve, Gerard & Hadjikhani, 2004); Papousek, Reiser, Weber, Freudenthaler & Schulter, 2012). However, the mechanism of motivational contagion is less clear. The current experiment sought to clarify the process of "catching" motivational dispositions by directly assessing motivational contagion using a multi-method approach (EMG, electroencephalographic (EEG)  $\alpha$ -asymmetry and self-report).

Evidence suggests that individuals “catch” the emotions of others through largely automatic and unconscious processes, and that these processes can be observed across cultures (de Waal, 2008; Hatfield et al., 1993; Dimberg, Thunberg & Elmehed, 2000). The process of emotional contagion involves mimicking facial expressions (Jackson, Meltzoff, & Decety, 2005; Wicker, Keysers, Plailly, Royet, Gallese & Rizzolatti, 2003) and bodily postures (Schefflen, 1964; Mehrabian, 1969; LaFrance & Ickes, 1981; Hatfield et al., 1993) as well as the automatic activation of brain regions involved in experiencing the observed affective states. Thus, emotional contagion involves a mimicry of emotional expressions at both the behavioral and neural level.

Past research indicates that mimicry, the synchronization of one’s expressions, vocalizations, postures, and movements with those of another person, relies on the activity of the mirror neuron system (Hatfield et al., 1993; Enticott, Johnston, Herring, Hoy, & Fitzgerald, 2008). Mirror neurons are cortical brain cells that fire during both the observation of an action and the performance of the same action. Research on mirror neurons demonstrates that certain brain regions (e.g. anterior insula, anterior cingulate cortex, inferior frontal cortex) are active both when people experience an emotion, and when they observe another person experiencing that emotion (Preston et al., 2002; Gallese & Goldman, 1998; Gallese, 2003; Morrison, Lloyd, Di Pellegrino & Roberts, 2004; Lamm, Batson, & Decety, 2007). These systems may promote understanding of the actions and intentions of others and provide a neural basis for emotional contagion.

Emotional contagion is often presumed to be adaptive because it is accompanied by relevant changes in motivation, which in turn drive behavior (De Gelder et al., 2004; Papousek et al., 2012). To our knowledge, however, motivational contagion has not been directly tested in

previous research. Motivational orientations are evolutionarily adaptive in that they prompt organisms to avoid things that are harmful and approach things that are desirable. For instance, snakes elicit avoidant motivations that can prevent harmful and potentially fatal bites, while delicious looking foods elicit approach motivations that serve to sate our dietary needs. One way to assess people's motivational state is to study their tendencies to approach or avoid stimuli. Faster reaction times to approach positive stimuli would indicate greater approach orientation and faster reaction times to avoid negative stimuli would indicate greater avoidance orientation (Davidson, 1992; Harmon-Jones, 2004). Thus, by asking participants to respond quickly to affective stimuli, we can assess their current motivational orientation.

### **The Psychophysiology of Emotion and Motivation**

Electroencephalographic (EEG) asymmetry in the prefrontal cortex is sensitive to both change in emotional arousal and the motivational direction of an individual's current affective state. The valence model posits that greater relative left frontal activity is associated with positive affect, and relative right frontal activity is associated with negative affect (Silberman & Weingartner, 1986). More recently, proponents of the motivational direction model have suggested that frontal asymmetry reflects the direction of motivation – left corresponding to approach and right corresponding to avoidance – rather than the valence of the affective state (Gable & Harmon-Jones, 2008, 2010a, 2010b; Harmon-Jones, 2004, Coan, Allen, & Harmon-Jones, 2001). The two models make similar predictions for negative emotions associated with avoidance and positive emotions associated with approach. When this is not the case, however, the motivational direction model appears to do a better job accounting for the observed results. Anger, for example, is a negative emotion but is associated with high approach motivation and

also relative left frontal asymmetry (Harmon-Jones, Harmon-Jones, Abramson, & Peterson, 2009).

In addition to having correlates at the neural level, emotion and motivation are also evident in facial expressions that serve to communicate feelings and intentions and bolster social relationships (Andrew, 1963). Facial electromyographic (EMG) activity over the corrugator region has been shown to be a reliable indicator of negative affect (Cacioppo, Petty, Losch & Kim, 1986). For example, images of fearful facial expressions evoke increased corrugator supercilii activity, while pictures of happy facial expressions decrease corrugator supercilii activity (Dimberg & Thell, 1988; Hamm, Cuthbert, Globisch, & Vaitl, 1997). Facial EMG can provide a relatively covert and sensitive measure of emotional expression (Cacioppo, Klein, Bernston & Hatfield, 1993; Harmon-Jones & Allen, 2001).

## **Overview**

In the proposed studies, we sought to extend the existing research on emotional contagion by examining whether people also show motivational contagion. In other words, does observing approach related emotions lead the observer to experience congruent approach related emotions, motivational states, and facial expressions? Similarly, does observing avoidance related emotions have the converse effect? In Study 1, we first examined emotional contagion by having participants report their affective responses to film clips of a target expressing fear, excitement, or no emotion. In addition, we assessed motivational contagion by observing how the same films influenced participants' performance on the Manikin Task, a measure of motivational orientation (De Houwer, Crombez, Baeyens & Hermans, 2001). We also assessed resting and task-specific measures of frontal EEG asymmetry as well as corrugator supercilii activity. In Study 2, we

assessed motivational contagion by assessing self-reported motivational states as participants' responded to the food and animal stimuli used in the motivational orientation task in Study 1.

