

Preliminary Materials Toward a Library of Affective Films (LAF):
Standardization and Psychophysiological Validation

by

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Abstract

Most emotion-elicitation film libraries use only self-report measures (e.g., Hagemann et al., 1999) and even those including physiological data (e.g., Gross & Levenson, 1995) often fail to control for variables such as simulation or familiarity. The current study introduces a new film stimulus set relatively free of narrative elements, and uniquely validated using dynamic self-reporting and six psychophysiological measures. Twenty-five healthy normal Auburn University students watched 16 short film clips while wearing electrodes to track autonomic changes while continuously indicating changes in their emotional valence and arousal. The films classify into three groups roughly corresponding to high, low, and neutral valence. Average valence and arousal were correlated with changes in autonomic activity, such as decreases in parasympathetic measures that correlated with increases in subjective arousal. These findings represent an initial attempt to develop and validate an affective film stimulus set with novel, temporally-synced, distinct autonomic and behavioral signatures.

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Introduction

Researchers are in consensus on the biological basis of emotions (Barrett, 2012; Barrett, Mesquita, Ochsner, & Gross, 2007). Many have proposed evolutionary functions of emotions, including communication and approach and avoidance of stimuli relevant to survival and reproduction (Ekman, 1999; Neese & Ellsworth, 2009; Shareef & Tracy, 2011). In order to avoid mentalistic language and to facilitate operationalization, Solomon (2008) defines emotions as motivating states causing changes in subjective feeling, expressive behavior, and physiological and neurological activation. Bradley and Lang (2007) qualify the covert, inhibited nature of emotions. Models of emotion may include dimensions such as arousal and valence, or categories such as discrete affective states (i.e., affect programs, e.g., anger or happiness) (Murphy, Nimmo-Smith, & Lawrence, 2003). Researchers may use the above definitions and constructs to create self-report, psychophysiological, and/or neurofunctional profiles of emotion to explain emotional function in healthy volunteers. Such profiles can serve as baseline measures to provide psychologists with insight into etiology and treatment of psychological disorders involving impairment in emotional function.

A common way to investigate emotions in the laboratory is using emotion-elicitation procedures, also known as mood induction procedures (MIPs; Westerman et al., 1996). MIPs may involve participants reading self-referent mood statements (i.e., Velten MIPs; Velten, 1968), engaging in imagination or visualizations, reading or generating stories, watching films, participating in social interactions, observing or producing facial expressions, receiving gifts, undergoing hypnosis, or taking drugs (Kenealy, 1986; Westerman et al., 1996). Researchers may assess emotions – and thus reactions to MIPs – using self-report, observation of facial

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expressions or actions (e.g., approach or avoidance), psychophysiology, neurophysiology, and neurofunctional activation. Meta-analyses exist pooling correlates of valence, arousal, and discrete emotions psychophysiological (e.g., Kreibig, 2010) and neurofunctional measures (e.g., Murphy, et al., 2003; Kirby & Robinson, 2015), although affective science is not at a consensus about such profiles. When Westerman et al. (1996) investigated MIPs, they found films and stories—categorized together—to be the most effective method of inducing emotions.

Most researchers who have sought to create a film-based emotion-elicitation stimulus set used self-report as their primary dependent measure (Gross & Levenson, 1995; Hagemann et al., 1999; McHugo, Smith, & Lanzetta, 1982; Philippot, 1993; Schaefer et al., 2010, Bartolini, 2011). Previous film libraries failed to control for variables not unique to the medium of film, such as fame or musical score. The literature also shows films elicit strong physiological as well as psychological effects (Frazier, Strauss, & Steinhauer, 2004; Gross, 1998; Palomba, et al., 2000); however, these studies vary across factors such as inclusion of audio, dialogue, valence, and simulation. Despite the numerous attempts mentioned above, affective science lacks a widely-used standardized film emotion-elicitation set. Furthermore, the search for physiological and neurological correlates of arousal, valence, and discrete affect programs is far from over. Work with emotion-elicitation stimuli using more objective dependent measures than commonly used can help elucidate the relationship between subjective feelings and activity of the body and brain. To address this gap, models of emotions will be reviewed, followed by the history of emotion elicitation, and the psychophysiology of emotions.

Literature Review

Measuring Emotions

Arousal. Arousal is one of the simplest emotional dimensions to measure and operationalize. It is a measure of amplitude or intensity (Bradley & Lang, 2007). Arousal can be measured through any of the methods introduced above and discussed below. In the case of self-report, a researcher may ask the participants to report degree of emotion felt on a graded scale of intensity (e.g., a Likert scale). Higher values indicate higher intensity of emotion felt, and therefore higher arousal. Psychophysiology can offer more objective measures to corroborate self-reports and arousal is typically thought of as a function of sympathetic activity (Bradley & Lang, 2007).

Valence. Valence refers to the positive or negative polarity of emotions (Bradley & Lang, 2007). Valence seems to be more intuitive than arousal: people readily and easily report it on Likert-style continua. However, the degree to which humans have a corresponding physiological correlate to valence, as we do for arousal, has been disputed in the literature. Many researchers such as Paul Ekman (1983) have used observation of facial expressions as an indication of valence. Behavioral avoidance or approach is also taken as evidence of valence (Miller, 1959)—specifically, researchers understand approach to indicate positive valence and avoidance to indicate negative valence. Although the approach-avoidance dichotomy is well-established as a correlate of valence, approach and avoidance behaviors are difficult to measure with psychophysiological techniques and so are beyond the scope of this paper. Thus, self-report and facial electromyography (EMG)—detailed below—may be best suited for collecting valence information in psychophysiology laboratories.

Discrete Emotions. In addition to conceptualizing emotions in terms of intensity and their appetitive or aversive (i.e., hedonically-valenced) nature, people also refer to emotions in discrete categories. Self-reports and behavioral observations yield evidence for distinct “affect programs” or discrete emotions. Paul Ekman (1983) created a list of “basic emotions” – anger, disgust, fear, happiness, sadness, and surprise – which he characterized as responses to similar situations across different cultures. Ekman posited that discrete emotions are observable through overt facial expressions and smaller microexpressions. Other researchers may use slight variations on Ekman’s list. Because the literature reports large variability in psychophysiological or neurofunctional correlates of discrete emotions, some researchers dispute the existence of affect programs as anything other than linguistic convention (review in Larson et al., 2008). Some models of emotion encompass only one of the above described factors or dimensions, but they are not mutually exclusive. For example, affect programs are not necessarily entirely categorical, but may also include the dimensionality of arousal and valence (e.g., Posner, Russell, & Peterson, 2005) as shown in Figure 1.

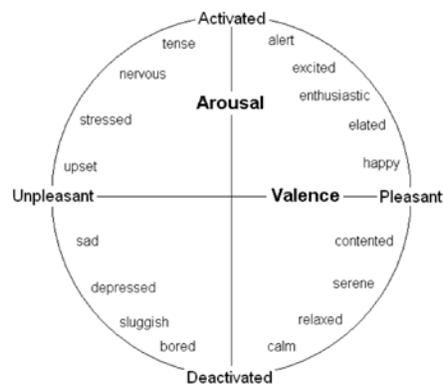


Figure 1. The circumplex model of emotions, a two-dimensional anchored valence and arousal scale.

Psychophysiology of Emotions

Psychophysiological measures provide an objective means of testing the autonomic outcomes of emotional processing, inclusive of the dimensions mentioned above. Common indicators of increased sympathetic activity (i.e., increases in arousal) include increases in the rate of respiration, increases in heart rate in conjunction with increases in the amplitude of a T-wave on an electrocardiogram (ECG), and rises in electrodermal activity (Bernston, Quigley, & Lozano, 2007; Boiten, Frijda, and Wientjes 1994; Bradley & Lang, 2007; Dawson, Schell, & Filion, 2007). Electrical activity of facial muscles (EMG) reveals contraction reflecting differences correlating with self-reported valence (Bradley & Lang, 2007; Tassinari, Cacioppo, & Vanman, 2007). Specifically, activity of the zygomaticus muscle (near the dimple of the cheek) correlates with positive valence and the corrugator supercilii muscles (near the brow) with negative valence (Lorig, 2007). Inconsistency in psychophysiological correlates of discrete emotions could be due to poor methodology, inadequate stimuli, or differences across emotion-elicitation contexts. Despite the debate in the field over their existence, Sylvia Kreibig (2010) produced a list of general consensus of psychophysiological signatures from 134 studies of physiological measurement of sixteen different emotions, including six basic ones—amusement, anger, anxiety, disgust, fear, and sadness—reported below.

Reviewed studies induced amusement almost exclusively using film clips and featured increased vagal (parasympathetic) cardiac control, respiration, EDA, and β -adrennergic sympathetic deactivation. Anger elicitation revealed less consistency across studies compared to other emotions. Kreibig hypothesizes that the “angry” stimuli in some studies may have induced fear rather than anger. However, common changes included reciprocal sympathetic activation

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and an increased rate of respiration. Anxiety provoking stimuli initiated a series of consistent autonomic changes inclusive of sympathetic activation and decreased vagal activity (i.e., fast and shallow breathing). Kreibig (2010) describes two kinds of disgust found in the literature: contamination-based and mutilation-based disgust. Contamination-related disgust shows a pattern of sympathetic and parasympathetic coactivation, with faster but shallower inspiration, matching a pattern associated with vomiting (Sherwood, 2008). On the other hand, mutilation-related disgust shows a decrease in sympathetic control of the heart, increased electrodermal activity (EDA), no change in vagal activity, fast breathing, increased heart rate, and decreased cardiac output. Fear studies showed increased sympathetic activation, such as increased heart rate, muscle contractility, peripheral vasoconstriction, and EDA. She described two different types of sadness responses: crying and not-crying. The crying (activating) response includes increased sympathetic activation, increased EDA, and no change in respiration. The not-crying (deactivating) condition involves a decrease in sympathetic activation and a decrease in EDA. Happiness involves increased heart rate, decreased vagal activity, increased EDA, respiratory rate, and peripheral vasodilation. Taken together, these data support the notion of potential unique biosignatures that can be associated with discrete emotional states.

Emotion Elicitation

In their review of the effectiveness of a large-scale database of film stimuli for emotion induction, Schaefer and colleagues (2010) name film as the most effective and reliable type of emotion induction material, citing Westerman and colleagues (1996). However, Westerman and colleagues (1996) grouped films and stories together, using the narrative features of both to promote identification with a protagonist. In this case, the researchers conflate film with narrative. We know language and narrative are not necessary for emotion induction (e.g., the

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International Affective Picture System: IAPS (Lang, Bradley, & Cuthbert, 1999)), so to improve upon previous film stimuli, several key characteristics were sought out including films that were cross-cultural, largely non-verbal, and relatively free of cultural context (i.e., in that most film clips will be relatively unknown to most general audiences). Buchwald, Strack and Coyne (1981) identified the risk of demand characteristics in the Velten MIP (Velten, 1968), though it is likely this applies to other MIPs as well.

Previous film libraries (Gross & Levenson, 1995; Hagemann et al., 1999; McHugo, Smith, & Lanzetta, 1982; Philoppot, 1993; Schaefer et al., 2010, Bartolini, 2011), though reliably inducing a range of emotions, do little to reduce demand characteristics. Furthermore, Schaefer and colleagues (2010) cite emotion induction using film as having good ecological validity, yet all stimulus sets examined in their analysis use exclusively simulated material. It remains uninvestigated whether fiction versus documentaries, for example, might have differential mood induction effects, so their results are impossible to attribute to the medium of film. Previous film library attempts are unable to distinguish which qualities of their film clips induce emotion. Additionally, films elicit strong physiological reactions (Frazier, Strauss, & Steinhauer, 2004; Gross, 1998; Palomba, Sarlo, Angrilli, Mini, & Stegagno, 2000); however, these studies also vary across factors such as inclusion of audio, dialogue, valence, and simulation. Because film clips used in some libraries are from well-known feature films (Hagemann et al., 1999; Scahefer et al., 2010; Bartolini, 2011), it is possible many film libraries induce emotions through narrative features rather than the scenes themselves. Perhaps accompanying emotional music in the scenes, dialogue, or other factors such as demand characteristics, which are not unique to the medium of film, could be responsible for the observed emotional self-reports. The current studies focus primarily on a bare-bones definition of film excluding emotional dialogue (any minimal

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language included is “neutral,” and so likely will not have differential emotional effects), music, and large well-known “blockbuster” films to reduce possible effects (e.g., demand characteristics, habituation) due to prior experience with the films.

Film is poised to be the best medium for emotion elicitation in the laboratory, as it provides a variety of options in ecological validity and experimental control, which have an inverse relationship in this case. Affective scientists may represent greater ecological validity in emotion elicitation using movement as opposed to still images, using color as opposed to grayscale, using dialog, using natural event segmentation, using sound accompaniment, and using all unsimulated (i.e., in vivo, documentary-style) films rather than acted scenes.

Segmenting extant films using scene changes introduces variability in timing of emotionally relevant events, but follows the way people intuitively segment events (Zacks & Magliano, 2011). On the other hand, some researchers may exercise greater experimental control—at the expense of the ecologically valid power of film—by controlling for amount and direction of movement, creating or cropping clips of equal length and timing of emotionally relevant events, counterbalancing for color and grayscale, counterbalancing for simulation, and excluding music or any sound. Additionally, although unsimulated scenes maximize ecological validity, they reduce the range of available affective events: violent or disgusting imagery useful in evoking strong emotional responses become more difficult or ethically impermissible to represent.

Affective scientists need to isolate and describe the effects of emotion-elicitation films by reducing demand characteristics and by employing validation with objective dependent measures. Thus, in the present study, attempts are made to balance ecological validity and experimental control by including film clips from commercially-available features and short films of various lengths, initially cropped to follow the natural event segmentation present in the

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editing, without dialog or music (with exceptions noted later) featuring normal sound effects, with a mixture of color and grayscale, and a mixture of simulated and unsimulated scenes. Also provided are films representing a neutral control condition, expected to be emotionally unarousing, and which have no apparent emotional valence. The potential for demand characteristics was reduced through the use of films that have not been viewed previously by most participants.

It is hypothesized that the films collected would induce anger, anxiety, disgust, fear, happiness, humor (amusement), and sadness. In deciding which emotions to elicit, a discrete emotions model was favored featuring the dimensionality of valence and arousal. Although there is evidence that emotions may be more complex or organized differently than in basic categories, film emotion-elicitation sets have not been investigated adequately (as reviewed above) with any model of emotion. Seeking to confirm or refute such a discrete model of emotions with more objective methods and an improved stimulus set is more pertinent than beginning with a more complex model of emotions. Regardless of the outcome testing a discrete emotions model, the stimulus set investigated is characterized by its self-report valence and arousal and psychophysiological measures throughout the duration of the films, a feature that is novel and unique to these stimuli.

Two studies were conducted to develop and characterize the film emotion-elicitation stimulus set: the first to gain self-report standardization data for the initial set of films and the second to gather both self-report and psychophysiological measurements of the same films (now cropped for uniform length). Both studies were preceded with a screening phase to rule out participants with psychological or neurological problems. Participants were also asked about their ability to regulate and understand their emotions. Three major hypotheses were examined.

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Hypothesis 1. Affective films intended to elicit anger, anxiety, disgust, fear, happiness, humor (amusement), and sadness, will classify into three major groups: positive, negative, and neutral films. Participants will report the highest ratings for the basic emotional categories for which the films were selected (e.g., participants will rate their levels of sadness higher than other emotions after watching the films expected to induce sadness).

Hypothesis 2. The affective films intended to elicit the seven emotion classes investigated will produce physiological changes significantly different from baseline and significantly different from responses to the neutral films; additionally, it is anticipated that the affective films will elicit affect-specific psychophysiological signatures such as those Kreibig (2010) described.

Hypothesis 3. Changes in psychophysiological measures of valence and arousal will be identified that correspond with participants' self-reported valence and arousal for each film. Negatively valenced films will also elicit larger differences in psychophysiological parameters from baseline compared to positive films.

Prescreening Method

Participants

Participants were 361 students aged 18-44 ($M = 20.12$, $SD = 2.13$), enrolled in Auburn University psychology courses anytime from January 2015-March 2016 who registered for participation through SONA. They included 249 women and 110 men; 16 Hispanic or Latino students; 313 Caucasians, 28 African Americans, nine Asian students, one Native American student, and three mixed-race students (Caucasian and Native American). As incentive, participants were offered one half-hour of SONA credit for a psychology course of their choosing. The pre-screening recruitment materials mentioned people with qualifying scores have the opportunity to participate in Part 2 (film-viewing). Depending on when they participated, students read a different description of Part 2, described below in Study 1 and Study 2 methods.

Materials

As a criterion for participating in future studies (described below in Study 1 and Study 2 Methods) investigating new emotion-elicitation film clips, students took a demographics questionnaire, a medical screening questionnaire, the Post-Traumatic Stress Disorder (PTSD) Checklist for DSM-5 (PCL-5; Weathers et al., 2013), the Beck Depression Inventory – II (BDI-II; Beck, Steer, Ball, & Ranieri, 1996), and the Beck Anxiety Inventory (BAI; Beck & Steer, 1993). In order to help control for individual differences in understanding and regulation of emotions, they also took Emotion Regulation Questionnaire (ERQ; Gross & John 2003), the 20-Item Toronto Alexithymia Scale (TAS-20; Bagby, Parker, & Taylor, 1994), and the Affect

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Modulation Ability Questionnaire (AMAQ; Robinson, 2006). Copies of all questionnaires from the Prescreening phase can be found in Appendix A.