## EXPERIMENT 1

### **Method**

We hypothesized that after viewing each film participants would demonstrate congruent emotions and motivations. Specifically, after viewing the excitement film we predicted that participants would report greater levels of self-reported excitement and general positive affect relative to viewing the fearful film. Conversely, we predicted that after viewing the fearful film participants would report greater levels of self-reported fear and general negative affect relative to watching the excitement film.

We also hypothesized for the motivational orientation task that after viewing the excitement film, participants would be faster to approach food stimuli than after viewing the fearful film. Similarly, we hypothesized that after viewing the fearful film participants would be faster to avoid threatening animal stimuli than after viewing the excitement film.

Lastly, we hypothesized that viewing the excitement film would elicit less corrugator supercillii activity than after viewing the fearful film.

**Participants.** Forty-four introductory psychology students (24 male,  $M_{\text{age}}=20.09$  years,  $SD_{\text{age}}=1.7$  years) participated in a laboratory study that was as an investigation of emotion, motivation and personality. They earned credit toward a course requirement for their participation.

**Manipulation.** Participants viewed one of three films intended to convey specific motivational states. The film stimuli depicted another individual sitting in a similar laboratory environment—from the shoulders up—expressing either fear, excitement, or no emotion. Each

film had a running time of 50 seconds and had no sound. In the excitement film, the individual was expressing approach motivation behaviors (e.g. moving towards the screen) and positive emotions (e.g. joy, interest, amusement, and awe). In the fearful film, the individual was expressing avoidant motivation behaviors (e.g. moving away from the screen) and negative emotions (e.g. fear, anxiety, concern, and worry). In the no emotion film, the individual was expressing no motivational behaviors or emotions.

**Manikin Task.** In order to assess participants' motivational state after each video, we had them complete a reaction time task in which they responded to affective pictures (Harmon-Jones, Lueck, Fearn, & Harmon-Jones, 2006). These types of behavioral tasks are employed to assess natural approach/avoidance behavior because they are manageable and remain valid indicators of behavioral reactions (Krieglmeyer & Deutsch, 2010). Here we used the computerized Manikin Task, which required participants to move a manikin (i.e., a computerized human figure) either towards or away from affectively salient images depending on task instructions (De Houwer, et al., 2001).

The images used in the Manikin Task were taken from the International Affective Picture System (IAPS; Lang, Bradley & Cuthbert, 2005). Two types of images were used: animal images depicting threatening animals (1030, 1050, 1070, 1080, 1090, 1110, 1111, 1113, 1200, 1201, 1220, 1230, 1240, 1274, 1280 & 1301); and food images depicting food (7200, 7230, 7260, 7270, 7282, 7330, 7350, 7352, 7390, 7400, 7410, 7430, 7450, 7460, 7470 & 7480). The animal images reliably elicit high arousal negative affect and the food images reliably elicit high arousal positive affect. Arousal means were  $M = 5.7$  for negative images and  $M = 4.94$  for positive images on a 9-point rating scale. Ratings were scored such that 9 represents a high arousal and 1 represents low arousal (Lang et al., 2005).

During the task, thirty-two food and thirty-two animal images were presented twice in randomized order. Participants were either instructed to move the manikin towards food stimuli and away from animal stimuli (compatible version), or to move the manikin away from food stimuli and towards animal stimuli (incompatible version). The compatible and incompatible versions were counterbalanced. Participants were instructed to respond as quickly and as accurately as possible. Participants had to press the “up” or “down” arrow key three times to move the manikin across the screen. Each key press moved the manikin 5% of the screen. By alternating the length of the manikin’s legs each time it appeared in a new position, the impression of walking was evoked. At the beginning of each trial, a fixation cross and the manikin was presented for 750 milliseconds. After the appearance of the fixation cross and manikin, a picture was presented in the center of the screen. 50 ms after the third key press all stimuli were deleted from the screen and the next trial began. The time between the onset of the picture and the first key press was measured as the dependent variable.

We computed an approach index for each image type by subtracting approach reaction times from avoidance reaction times for correct responses only (Rinck, Telli, Kampmann, Woud, Kerstholt, te Velthuis, Wittkowski & Becker, 2013). This analysis is consistent with previous research on the Manikin Task (Krieglmeyer & Deutsch, 2010), which also analyzes these behaviors using difference scores (i.e. the approach/avoid index). These indices reflected the speed with which participants responded to the images, such that higher numbers indicated greater approach tendencies. Approach indices have been shown to be related to relevant behaviors (Rinck et al., 2013).

### **Individual Difference Measures**

**The Big Five Inventory.** The Big Five Inventory (BFI; John, Naumann & Soto, 2008;

John, Donahue & Kentle, 1991; Benet-Martinez & John, 1998) is a self-report inventory designed to measure the Big Five personality dimensions. It consists of forty-four items total and five subscales: (a) Extraversion; (b) Agreeableness; (c) Conscientiousness; (d) Neuroticism; and (e) Openness. Responses were measured using a 5-point scale (1= *disagree strongly* to 5= *agree strongly*).

**Behavioral Inhibition System & Behavioral Activation System.** The Behavioral Inhibition System and Behavioral Activation System (BIS/BAS; Carver & White, 1994, p. 322) questionnaires assess individual differences in behavioral inhibition sensitivity (BIS) and behavioral activation sensitivity (BAS). The BIS scale contains seven items. The BAS scale consists of three subscales: (a) Reward Responsiveness; (b) Drive; and (c) Fun Seeking. Responses were measured using a 4-point scale (1 = *strongly disagree* to 4 = *strongly agree*).