The medical screening form—focusing on diseases, injuries, and psychological disorders—assessed the health history of participants. The PCL-5 contains 20 statements describing PTSD symptoms recognized by the DSM-5 (American Psychiatric Association, 2013). Participants indicate endorsement of the symptom items with scores 0-4 (*0-not at all, 1-a little bit, 2-moderately, 3-quite a bit, and 4-extremely*). The BDI-II is a 21-item inventory asking participants to report endorsement and degree of severity (*0-mildly affected-4-severely affected*) for 21 different symptoms of Major Depressive Disorder. The BAI is a similar measure querying severity of 21 common anxiety disorder symptoms on the same 0-4 scale.

The ERQ, TAS-20, and AMAQ were administered to determine normal affective style, and to potentially answer research questions beyond the scope of this paper, such as seeking concurrent validity for the AMAQ. They also have the potential to serve as covariates to explain variability in emotional responses to films. The ERQ is a 10-item measure querying the degree (from 1-7—*strongly disagree* to *strongly agree*) to which participants endorse statements about emotional experience and regulation—e.g., “When I want to I control my emotions, I think about the situation I’m in.” It contains subscales to measure two different emotion regulation strategies: cognitive reappraisal—changing thoughts about an emotional situation—and expressive suppression—dampening the display of emotions. The TAS-20 measures the degree (1-5, *strongly disagree* to *strongly agree*) to which participants have difficulty understanding and labeling their emotions, using statements such as “I am often confused about what emotion I am feeling.” Scores 52-60 are considered possible alexithymia and 61 and above constitute alexithymia. The AMAQ is a novel emotion regulation questionnaire that uses a scale of 1-7

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(*strongly disagree to strongly agree*) on 36 items to measure ability to suppress or enhance both positive and negative emotions. The AMAQ includes items such as “When I’m nervous or anxious, I can keep it from showing,” and “I like to make others think I am happier than I really am.”

Procedure

Participants followed a link to an online Qualtrics survey and clicked the “next” button to indicate their agreement to the information letter, warning about the risks of answering sensitive topics such as psychopathological symptomatology. Students took the questionnaires in the following order: the demographics questionnaire, the medical screening questionnaire, the PCL-5, the BDI-II, the BAI, the ERQ, the TAS-20, and the AMAQ. After taking the questionnaires participants viewed a referral sheet listing contact and pricing information of local psychological service providers.

Because the following studies involved eliciting negative as well as positive emotions, it is important to be sensitive to any potential abnormal emotional reactivity both from an ethical and an experimental standpoint. To reduce the risk of psychological distress from viewing films, only people who reported no significant psychopathology were invited to complete the study. The medical screening questionnaire was used to exclude participants who reported neurological or psychiatric diagnoses, and the PCL-5, BDI-II, and BAI scores were used to exclude people reporting above moderate levels of PTSD, depression, or anxiety symptoms.

Due to little current validation data for this latest version of the PCL, Dr. Frank Weathers (personal communication, 2015) tentatively recommended a score of 28 as a cutoff for participation in film-viewing—i.e., only participants scoring at or below 28 were eligible to participate in Part 2. A conservative cutoff score of 16 was used on both the the BDI-II, falling in

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the “mild depression range” (Beck et al., 1996) and the BAI (“mild anxiety;” Beck & Steer, 1993). Importantly, item 9 of the BDI-II (querying suicidality) was removed because of the online nature of the study.

Prescreening Results

On the medical screening form, relatively few participants reported serious head trauma (35), cardiovascular accidents (4), epilepsy (10), neurosurgery (1), neurological disorders (7), or heart disease (2). However, larger numbers reported psychiatric diagnoses (23) and taking prescription medications (116, or 32.3%). The most commonly reported diagnoses included depression, anxiety, and ADHD, and the most common prescriptions were birth control, ADHD medications, and anti-depressants including SSRIs and Wellbutrin. Participants were not excluded based on the medical screening form because doing so excluded a significant portion of participants who reported subclinical symptomatology on the PCL-5, BDI-II, and BAI – rather, this was taken as evidence their diagnoses were well-controlled, suggesting they may not have extreme or dangerous reactions to emotion-elicitation stimuli. Furthermore, excluding this subclinical population may reduce generalizability.

Mean pre-screening measure scores were well within healthy ranges, but with much variability. The PCL-5 had a mean of 12.84 (range = 0-68, SD = 13.06), the BDI-II showed a mean of 8.09 (range = 0-44, SD = 7.99), and the BAI centered around 7.5 (range = 0-57, SD = 8.67). Fifty-two participants were not invited to participate in Part 2 because they exceeded thresholds for one or more of the measures; ultimately invitation e-mails (including a description of Part 2 and an invitation code for registering on SONA) were sent to 309 prescreened participants. Average scores on the ERQ subscales ranged from 6-42 (reappraisal: $M = 27.82$, SD

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= 6.29) and 4-28 (suppression: $M = 14.78$, $SD = 4.63$), indicating higher support for reappraisal as an emotion regulation strategy. TAS-20 scores had wide variability, ranging from 23-85 ($M = 48.30$, $SD = 11.93$), placing the average participant near the “possible alexithymia” range beginning at 52. The AMAQ yielded positive suppression scores ranging from 23-57 ($M = 38.94$, $SD = 5.99$), negative suppression between 18-55 ($M = 41.91$, $SD = 6.46$), positive enhancement from 17-56 ($M = 39.75$, $SD = 7.07$), and negative enhancement scores between 7-49 ($M = 29.68$, $SD = 7.80$). Detailed interpretation of the ERQ, TAS-20, and AMAQ results are largely beyond the scope of this paper.

Method for Study 1: Normative Ratings for LAF

Participants

Participants were 76 students (out of 209 invited) aged 19-25 ($M = 20.11$, $SD = 1.37$), including 50 women and 26 men; four Hispanic or Latino students; 67 Caucasians, six African Americans, two Native Americans, and one Asian student. All were enrolled at Auburn University in the Spring and Summer 2015 semesters and signed up through SONA. No participants reported having experienced a stroke, heart disease, neurosurgery, neurological disorders, or having a psychiatric diagnosis; three reported mild head injuries and 28 were taking prescription medication for reasons other than psychiatric diagnoses. Each participant was randomly assigned to watch one of four partially counterbalanced sequence of films, described in Appendix C; 22, 18, 17, and 19 students watched versions 1, 2, 3, and 4, respectively. They each received 1.5 hours of SONA credit for participating.

Materials

Sixteen film segments were chosen to elicit six discrete emotions—anger, anxiety, disgust, fear, happiness, humor, and sadness—and a neutral condition, including two films per condition. Films were acquired through YouTube searches for simulated scenes from lesser-known commercially-available films, bound by natural event segmentation, which include only small incidental (not emotionally-salient) dialog. Because the scenes are pre-segmented, their original length varied between 1:08-4:30. Films were then trimmed to the length of the shortest segment to facilitate standardization and future work using psychophysiological and neurofunctional dependent measures (for more information on each film segment, please refer to Appendix B).

Film segments were downloaded, edited, and uploaded to a private YouTube account

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(viewable by invitation only). All film segments had acknowledgements for copyright reasons. Film segments were then embedded into a Qualtrics survey for administration online. Following each film were two items from the Self-Assessment Manikin (SAM: Bradley & Lang, 1994) to assess arousal and valence, and seven items per film regarding emotional affect, including three items adapted from the Differential Emotions Scale (DES; Izard, 1992). Study 1 questionnaire items are included in Appendix B. Four versions of the survey were created, partially counterbalancing the sequence of the films using a Lewis square (shown in Appendix B).

Procedure

Participants followed a link to a Qualtrics survey and viewed 16 film clips (in one of four sequences). Following each film they reported whether they had watched the entire film (and why if not), whether they could hear any sound in the film, and whether they had seen the clip before. Participants then rated their emotional valence and arousal (after each film) on the Self-Assessment Manikin (1-9 scale) and rated their affect on a Likert scale of 1-9 (1 for *least emotion felt*, 9 for *most emotion felt*) for each emotion (anger, anxiety, disgust, etc.). Participants then viewed a referral sheet to local psychological service providers, just as in Part 1 (prescreening).

Study 1 Results

Prescreening Results

Scores ranged from 0-28 on the PCL-5 ($M = 5.57$, $SD = 5.96$), 0-17 on the BDI-II ($M = 4.04$, $SD = 4.55$), and 0-16 on the BAI ($M = 3.63$, $SD = 3.91$). According to the ERQ, participants reported preference for cognitive reappraisal ($range = 20-42$, $M = 28.95$, $SD = 5.89$) over expressive suppression ($range = 4-28$, $M = 14.43$; $SD = 4.65$) as their primary emotion regulation strategy. According to the TAS-20 ($range = 25-81$, $M = 46.28$; $SD = 11.20$), the “possible alexithymia” range encompassed 19 students and three had alexithymia. No differences were found when including or excluding participants with alexithymia from analyses. AMAQ subscale totals suggest participants favor suppression of positive ($range = 26-61$, $M = 38.55$, $SD = 6.76$) and negative emotions ($range = 27-63$, $M = 41.94$, $SD = 7.35$) over enhancement of either (positive: $range = 17-56$, $M = 40.22$, $SD = 7.43$; negative: $range = 10-46$, $M = 28.93$, $SD = 8.11$). Overall participants were healthy and reported typical ability to understand and regulate their emotions.