**Interpersonal Reactivity Index.** The Interpersonal Reactivity Index (IRI; Davis, 1980, 1983) is a measure of dispositional empathy. The IRI contains four seven-item subscales, each tapping a separate facet of empathy: (a) Perspective Taking (PT); (b) Empathic Concern (EC); (c) Personal Distress (PD); and (d) Fantasy (FS). Responses are measured using a 5-point scale (1= *does not describe me well* to 5= *describes very well*).

**Triarchic Psychopathy Measure.** The Triarchic Psychopathy Measure (TriPM; Patrick, Fowles, & Krueger, 2009) is a 58-item self-report questionnaire designed to measure psychopathy in terms of three distinct phenotypic constructs: (a) boldness; (b) meanness; and (c) disinhibition. Each construct is measured by a separate subscale. Responses are measured using a 4-point scale (1= *True* to 4= *False*).

**The Positive and Negative Affect Schedule.** The Positive and Negative Affect Schedule (PANAS; Watson, Clark & Tellegen, 1988) is a 20-item self-report questionnaire designed to

measure feelings and emotions. The items comprise two aggregate mood scales, one measuring positive affect and the other measuring negative affect. Each item is rated on a 5-point scale (1 = *very slightly or not at all* to 5 = *extremely*) to indicate the extent to which the respondent is feeling this way right now.

### **Self-Report Measures of State Emotion and Motivation**

**Emotion Items.** This 15-item measure was designed to assess state self-reported emotion. Because we were interested in mirrored emotions, we wanted to focus on individual items that most closely matched the emotions we were aiming to depict in the film clips. Therefore, we ran independent analyses of *excitement*, *fear*, and *anger* as our items of interest (see Appendix for additional items). Each item was rated on a 5-point scale (1 = *very slightly or not at all* to 5 = *extremely*) to indicate the extent to which the respondent felt this way during the film. In addition to the emotion items, general negative and positive affect were also measured. These were comprised of a 9-item general positive affect subscale which consisted of items such as serene, excited & happy and a 6-item general negative affect subscale which consisted of items such as nervous, afraid & sad. The emotion measure items include: Afraid, Mad, Nervous, Serene, Eager, Disgusted, Tranquil, Sad, Pleasant, Excited, Interested, Glad, Distressed, Happy & Content.

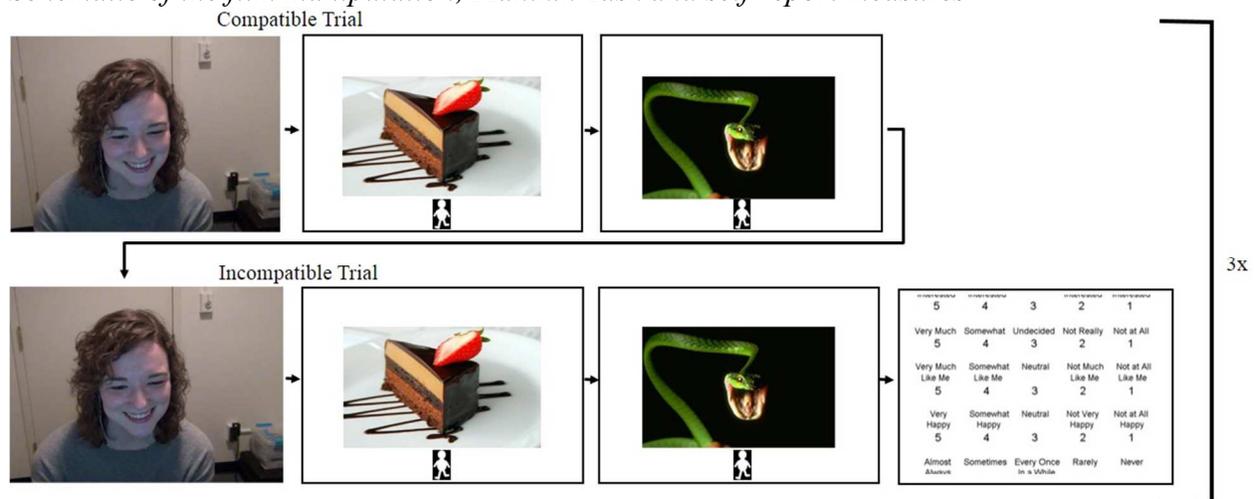
**Motivation Items.** This 2-item measure was designed to assess state motivational orientation. Again, because we were interested in mirrored motivational states, we included the individual items *go towards*, and *go away*. Each item was rated on a 5-point scale (1 = *very slightly or not at all* to 5 = *extremely*) to indicate the extent to which the respondent felt this way to the film.

**Procedure.** Participants first completed the individual difference measures as well as a

demographics questionnaire. Following the questionnaires, we began EEG and EMG recording and participants did a practice version of the Manikin Task. This consisted of a congruent version and an incongruent version, each containing 16 pictures from the IAPS (8 animal, 8 food). After practicing the task participants viewed the first film clip and then completed either the congruent or incongruent version of the full Manikin Task. Participants then re-watched the film and then completed the alternate version of the Manikin Task. At this point, participants were asked to complete a brief questionnaire of self-reported emotions and motivations. Participants then repeated the same procedure for the remaining two films (See Figure 1). The order of the three films was counterbalanced across participants.

In order to assess participant’s affective reactions to the pictures, participants viewed the thirty-two pictures from the Manikin Task again (2 s each), and indicated their mood (1 = *very unpleasant*; 9 = *very pleasing*) and arousal (1 = *calm*; 9 = *exciting*) on the Self-Assessment Manikin (Bradley & Lang, 1994), as well as indicated the “strength of the feeling you felt while viewing the picture” (1=*move toward*, 9=*move away*).

Figure 1  
Schematic of the film manipulation, Manikin Task and self-report measures



**EEG Recording and Processing.** EEG was recorded with 32 Ag/AgCl electrodes in a stretch Lycra electrode cap. Each electrode was filled with conductive gel (Electro-Gel). All sites

were referenced online to electrode Cz. Signals were amplified using Brainvision actiCHamps, band-pass filtered (0.10–100 Hz). Data was acquired from electrodes Fp1, Fpz, Fp2, FCz, F7, F3, Fz, F4, F8, FT9, FC5, FC1, FC2, FC6, FT10, T7, C3, Cz, C4, T8, TP9, CP5, CP1, CP2, CP6, Tp10, P7, P3, Pz, P4, P8, O1, Oz and O2. Vertical eye movements were recorded to facilitate artifact identification. Recordings were digitized at 2,000 Hz.

Recordings were re-referenced offline to the average of the two mastoid sites (TP9 & TP10). EEG was digitally filtered between .1 and 15 Hz, and corrected for vertical electrooculogram artifacts (Gratton, Coles & Donchin, 1983), with signal exceeding +/- 75 mV rejected by computer algorithm. Artifact-free epochs were extracted through a 75% overlap Hamming window and submitted to fast Fourier transform. Power values were averaged across the 4 min of eyes-open and 4 min of eyes-closed blocks of baseline. Power values were also averaged across the six, fifty-second films. Power values were log-transformed and asymmetry indexes (log right minus log left) were computed for all homologous sites. Because alpha power is inversely related to cortical activity, higher scores indicate greater left than right activity (Allen, Coan & Nazarian, 2004).

**EMG Recording and Processing.** EMG was recorded with 2 Ag/AgCl electrodes. Each electrode was filled with conductive gel (Electro-gel) and positioned over the corrugator supercilii on the left side of the face. This site was referenced online to an electrode positioned on the forehead. Signals were amplified using Brainvision actiCHamps and recordings were digitized at 1024 Hz.

EMG data was filtered offline (low pass 30 Hz, high pass 500 Hz, 60 Hz notch filter), rectified and segmented into 5-s epochs. Raw data were visually inspected and participants with an excessive amount of artifact were excluded without being analyzed ( $n = 33$ ). The EMG

response was measured as the difference between the rectified EMG signal and the rectified mean activity during the last second before stimulus presentation. An index of EMG activity was then measured as the mean rectified activity across all artifact-free epochs for a given film clip.

## Results

Results of self-reported emotion were analyzed by looking at both the positive and negative affect subscales and at the two individual items of interest (i.e., *fear* and *excitement*). We hypothesized that participants would report more excitement in response to the excitement film compared to the fear film. No specific predictions were made for the neutral film; however, it allowed us to have a baseline comparison. There was a statistically significant effect of film on self-reported excitement,  $F(2,88)=12.676$ ,  $p<.001$ ,  $\eta^2_p=.224$ . Pairwise comparisons revealed that participants reported greater excitement after the excitement film ( $M=2.20$ ,  $SD=1.375$ ) compared to the fear film ( $M=1.64$ ,  $SD=.830$ ),  $t=2.59$ ,  $p=.013$ . Participants also reported greater excitement after the excitement film compared to the neutral film ( $M=1.24$ ,  $SD=.570$ ),  $t=4.342$ ,  $p<.001$ . We also found a statistically significant effect of film on self-reported positive affect,  $F(2,88)=12.776$ ,  $p<.001$ ,  $\eta^2_p=.470$ . Pairwise comparisons revealed that participants reported greater positive affect after the excitement film ( $M=2.664$ ,  $SD=.862$ ) compared to the fear film ( $M=1.798$ ,  $SD=.540$ ),  $t=6.395$ ,  $p<.001$ . Participants also reported greater positive affect after the excitement film compared to the neutral film ( $M=1.693$ ,  $SD=.596$ ),  $t=6.928$ ,  $p<.001$ .

In contrast, we hypothesized that the fearful film would cause participants to report greater fear compared to the excitement film. There was a statistically significant effect of film on self-reported fear,  $F(2,88)=20.213$ ,  $p<.001$ ,  $\eta^2_p=.315$ . Pairwise comparisons revealed that participants reported greater fear after the fearful film ( $M=2.04$ ,  $SD=1.278$ ) compared to the excitement film ( $M=1.04$ ,  $SD=.298$ ),  $t=5.244$ ,  $p<.001$ . Participants also reported greater fear after

the fearful film compared to the neutral film ( $M=1.31$ ,  $SD=.701$ ),  $t=3.993$ ,  $p<.001$ . We also found a statistically significant effect of film on self-reported negative affect,  $F(2,88)=26.157$ ,  $p<.001$ ,  $\eta^2_p=.373$ . Pairwise comparisons revealed that participants reported greater negative affect after the fearful film ( $M=1.882$ ,  $SD=.898$ ) compared to the excitement film ( $M=1.114$ ,  $SD=.376$ ),  $t=5.997$ ,  $p<.001$ . Participants also reported greater negative affect after the fearful film compared to the neutral film ( $M=1.419$ ,  $SD=.560$ ),  $t = 4.058$ ,  $p<.001$ .