Affective Ratings

The primary aim of the present study was to to standardize a novel emotion-elicitation stimulus set. Means and standard deviations for valence and arousal are reported for each film in Table 3, (Appendix B) and Figure 2 (below).

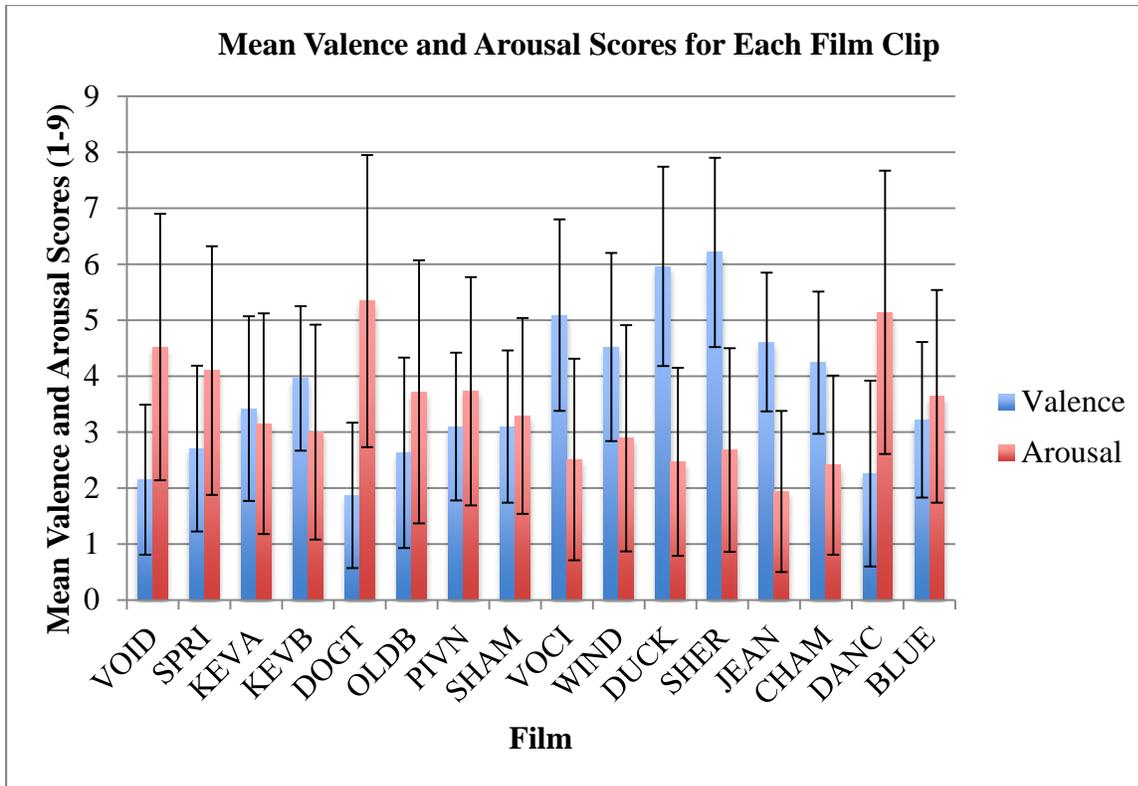


Figure 2. Films are organized by expected emotion with two each for the following categories: anger, anxiety, disgust, fear, happiness, humor, neutral, and sadness. Error bars are shown using the standard deviation of each film.

When using a multivariate dataset collapsed across film with repeated-measures, a Bonferroni-corrected one-way ANOVA revealed no main effect of sequence on valence, $F(3, 1185) = 1.62, p = 0.18$; and a significant main effect of sequence on arousal, $F(3, 1188) = 2.80, p = 0.04$ (Sequence 1 had significantly higher arousal than Sequence 4). Sequence also had a significant main effect on anger, $F(3, 1188) = 3.28, p = 0.02$; disgust, $F(3, 1186) = 4.15, p = 0.01$; and fear ratings, $F(3, 1189) = 5.781, p = 0.001$. Tukey's post-hoc analyses revealed a significant difference between Sequences 3 and 4 in anger, 2 and 3 for disgust, and 2 and 3 for fear. No effect of sequence was demonstrated on anxiety $F(3, 1188) = 1.69, p = 0.17$; happiness $F(3, 1186) = 0.92, p = 0.43$; humor $F(3, 1187) = 1.26, p = 0.29$; or sadness $F(3, 1188) = 1.6, p =$

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0.19. In examining the significant effects on anger, disgust, and fear, it is noteworthy that Sequence 1 features angry films followed by disgusting and fearful ones, Sequence 2 plays angry films after fearful and then disgusting ones, Sequence 3 shows fearful films first, with disgusting and angry ones later, and Sequence 4 features angry, fearful, then disgusting films. Sequences 3 and 4 were most different from each other for anger ratings, and in Sequence 3 angry films are played first, whereas they are last in Sequence 4. Sequences 2 and 3 showed the most differences in disgust and fear ratings, and fear and disgust are placed first and second in Sequence 2 and second and first, respectively, in Sequence 3. Thus, these data suggest angry, disgusting, or fearful films are most effective when viewed before the other categories. It is also possible order effects may be due to overinflated degrees of freedom from when data were organized in a multivariate fashion.

Next, film segments were tested to see if they were different from each other with regard to valence, arousal, and all seven affects. One-way ANOVAs with Bonferroni correction were conducted using film identity to predict valence, arousal, anger, anxiety, disgust, fear, happiness, humor, and sadness. Analyses revealed a significant main effect of film identity on all categories: valence $F(15, 1173) = 72.1$; arousal $F(15, 1176) = 20.96$; anger $F(15, 1176) = 29.24$; anxiety $F(15, 1176) = 29.40$; disgust $F(15, 1174) = 86.48$; fear $F(15, 1177) = 29.26$; happiness $F(15, 1174) = 52.54$; humor $F(15, 1175) = 57.86$; and sadness $F(15, 1176) = 51.59$; all with significance at $p < 0.001$. Tukey's post-hoc analyses revealed that the segments from *Sherlock, Jr.*, *Duck Soup* (both silent slapstick comedies), and *Voci nel tempo* (children playing outdoors) elicited the highest valence, whereas *Dogtooth* (featuring a woman breaking her teeth out with a dumbbell) elicited the lowest. *Dogtooth* was the most arousing film and *Jeanne Dielmann, 1080 Quai du Commerce, Bruxelles 2080* (a housewife cooking potatoes) was the least. *Enter the Void*

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and *The Virgin Spring* elicited the most anger, and *Jeanne*, *Sherlock*, *Voci nel tempo*, and *Duck Soup* produced the least. *Dogtooth* also produced the most anxiety and disgust (followed in the latter by *Oldboy* and *Enter the Void*). Participants rated *Dogtooth* and *Dancer in the Dark* highest on fear, but fear was not elicited as highly as anger, anxiety, or disgust. *Duck Soup*, *Sherlock*, and *Voci* were rated the highest for happiness, the former two for humor, and the saddest films were *Enter the Void* and *Dancer in the Dark*.

In addition to being tested for differences among films within each emotion category the films were classified based on similarity to one another. Because the film segments did not fit neatly into one affective category at the exclusion of all others, it was investigated whether they generally group together into still useful categories. The multivariate dataset was collapsed across film, resulting in one mean rating of valence, arousal, anger, anxiety, disgust, fear, happiness, humor, and sadness. Hierarchical cluster analyses (depicted in Figures 3) minimized the squared Euclidian distance between films on all nine variables—valence, arousal, and the seven affective categories—and suggested future classification use between two and 10 clusters.

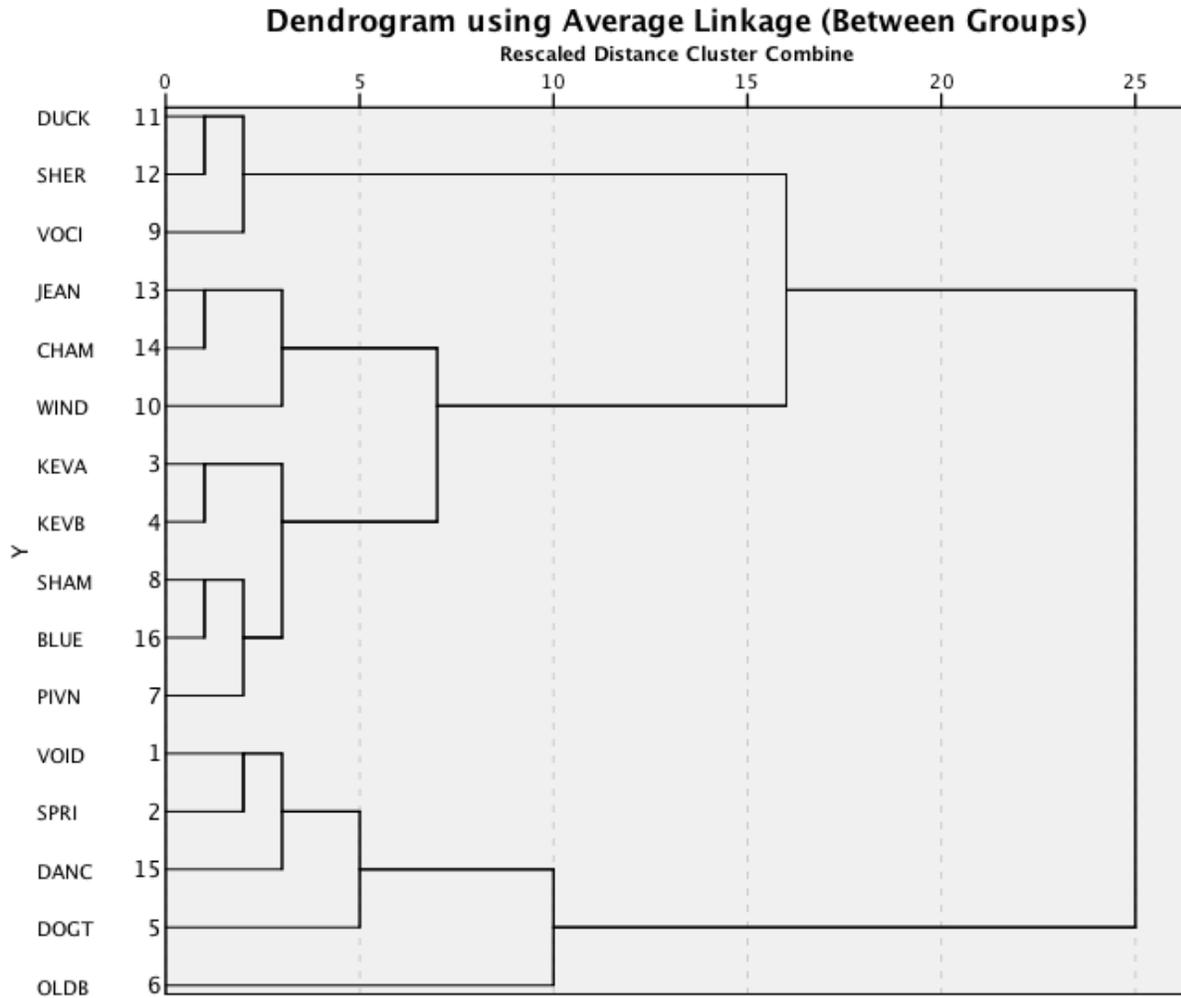


Figure 3. Hierarchical clustering dendrogram. The x-axis features the Euclidian distance between films and the lines and branches indicate relationships between the films, labeled along the y-axis with their abbreviations and position in Sequence 1. For example, the films *Duck Soup* (DUCK) and *Sherlock, Jr* (SHER), are most similar to each other when considering all dimensions—valence, arousal, anger, anxiety, disgust, fear, happiness, humor, and sadness. Further branching indicates subsequent degrees of relatedness, such as a second-order relationship between *Enter the Void* (VOID) and *Dancer in the Dark* (DANC). Thus, a few higher-order relationships emerge, justifying the investigation of a range of clusters in K-means clustering.

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For theoretical (valence-based) and data-driven (Hierarchical clustering results) purposes, a K-means cluster analysis was then conducted to query three clusters. Three films grouped into the first, five into the second, and eight into the third clusters—cluster membership and means follow in Tables 5 and 6, respectively.

Table 5

K-Means Cluster Membership

Film	Expected Emotion	Cluster	Distance
VOID	Anger	2	1.35
SPRI	Anger	2	1.85
KEVA	Anxiety	3	0.96
KEVB	Anxiety	3	0.62
DOGT	Disgust	2	2.05
OLDB	Disgust	2	3.18
PIVN	Fear	3	2.37
SHAM	Fear	3	2.18
VOCI	Happiness	1	1.06
WIND	Happiness	3	2.49
DUCK	Humor	1	0.53
SHER	Humor	1	0.59
JEAN	Neutral	3	2.67
CHAM	Neutral	3	1.64
DANC	Sadness	2	1.83
BLUE	Sadness	3	1.87

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Table 6

Final Cluster Centers

	Cluster		
	1	2	3
Valence	6.02	2.32	3.77
Arousal	2.55	4.57	3.01
Anger	1.19	3.45	1.91
Anxiety	1.38	4.24	3.03
Disgust	1.16	5.77	2.19
Fear	1.21	3.9	2.64
Happiness	3.73	1.23	1.35
Humor	3.7	1.31	1.25
Sadness	1.14	4.33	2.57

Clusters seem to track valence and arousal fairly well, in that Cluster 1 are more positive films (highest on valence and happiness, while lowest on arousal), Cluster 2 are the most negative films (lowest on valence, highest on arousal, and highest on unpleasant affective categories), and Cluster 3 appears mixed or neutral, containing middling values for valence, arousal, and low values of discrete affective categories. However, more objective measures than self-report are needed to validate the stimulus set, such as classifying based on autonomic responses or testing correspondence between self-report and biologically-based responses to the films.

Method for Study 2: Psychophysiological Validation for LAF

Participants

Participants were 23 students (out of 100 invited) aged 19-38 ($M = 22.391$, $SD = 4.99$), including 10 women and 13 men; 21 Caucasians (none Hispanic or Latino) and two mixed-race students—one Native American and Caucasian and the other Caucasian and African American. All were enrolled at Auburn University in the Spring 2015 semester and signed up through SONA. No participants reported having experienced serious head injuries, cardiovascular accidents, heart disease, neurosurgery, neurological disorders, or having a psychiatric diagnosis; one had epilepsy, three reported mild head injuries, four listed psychiatric diagnoses (but reported subclinical symptomatology) and 8 were taking prescription medications such as birth control, Adderall, and Wellbutrin. Participants were randomly assigned to watch one of four partially-counterbalanced sequences of films, described in Appendix C; 7, 6, 2, and 8 students watched versions 1, 2, 3, and 4, respectively. They each received 2.5 hours of SONA credit for participating, 14 were entered into the \$50 drawings, and nine were paid \$10 to thank them for participating. Some participants received different incentives because during data collection, two different IRB modification requests were submitted to increase incentives when recruitment was slow. Due to a programming error, 3 subjects were excluded from analysis, leaving a total of 20 participants for analysis.

Materials

Participants viewed the same 16 film segments as Study 1 embedded in four versions of an E-Prime 2.0 program using the same Latin square partial counterbalancing sequences as

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described above and shown in Appendix C. Each film segment was 68 seconds long and preceded and followed by a 140-second screen asking participants to remain still and quiet for baseline physiological data collection. Participants indicated valence and arousal simultaneously and in real time by moving the mouse cursor over the image featured in Figure 1 while E-Prime collected cursor position data (using arbitrary units as a function of screen resolution) every 500 milliseconds for 68 seconds during each film segment. Due to a programming error, Sequence 3 did not collect the mouse cursor position coordinates correctly, limiting analyses to the three other sequences.

Psychophysiological data was collected using a BIOPAC MP150WSW data acquisition system featuring an ECG MRI-compatible amplifier (BIOPAC product #ECG100C-MRI) with what electrodes?, an EDA MRI-compatible amplifier (BIOPAC product #EDA100C-MRI) with what electrodes?, two MRI-compatible EMG amplifiers (BIOPAC product #EMG100C-MRI) with what electrodes?, a respiration amplifier (BIOPAC product number RSP100C), and an MRI-compatible non-invasive cardiac output (NICO, AKA impedance cardiography or IC) amplifier (BIOPAC product #NICO100C-MRI) with what electrodes?. A high-end HP 6570b notebook PC with Windows 7 Professional, AcqKnowledge 4.2 BIOPAC software, mobile Intel HM76 chipset, 8GB 1600MHz DDR3 SDRAM, and a 500GB 7200rpm SATA hard drive was used to collect and analyze the data. Data between the amplifiers and the PC were transmitted via an ethernet high-speed cable for recordings up to 400KHz. Digital triggers were transferred between E-Prime and AcqKnowledge 4.2 using a parallel printer cable. Triggers were embedded in the physiological data via E-Prime at the beginning and end of all experimental conditions and film segments for precise localization of stimulus events. Participants wore 12 electrodes (2 ECG, 4IC, 2 EDA, and 4 EMG) and a respiration belt (described below).