We were also interested in how participants rated the food and animal pictures. Participants reported the food pictures are more pleasant ( $M = 2.831$ ,  $SD = 1.078$ ) compared to the animal pictures ( $M = 6.788$ ,  $SD = 1.707$ ),  $t = -12.515$ ,  $p<.001$ . They reported the animal pictures are more arousing ( $M = 5.64$ ,  $SD = 1.755$ ) compared to the food pictures ( $M = 4.569$ ,  $SD = 1.757$ ),  $t = -2.633$ ,  $p = .012$ . They also reported wanting to move towards the food pictures more ( $M = 2.838$ ,  $SD = 1.143$ ) compared to the animal pictures ( $M = 7.636$ ,  $SD = 1.261$ ),  $t = -15.230$ ,  $p<.001$ .

For the motivational task, we predicted a higher approach index towards food after the excitement film when compared to the fearful film. Furthermore, we predicted a lower approach index towards animals after the fearful film when compared to the excitement film. A two-way repeated measures ANOVA was conducted that examined the effect of picture type and film type on approach-avoidance indices in the manikin task. As predicted, there was a statistically significant interaction between picture type and film type on reaction time indices,  $F(2, 86)= 3.809$ ,  $p = .026$ ,  $\eta^2_p=.081$ . We did not find a significant main effect of picture type,  $F(1,43)$ ,  $p=.334$ ,  $\eta^2_p=.022$  or of video,  $F(2,86)$ ,  $p=.996$ ,  $\eta^2_p <.001$ . Consistent with our prediction, pairwise comparisons showed that for food pictures, participants had higher approach index scores after watching the excitement video ( $M=3.238$ ,  $SD=18.765$ ) compared to the fearful film

( $M=-6.537$ ,  $SD=15.609$ ),  $t=3.016$ ,  $p=.004$ . Participants also had higher approach index scores after watching the excitement film compared to the neutral film ( $M=-1.776$ ,  $SD=18.991$ ),  $t=1.395$ ,  $p=.170$ . For the animal pictures, results did not support our predictions. Pairwise comparisons for animal pictures revealed that participants had higher approach index scores after watching the fearful film ( $M=6.537$ ,  $SD=15.609$ ) compared to the excitement film ( $M=-3.047$ ,  $SD=22.477$ ),  $t=2.546$ ,  $p=.015$ . Similarly, there was no significant difference between participants' approach index scores to the fearful film and the neutral film, ( $M=1.655$ ,  $SD=19.193$ ),  $t=1.335$ ,  $p=.189$ . These results suggest that fear films evoked approach-oriented emotions and behaviors. While individuals adopted the approach motivation displayed by the excitement film as hypothesized, they were also approach motivated by the fear film.<sup>1</sup>

**Frontal Asymmetry.** We hypothesized that participants would show the most left-frontal asymmetry (consistent with approach-motivation) in the excitement condition, followed by the neutral condition, with the lowest values for the fear condition. Conducting a one-way ANOVA with film type as the independent variable revealed no significant differences in state frontal asymmetry,  $F(2,24)=1.268$ ,  $p=.287$ ,  $\eta^2_p=.033$ . The means for film type are in the predicted directions, with greater relative left frontal asymmetry in the excitement ( $M = .012$ ,  $SD = .093$ ) and neutral films ( $M = .013$ ,  $SD = .092$ ) compared to the fear film ( $M = .002$ ,  $SD = .094$ ).

**EMG.** We hypothesized that after viewing the excitement film, participants would demonstrate less corrugator activity—associated with negative emotional stimuli and negative mood state—compared to the fear film. Conducting a one-way ANOVA with film type as the

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<sup>1</sup> Another way to look at this effect is with a 3-way interaction; a 3 (Film: food vs. animal vs. neutral) x 2 (Compatibility: compatible vs. incompatible) x 2 (Picture type: positive vs. negative) factorial within subjects analysis of variance (ANOVA) revealed a marginally significant 3-way interaction,  $F(2,86)=2.913$ ,  $p=.06$ ,  $\eta^2_p=.063$ . We report the scores using difference scores for ease of interpretation.

independent variable revealed a significant difference in state EMG activity,  $F(2,64)=6.058$ ,  $p=.004$ ,  $\eta^2_p=.159$ . Pairwise comparison analysis of the EMG data revealed that participants responded with less corrugator activity after the excitement film ( $M=-180.58$ ,  $SD=278.202$ ) compared to the fearful film ( $M=12.59$ ,  $SD=372.468$ ),  $t=-2.645$ ,  $p=.013$ . Participants also responded with less corrugator activity after the excitement film compared to the neutral film ( $M=35.86$ ,  $SD=272.524$ ),  $t=-3.031$ ,  $p=.005$ . There was no significant difference between participants' corrugator activity after the fearful film ( $M=12.59$ ,  $SD=372.468$ ) and compared to the neutral film ( $M=35.86$ ,  $SD=272.524$ ),  $t=-.391$ ,  $p=.699$ . Consistent with participants' increased self-reported excitement and positive affect after the excitement film, this suggests that participants are “catching” congruent emotions.

Because our results suggest that the fear films evoked approach-oriented behaviors (higher approach index scores towards animal pictures after the fearful film than after the excitement film), we followed up these analyses by testing an alternative hypothesis. Perhaps participants were responding to the videos by feeling *complimentary* emotions and motivations, rather than *congruent* emotions and motivations. Specifically, watching someone expressing fear could make an observer feel powerful (consistent with a complimentary account) or it could make an observer feel fearful (consistent with a contagion account). To assess this possibility we focused on the emotion word that most closely assessed feelings associated with power: *anger*. There was a statistically significant effect of film on self-reported anger,  $F(2,64)=5.324$ ,  $p=.013$ ,  $\eta^2_p=.143$ . Pairwise comparisons revealed that participants reported greater anger after the fearful film ( $M=1.48$ ,  $SD=.795$ ) compared to the excitement film ( $M=1$ ,  $SD=0$ ),  $t=3.502$ ,  $p=.001$ . Participants also reported greater anger after the fearful film compared to the neutral film ( $M=1.27$ ,  $SD=.674$ ),  $t=1.157$ ,  $p=.256$ .

## **Discussion**

Our results from study 1 indicated that participants rated the picture stimuli in the desired directions. Participants also reported greater excitement and general positive affect after the excitement film compared to the fearful video. In contrast, participants reported greater fear and general negative affect after the fearful film compared to the excitement film. We found a significant interaction between picture type and film type on reaction time indices such that, for food pictures, participants had higher approach index scores after watching the excitement video compared to the fearful film. We also found a significant difference in state EMG activity such that participants responded with less corrugator activity after the excitement film compared to the fearful film.

## EXPERIMENT 2

### **Method**

In Study 2 we attempted to explore the idea of motivational contagion using self-report in order to clarify the results of the reaction-time data observed in Study 1. This time we had participants watch the same video, but we assessed their self-report reactions to the same animal and food pictures used in the Manikin Task in Study 1. We hypothesized that after viewing the excitement film participants would respond to the food pictures as more exciting and want to go towards these pictures more than after viewing the fearful film. Similarly, we hypothesized that after viewing the fearful film, participants would respond to the animal pictures as more fearful and want to go away from these pictures more than after watching the excitement film. We also hypothesized that after viewing the excitement film, participants would want to approach the food pictures more than after viewing the fearful film. Conversely, we hypothesized that after viewing the fearful film, participants would want to go away from the animal pictures more than after viewing the excitement film.

**Participants.** One-hundred and sixty two introductory psychology students participated in a laboratory study that was as an investigation of emotion, motivation and personality. They earned credit toward a course requirement for their participation.

**Manipulation.** Participants viewed the same three films from Study 1 (excitement, fearful, and neutral), which were intended to convey specific emotional and motivational states.

**Individual Difference Measures.** Participants filled out The Big Five Inventory (BFI), The Behavioral Inhibition System and Behavioral Activation System scale (BIS/BAS), The

Interpersonal Reactivity Index (IRI), The Triarchic Psychopathy Measure (TriPM) & The Positive and Negative Affect Schedule (PANAS); see Appendix) For this study, however, we were mostly interested in participant's state measures.

**Emotion Items.** This 8-item measure was designed to assess state self-reported emotion. For each image participants rated their emotions for: afraid, angry, submissive disgusted, excited, dominant, powerful and helpless. Each item was rated on a 5-point scale (1 = *very slightly or not at all* to 5 = *extremely*) to indicate the extent to which the respondent felt this way during the film.

**Motivation Items.** This 2-item measure was designed to assess state motivational orientation. Again, because we were interested in mirrored motivational states, we included the individual items *go towards*, and *go away*. Each item was rated on a 5-point scale (1 = *very slightly or not at all* to 5 = *extremely*) to indicate the extent to which the respondent felt this way to the film.

**Procedure.** As in Study 1, participants first completed the individual difference measures as well as a demographics questionnaire (See Appendix). Following the questionnaires, participants viewed the first film clip. After viewing the first film clip, participants viewed the 32 (16 food, 16 animal) that were included in the Manikin Task in Study 1. Participants then repeated the same procedure for the remaining two films. The order of the three films was counterbalanced across participants.

## Results

Study 2 was designed to clarify the results of Study 1 by using a self-report measure of motivational contagion. We hypothesized that participants would be more likely to respond to the animal pictures with congruent fearful emotions and avoidance motivation after viewing the

fearful film compared to the excitement film. Conversely, we hypothesized that participants would be more likely to respond to the food pictures with excitement and approach motivation after viewing the excitement film compared to the fear film.