Procedure

After coming to the laboratory and giving informed consent, participants' height and weight were recorded, facing away from the scale, along with room temperature and humidity (as these may affect physiological recordings). Participants were given the option of placing the electrodes on themselves, to reduce modesty concerns: all declined and preferred for the experimenter to apply them. To prepare for EDA placement, participants cleaned their hands with a wet wipe and allowed it time to dry. EDA electrodes were placed on the last joint of the middle and fourth fingers of the left hand in order to measure sympathetic activity, a correlate of emotional arousal. ECG electrodes were placed in lead II configuration--near the right collarbone and just below the left ribs--in order to measure parasympathetic activity. IC electrodes—placed on the lower back and back of the neck (or in roughly half of participants on the right side of the neck for better signal)—and the respiration belt aid in generating heartrate variability measures—such as respiratory sinus arrhythmia—to further elucidate parasympathetic activity. Two pairs of EMG electrodes were placed on the face to measure muscle contractions indicative of microexpressions and emotional valence – the first near the dimple of the left cheek (or one or two inches higher in three bearded participants) and the second immediately medial and anterior to the left eyebrow, corresponding to the zygomatic and corrugator muscles.

ECG, IC, and EMG electrodes were prepared with gel and the participant's skin was abraded using an exfoliant, which was then cleaned off with a non-alcoholic wet wipe. After research assistants measured the distance between the IC electrodes and instructing the participant to remain still and quiet during the study, E-Prime was started for stimulus presentation, and baseline physiological data were collected before starting the films. Preparation

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and electrode application lasted 15-30 minutes (varied because of quality assurance, electrode impedance checking, and subsequent troubleshooting). Over the next 60 minutes of the session, participants alternated between watching the 68-second film segments and sitting quietly and still during 140-second rest periods between films. While wearing the 12 electrodes and belt, and watching the films described above, participants indicated changes in their valence and arousal in real time by dragging a mouse cursor over a coordinate plane such as shown in Figure 1 for the duration of each film segment. After watching the 16th film and 17th rest screen, participants were thanked and paid (if applicable at the time), and given a copy of the consent form with a referral sheet (the same from Prescreening and Study 1).

Results and Discussion for Study 2

Behavioral Results

E-Prime reported mouse coordinates as a function of screen resolution. For example, the origin for the valence-arousal continuum was at (315, 332). Therefore, coordinates were subtracted from the origin to center them. E-Prime did not allow for constraining the movement of the mouse cursor to within the bounds of the image and there were many outlier coordinates. To handle outliers, the radius of the circle was used (100 units) was used as a replacement.

Coordinates were plotted as a function of time and visual inspection reveals a unique pattern of valence and arousal change for each film: the graphs for each film are provided in Appendix C and one exemplar from each cluster is shown here.

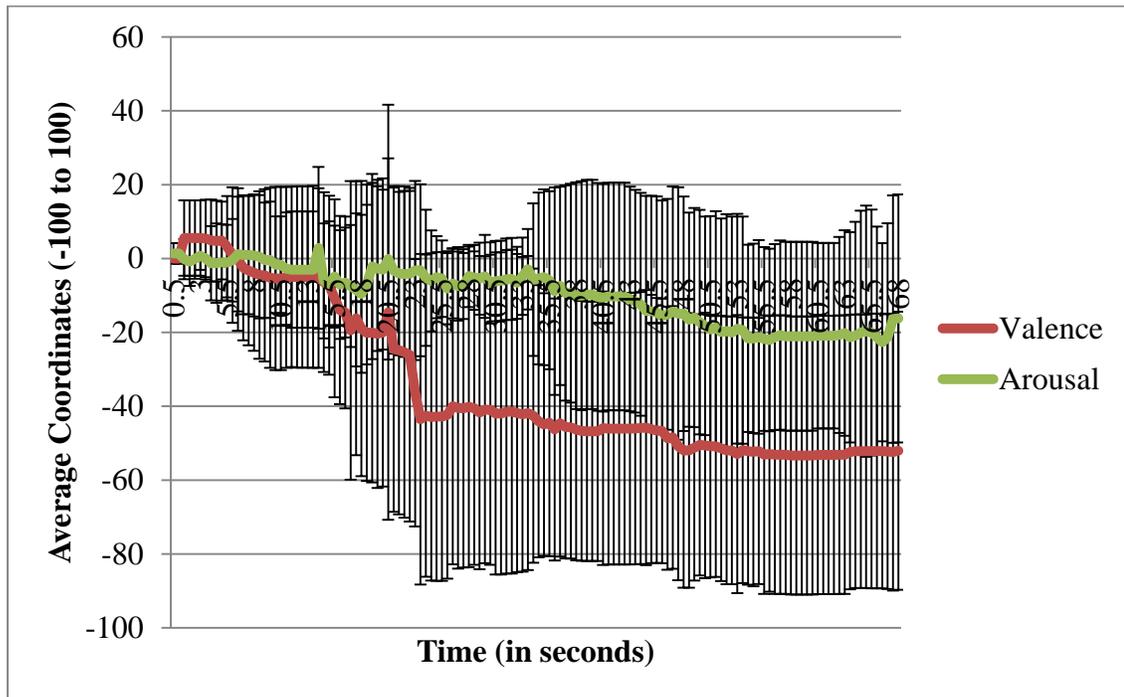


Figure 4. Enter the Void mean valence and arousal. VOID fits into cluster 2, labeled “Negative”.

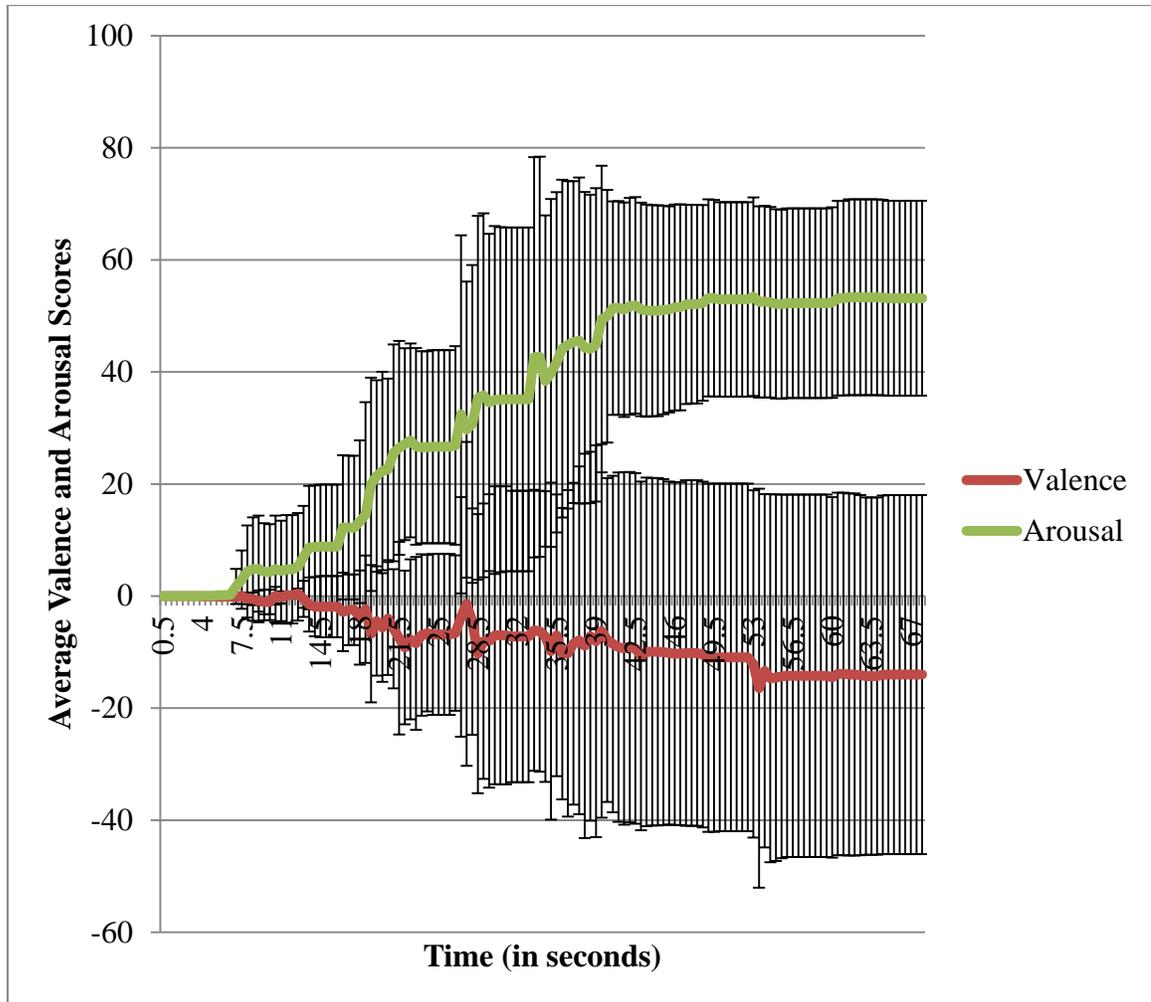


Figure 16. *Jeanne Dielman* mean valence and arousal. JEAN fits into Cluster 3, labeled “mixed” because dynamic self-report yielded no films neutral on both valence and arousal across the intervals.

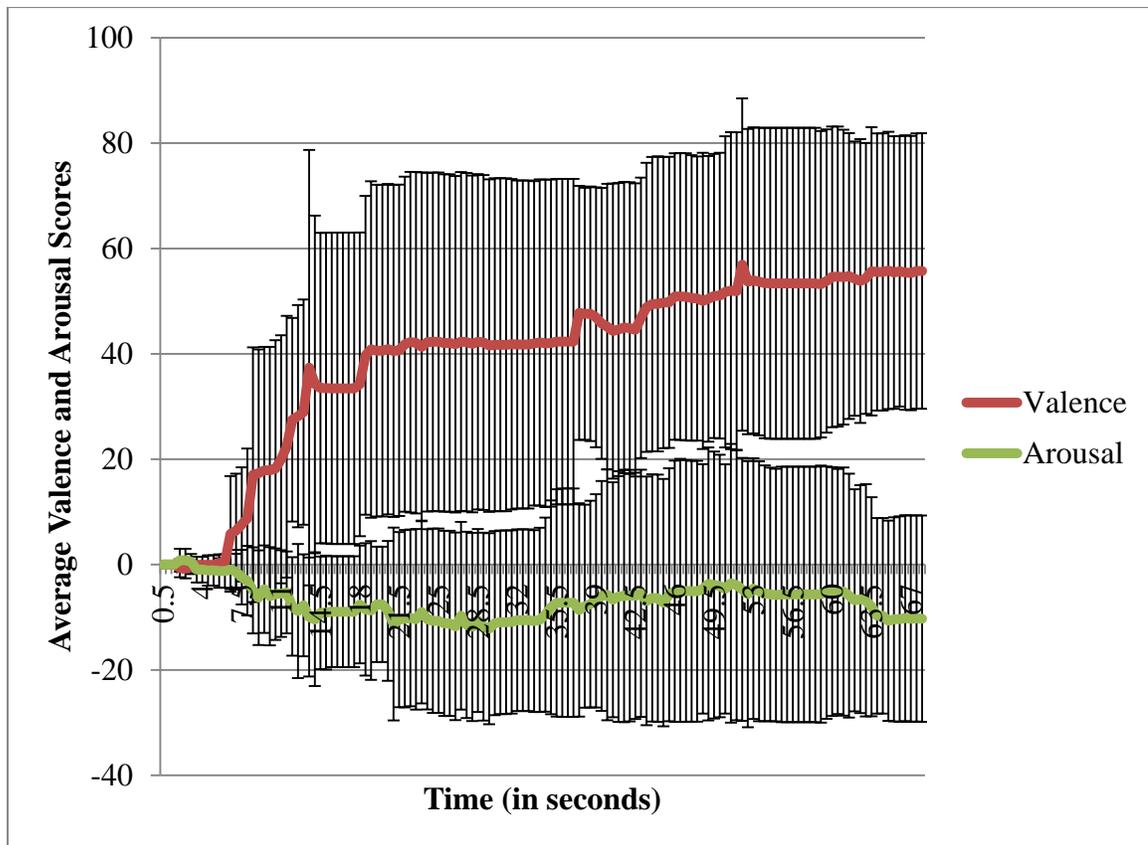


Figure 14. *Duck Soup* mean valence and arousal. DUCK fits into Cluster 1, labeled “Positive.”

Almost all the films became more strongly-valenced over time (as affective events played out on the screen), but arousal typically remained low, despite overall high arousal scores for some negative films in Study 1. When investigating whether the new self-report data matched those from Study 1, the coordinates across each film were averaged and correlations between valence from the Self-Assessment Manikin and the dynamic self-report continuum were tested. The traditional measure of valence (SAM) coordinated with the x-coordinate measure of valence at $r = 0.940$, significant at the $p < 0.01$ level. The 9-point Likert scale measurement of valence mapped well onto the continuous measurement. However, the arousal scores in Study 1 were strongly negatively correlated with the y-axis coordinates representing arousal ($r = -0.677$, $p <$

0.01).

Physiological Results

EMG. Facial electromyography is commonly understood as a correlate of emotional valence: more zygomatic activity can be interpreted as indicating positive valence and corrugator activity means negative valence. Using AcqKnowledge 4.4 software, data were filtered with a low-pass 10-Hz filter, muscle activity events were located using a threshold of 1 standard deviation from the baseline, and were counted and averaged for a baseline period for each of the films. In this case we refer to the zygomatic measurement site as “EMG1” and the corrugator measurement site as “EMG2”. The hypothesis that facial EMG would track self-report valence was supported—EMG1 ($r = 0.133, p < 0.001$) and EMG2 ($r = 0.359, p < 0.001$) were correlated with valence. That is, both zygomatic (smiling) contraction and corrugator (scowling) contraction were correlated with how positive a film was rated. There was more overall facial muscle activity during the highly-valenced films, which also had the highest self-reported arousal in Study 2 (but the lowest in Study 1, because Study 1 and 2 arousal are negatively-correlated) (*Sherlock, Jr.* and *Duck Soup*). Furthermore, EMG1 was correlated with arousal ($r = 0.215, p < 0.001$), but EMG2 was not correlated with arousal ($r = 0.043, p > 0.05$), suggesting that more smiling was associated with higher arousal. It is also possible participants were more expressive for positively-valenced films than for negative ones. The magnitude of valence could also be a factor, as the most affective films were the humorous ones..

RSA. We hypothesized measures of sympathetic activity would correlate with arousal. However, due to technical problems with data analysis, EDA—an indicator of sympathetic arousal—was not analyzed in the current sample. Instead, we investigated whether a

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parasympathetic measure could be negatively correlated with arousal. Therefore, we tested the correlation between respiratory sinus arrhythmia (RSA)—a correlate of vagal tone—and arousal. Indeed, RSA was negatively correlated with arousal ($r = -.170, p < 0.001$), providing support for the hypothesis. This indicates the dynamic self-report data on arousal somewhat compares with a parasympathetic measure, conversely implying a positive relationship between arousal and sympathetic activity (not directly measured).

Impedance Cardiography. Pre-ejection period, a measure of sympathetic arousal at the level of the myocardium, was calculated in 10 participants. Technical difficulties such as poor signal (discussed further below) led to no recoverable impedance data for 12 participants, and AcqKnowledge yielded no cardiac output data for any participant.

General Discussion and Conclusions

The current study sought to establish a physiological and dynamic self-report validation procedure to standardize a collection of short emotion-elicitation film clips. Study 1 ($N = 77$) sought to determine the valence, arousal, and affective characteristics of each film. No film elicited one discrete emotion as expected: they were all fairly mixed. Due to a lack of discrete affective patterns emerging, specific hypotheses regarding affective categories were omitted from Study 2. There is generally mixed support for the construct of discrete affective categories (Murphy, Nimmo-Smith, & Lawrence, 2003), although basic emotions are fairly well-reputed in the literature (e.g., Ekman, 1999). Results from Study 1 indicate that the films chosen did not align with any one affective category, which raises the question of whether discrete emotions can be elicited in the lab, or whether using dynamic stimuli confounds one's ability to assess the discrete emotions hypothesis, as emotions will inevitably shift and change throughout the course of the film. Study 1 also examined 'humor,' which is not a basic emotion, but we were unable to sufficiently distinguish it from happiness, again demonstrating the difficulty in parsing out discrete affective states. These data provided additional necessity for Study 2, which allowed for the dynamic characterization of the films over time.

Importantly, a main effect of sequence on arousal was observed, with Sequence 1 (detailed in Table 3, beginning with mixed films and ending with negative films) significantly more arousing than Sequence 4 (beginning with positive and ending with negative films). Perhaps the generally arousing positively-valenced films (such as *Duck Soup* or *Sherlock, Jr.*) being placed in the middle of Sequence 1 kept participants more aroused throughout the study. In

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Sequence 4 relative to Sequence 1, the positive films were followed by several mixed ones which could have bored participants overall throughout participation. No effect of sequence on valence was found, but sequence played a role in affective ratings—specifically for anger, disgust, and fear. It appears that each of those emotions is strongest when it is elicited first, suggesting potential carryover effects despite our rest periods over twice the length of the films. Thus, the effects of anger, fear, or disgust may be more lingering compared to other emotions, at least in the present sample. These data highlight the need to carefully manipulate sequencing, assess physiological correlates, and/or use between subjects designs to avoid, or control for, carry over effects. Additionally, more manipulations involving fewer affective categories—using stimuli that more distinctly elicit them—should be sought to tease apart the effects of elicitation sequence in general.

Because of the number of dependent measures (nine) examined in Study 1, practical significance through film classification became a more viable option than focusing on statistical significance. Hierarchical analysis suggested a wide range of clusters, and K-means clustering for a 3-cluster model provided support for a valence-based classification model. Films classified into three clusters, 1-Positive, 2-Mixed/Neutral, and 3-Negative. These results may be suggestive of a number of things: 1) participants are less skilled at distinguishing between affective states, and more inclined to identify with ‘positive’ and ‘negative’, 2) emotions are more universal within the dimensionality of valence, or 3) the true underlying structure of emotion rests upon a spectrum of valence. However, it is also important to note that arousal may be a contributor to the 3-cluster model, as the lowest-valence and highest-arousal films clustered together and vice versa. The opposite pattern held for Study 2.