**Food Pictures.** We hypothesized that after viewing the excitement film, participants would rate the food pictures as more exciting, and want to go towards these pictures more than after viewing the fearful film. There was a statistically significant effect of film on excitement towards food pictures,  $F(2,314)=4.215$ ,  $p<.016$ ,  $\eta^2_p=.026$ . Post hoc tests revealed that participants reported marginally increased excitement after viewing the excitement film ( $M=1.95$ ,  $SD=1.243$ ) compared to the fearful film ( $M=1.79$ ,  $SD=1.189$ ),  $t=1.640$ ,  $p=.103$ . In addition, there was a statistically significant effect of film on positive affect towards food pictures,  $F(2, 314)$ ,  $p=.014$ ,  $\eta^2_p=.027$ . Post hoc tests revealed that participants reported increased positive affect after viewing the excitement film ( $M=1.721$ ,  $SD=.844$ ) compared to the fearful film ( $M=1.588$ ,  $SD=.886$ ),  $t=2.019$ ,  $p=.045$ . The effect of film on participants desire to go towards food pictures after viewing the excitement film was not statistically significant,  $F(2, 314)=1.808$ ,  $p=.166$ ,  $\eta^2_p=.011$ , (Film type: Excitement,  $M=1.92$ ,  $SD=1.348$ ; Neutral,  $M=1.69$ ,  $SD=1.241$ ; Fear,  $M=1.86$ ,  $SD=1.398$ ). No specific predictions were made for the neutral film, however this allows us to have a baseline comparison for film. After viewing the excitement film participants reported increased feelings of excitement for food picture ratings when compared to the neutral film ( $M=1.66$ ,  $SD=1.078$ ),  $t=8.870$ ,  $p=.005$  and increased general positive affect ( $M=1.524$ ,  $SD=.825$ ),  $t=3.186$ ,  $p=.002$ .

**Animal Pictures.** In contrast, we hypothesized that after viewing the fearful film participants would rate the animal pictures as more fearful, and want to go away from these pictures more than after viewing the excitement film. There was not a statistically significant

effect of film on fear towards animal pictures,  $F(2,314)=2.033$ ,  $p=.133$ ,  $\eta^2_p=.013$ . Post hoc tests revealed that participants reported decreased fear after viewing the fearful film ( $M=1.48$ ,  $SD=1.034$ ) compared to the excitement film ( $M=1.61$ ,  $SD=1.61$ ),  $t=-1.272$ ,  $p=.205$ . There was, however, a statistically significant effect of film on negative affect towards animal pictures,  $F(2, 314)$ ,  $p=.019$ ,  $\eta^2_p=.025$ . Post hoc tests revealed that participants reported decreased negative affect after viewing the fearful film ( $M=1.386$ ,  $SD=.625$ ) compared to the excitement film ( $M=1.538$ ,  $SD=.79$ ),  $t=-2.487$ ,  $p=.014$ . The effect of film on participants desire to go away from animal pictures after viewing the fearful film was not statistically significant,  $F(2, 314)=1.748$ ,  $p=.176$ ,  $\eta^2_p=.001$ , (Film type: Excitement,  $M=2.12$ ,  $SD=1.473$ ; Neutral,  $M=1.89$ ,  $SD=1.408$ ; Fear,  $M=1.91$ ,  $SD=1.402$ ). Again, no specific predictions were made for the neutral film. After viewing the fearful film participants reported increased feelings of fear for animal picture ratings when compared to the neutral film ( $M=1.44$ ,  $SD=1.022$ ),  $t=.069$ ,  $p=.945$  and decreased general negative affect ( $M=1.417$ ,  $SD=.789$ ),  $t=-.680$ ,  $p=.497$ .

To test the complimentary hypothesis, in which participants react with complimentary emotions and not congruent emotions to the films, we also analyzed self-reported anger and as a separate item. A repeated-measured ANOVA for effect of film on animal picture ratings for anger was not significant,  $F(2,314)=2.910$ ,  $p=.061$ ,  $\eta^2_p=.018$ , (Film type: Excitement,  $M=1.3$ ,  $SD=.738$ ; Neutral,  $M=1.35$ ,  $SD=.868$ ; Afraid,  $M=1.19$ ,  $SD=.609$ ). Here, we have a marginal effect. However, the complimentary hypothesis would say that people show increased anger to the fear film compared to the excitement film, and here we are seeing the opposite trend.

## **Discussion**

Study 1 revealed that participants reported affective responses to the film clips in the predicted directions. These results indicated that observing approach/avoidant related emotions

led the observer to experience congruent approach/avoidant related emotions. Study 1 also indicated that congruent motivational orientations were experienced through observation of these films. EMG analysis revealed outcomes consistent with participants' increased self-reported excitement and positive affect after the excitement film, which suggests that participants are “catching” congruent emotions.

To further investigate the mechanism of motivational contagion, we designed Study 2 to clarify the results of study 1 by using a self-report measure of motivational contagion. We found participants experienced congruent approach emotions to the food pictures after the excitement video, but not avoidant emotions to the animal pictures after the fearful video. We also found that the desire to go towards the food pictures after the excitement film and away from animal pictures after the fearful film was not significant. These results indicate that participants did not experience congruent motivational states in Study 2.

Broadly, the current experiment helped clarify the process of “catching” motivational dispositions by directly assessing motivational contagion. By examining the processes of emotional contagion and motivational orientation concurrently, we believe that the current findings help clarify the role of motivational contagion in adaptive “catching processes” and subsequent behaviors.

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## APPENDIX



November 16, 2012

Alexa Tullett, Ph.D.  
Department of Psychology  
College of Arts & Sciences  
Box 870348

Re: IRB # 12-OR-<sup>373</sup>~~273~~: "Emotion, Motivation, and Action"

Dear Dr. Tullett,

The University of Alabama Institutional Review Board has granted approval for your proposed research.

Your application has been given expedited approval according to 45 CFR part 46. You have also been granted the requested waiver/alteration of informed consent. Approval has been given under expedited review category 7 as outlined below:

*(7) Research on individual or group characteristics or behavior (including, but not limited to, research on perception, cognition, motivation, identity, language, communication, cultural beliefs or practices, and social behavior) or research employing survey, interview, oral history, focus group, program evaluation, human factors evaluation, or quality assurance methodologies.*

Your application will expire on November 15, 2013. If the study continues beyond that date, you must complete the IRB Renewal Application. If you modify the application, please complete the Modification of an Approved Protocol form. Changes in this study cannot be initiated without IRB approval, except when necessary to eliminate apparent immediate hazards to participants. When the study closes, please complete the Request for Study Closure (Investigator) form.

**Please use reproductions of the IRB-stamped information sheet and debriefing.**

Should you need to submit any further correspondence regarding this application, please include the assigned IRB application number.

Good luck with your research.

Sincerely,



Carpantat, T. Myles, MSM, CIM  
Director & Research Compliance Officer  
Office for Research Compliance  
The University of Alabama



358 Rose Administration Building  
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TOLL FREE (877) 820-3066

IRB Project #: 12-OR-~~273~~<sup>373</sup>

UNIVERSITY OF ALABAMA  
INSTITUTIONAL REVIEW BOARD FOR THE PROTECTION OF HUMAN SUBJECTS  
REQUEST FOR APPROVAL OF RESEARCH INVOLVING HUMAN SUBJECTS

I. Identifying information

	Principal Investigator	Second Investigator	Third Investigator
Names:	Alexa Tullett	Brett Grant	
Department:	Psychology	Psychology	
College:	Arts & Sciences	Arts & Sciences	
University:	University of Alabama	University of Alabama	
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Telephone:	205-348-0607	972-467-9983	
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Title of Research Project: Emotion, Motivation, and Action

Date Submitted: 9/4/2012  
Funding Source: None

Type of Proposal  New  Revision  Renewal  Completed  Exempt

Please attach a renewal application

Please attach a continuing review of studies form

Please enter the original IRB # at the top of the page

UA faculty or staff member signature: \_\_\_\_\_

II. NOTIFICATION OF IRB ACTION (to be completed by IRB):  
Type of Review: \_\_\_\_\_ Full board  Expedited

IRB Action:

Rejected Date: \_\_\_\_\_  
 Tabled Pending Revisions Date: \_\_\_\_\_  
 Approved Pending Revisions Date: \_\_\_\_\_

Approved-this proposal complies with University and federal regulations for the protection of human subjects.

Approval is effective until the following date: 11/15/2013

Items approved:  Research protocol (dated \_\_\_\_\_)  
 Informed consent (dated \_\_\_\_\_)  
 Recruitment materials (dated \_\_\_\_\_)  
 Other *Water info sheet debriefing* (dated \_\_\_\_\_)

Approval signature \_\_\_\_\_

Date 11/16/12

Office for Research  
Institutional Review Board for the  
Protection of Human Subjects

March 21, 2013



Alexa Tullett, Ph.D.  
Assistant Professor  
Department of Psychology  
College of Arts & Sciences  
The University of Alabama

Re: IRB # 12-OR-373 (Revision) "Emotion, Motivation, and Action"

Dear Dr. Tullett:

The University of Alabama Institutional Review Board has reviewed the revision to your previously approved expedited protocol. The board has approved the change in your protocol.

Please remember that your approval period expires one year from the date of your original approval, November 16, 2012, not the date of this revision approval.

Should you need to submit any further correspondence regarding this proposal, please include the assigned IRB application number. Changes in this study cannot be initiated without IRB approval, except when necessary to eliminate apparent immediate hazards to participants.

Good luck with your research.

Sincerely,

A rectangular box with a black border, used to redact the signature of the sender.

Carlytato T. Myles, MSM, CIM  
Director & Research Compliance Officer  
Office for Research Compliance  
The University of Alabama



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IRB Project #: 12-OR-373

UNIVERSITY OF ALABAMA  
INSTITUTIONAL REVIEW BOARD FOR THE PROTECTION OF HUMAN SUBJECTS  
REQUEST FOR APPROVAL OF RESEARCH INVOLVING HUMAN SUBJECTS

I. Identifying information

	Principal Investigator	Second Investigator	Third Investigator
Names:	Alexa Tullett	Brett Grant	
Department:	Psychology	Psychology	
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Title of Research Project: Emotion, Motivation, and Action

Date Submitted: 3/19/2013

Funding Source: None

Type of Proposal  New  Revision  Renewal  Completed  Exempt

Please attach a renewal application

Please attach a continuing review of studies form

Please enter the original IRB # at the top of the page

UA faculty or staff member signature: \_\_\_\_\_

II. NOTIFICATION OF IRB ACTION (to be completed by IRB):

Type of Review: \_\_\_\_\_ Full board  Expedited

IRB Action:

\_\_\_\_ Rejected Date: \_\_\_\_\_

\_\_\_\_ Tabled Pending Revisions Date: \_\_\_\_\_

\_\_\_\_ Approved Pending Revisions Date: \_\_\_\_\_

Approved-this proposal complies with University and federal regulations for the protection of human subjects.

Approval is effective until the following date: 11-15-13.g

Items approved: \_\_\_\_\_ Research protocol (dated \_\_\_\_\_)

\_\_\_\_\_ Informed consent (dated \_\_\_\_\_)

\_\_\_\_\_ Recruitment materials (dated \_\_\_\_\_)

\_\_\_\_\_ Other (dated \_\_\_\_\_)

Approval signature: \_\_\_\_\_ Date: 3/21/2013