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Other researchers discussed above (e.g., Gross & Levenson, 1995 or Hagemann et al., 1999) validated their film sets in a laboratory setting. As a potential limitation, we administered ours online to increase recruitment and gain self-report norms used to predict physiological changes in Study 2. Differences in recruitment practices and self-selection biases could play a role in inconsistent results in arousal reporting between Study 1 and Study 2. Also, Study 1 used only self-report measures given anonymously online and presented some technical difficulties outside experimental control—as such, not all of the films were viewed by the same number of participants. These are important considerations for comparing the results of Study 1 to other attempts at emotion elicitation libraries.

Study 2 was designed to provide more continuous emotional reports than Study 1, in addition to collecting objective biological dependent measures. Valence correlated highly and positively between Studies 1 and 2. Arousal in Study 1 (on a 1-9 scale asked after the film) was strongly negatively correlated with arousal in Study 2 (reported every 500 ms as cursor position on the y-axis of Figure 1). Differences between arousal reporting across the online and lab studies could be due to the setting, or to other factors such as differing interpretation of the scale, distraction (from dividing attention among the films simultaneous with valence and arousal ratings), or the dynamic nature of the film (i.e., if an arousing event happened at the beginning of the film, but participants were asked at the end to rate their arousal, there may be significant differences). However, valence was not subject to the same disparity, suggesting setting or modality alone do not explain the difference, or that valence is an easier construct for participants to assess and report. Valence seems to offer less room for differing interpretations or reporting across samples than does arousal.

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Plots of x - and y -coordinates of mouse cursor position over time on the circumplex figure (Figure 1) reveal distinct patterns of activity across and during films. Notably, JEAN, a film expected to be neutral (featuring a French housewife in the 1970s cooking dinner) shows increasing levels of self-reported arousal. Perhaps the uneventful nature of the film (and the sometimes shocking nature of the ones preceding it) primed participants to expect unpleasant surprises. Interestingly as well, some films showed a pattern of spikes in valence and arousal changes following intense or surprising events, but plateau after that. One interpretation is that participants are distracted by engaging film events, and stop reporting on their emotions: another is that the affective qualities of the films themselves plateau after an early intense event. The above observations provide avenues for future investigations to better understand these potential patterns of emotional behavior.

To this author's knowledge, no other studies have used nearly continuous self-report ratings on a circumplex model of emotions (Posner, Russell, & Peterson, 2005) during film viewing. The creators of the circumplex scale we used in Study 2 (Figure 1) found the model to be comparable to SAM ratings of arousal (used in Study 1), so the present study's opposite result is puzzling. Sampling differences between location (i.e., online vs. lab, with physiological measures) and duration (around 50 minutes for Study 1 vs. 90 in Study 2) could account for some potential differences. Other possibilities include having electrodes placed on the participants, which may have induced stress or anxiety (i.e., increased arousal which could have confounded our results), or dual-task effects, whereby participants are trying to pay attention to the clips while also making continuous reports on affective measures. Additional investigations using this validation procedure is necessary to draw conclusions about the surprising difference across arousal between studies, and to uncover the true nature of emotion elicitation using films.

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Focusing on Study 2, we found interesting EMG patterns, including higher activity overall in positive films than of those in other clusters. The higher-valenced films on average showed more arousal than other clusters of films in Study 2. Therefore, more zygomatic (positive) muscle activity was observed for the arousing films. However, this finding needs to be investigated further as it remains unclear which films are arousing or unarousing because of the disparity between arousal measurements between Studies 1 and 2. It was also discovered that RSA correlates negatively with arousal, perhaps indicating that our self-report continuous arousal measurement in Study 2 is correlated with sympathetic activity. However, lack of a direct sympathetic measurement at this time precludes stronger conclusions about such a relationship.

Particular concerns limit the generalizability and conclusions of Study 2. First, recruitment was difficult even after adding paid incentives, likely because of the length of the study. Secondly, some measures such as impedance cardiography were not analyzed despite troubleshooting and technical support with the software. This could potentially be due to acquisition problems-impedance data were often a flat line despite troubleshooting steps such as better skin preparation, trying different electrode placement, and switching channels on the amp. The channel representing the derivative of the raw impedance measurement yielded a visually-discernable waveform for each participant, yet 10 out of 22 of those did not yield any pre-ejection period analyses; similarly, no files yielded cardiac output. Another potential problem could be length of areas analyzed (i.e., the 68-s films); many physiological investigations analyze data from much longer blocks of time on impedance and heartrate variability measures.

Although electrodermal activity was collected and appeared normal to visual inspection during acquisition (such as increasing when participants held their breath or viewed a surprising or upsetting film event), skin conductance responses (SCRs) could not be counted or analyzed

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using the AcqKnowledge program; files attempted would undergo analysis for many hours and produce no results, even after reducing the sampling rate from 1000Hz to 15.625Hz, cutting down file size by around 1/3, and constructing the phasic EDA channel from the tonic measurement before attempting to locate SCRs. These limitations were software-dependent and the data will be further extracted with open-source programs in the future. Thus, the only current indicator of sympathetic activation obtained is inferred from decreases in parasympathetic activation (as measured by RSA). In the future, a more reliable analysis pipeline needs to be established for this particular study design in order to more completely address hypotheses about the films' psychophysiological effects and provide stronger validation.

Although many of the queried films did not appear to elicit the emotions originally hypothesized, each film was still characterized by a unique pattern of valence and arousal, both when reporting following the completion of the film or continuously during film-viewing, although those two different types of ratings were not consistent between each other. Sampling and stimuli selection procedures designed to further reduce error variability could refine further investigations using emotion-elicitation films. One potential avenue for reducing variability is to display more clearly-isolated affective events, featuring more obvious facial expressions or communication (such as a character scolding or praising another). Future investigations of such a validation procedure for film stimuli could involve creating rather than collecting film clips, using longer clips, recruiting more participants with a smaller list of films, or requiring more training using the dynamic self-report scale. The present study has introduced a novel procedure for measuring emotion during continuous events and could be useful in future studies developing or employing continuous emotion elicitation stimuli, which have practical significant because emotion induction is useful in understanding both normal and pathological emotional patterns.

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Appendix A: Prescreening Measures

Film Rating Pre-Screening

Q1 Information Letter

Q2 Demographics Questionnaire

Q3 What is your e-mail address you used to sign up for this study?

NOTE: This will ONLY be used to invite you to the second phase of the study, and will then be DELETED from your data so that the researchers will NO LONGER have access to ANY of your identifying information attached to your responses.

Q5 Age

Q6 Sex

- Female
- Intersex
- Male

Q7 Gender Identification

- Man
- Woman
- Trans*
- Genderqueer

Q8 Ethnicity (choose one)

- Hispanic or Latino(a)
- NOT Hispanic or Latino(a)

Q9 Racial Identification (choose all that apply)

- American Indian/Alaskan Native
- Asian
- Native Hawaiian/Pacific Islander
- African American/Black
- Caucasian

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Q10 Medical Questionnaire

Have you ever experienced or been diagnosed with any of the following, or are you experiencing any of the following at present? (Please choose the appropriate response and explain "yes" answers below.)

Q11 Severe trauma/head injury

- Yes
- No

Q12 Stroke

- Yes
- No

Q13 Epilepsy or seizures

- Yes
- No

Q14 Neurological surgery

- Yes
- No

Q15 Other neurological problems

- Yes
- No

Q16 Cardiovascular disease

- Yes
- No

Q17 Psychiatric illness

- Yes
- No

Q18 Are you currently taking any prescription medications?

- Yes
- No

Q19 Please explain "yes" responses.

Q20 Would you be willing to refrain from caffeine for three (3) hours before participating in future research?

- Yes
- No

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Q21 PTSD Checklist (PCL-5)

INSTRUCTIONS: Below is a list of problems that people sometimes have in response to a very stressful experience. Please read each problem carefully and then select the answer to indicate how much you have been bothered by that problem in the past month.

Q22 Repeated, disturbing, and unwanted memories of the stressful experience?

- Not at all
- A little bit
- Moderately
- Quite a bit
- Extremely

Q23 Repeated, disturbing dreams of the stressful experience?

- Not at all
- A little bit
- Moderately
- Quite a bit
- Extremely

Q24 Suddenly acting or feeling as if the stressful experience were actually happening again (as if you were actually back there reliving it)?

- Not at all
- A little bit
- Moderately
- Quite a bit
- Extremely

Q25 Feeling very upset when something reminded you of the stressful experience?

- Not at all
- A little bit
- Moderately
- Quite a bit
- Extremely

Q26 Having strong physical reactions when something reminded you of the stressful experience (for example, heart pounding, trouble breathing, sweating)?

- Not at all
- A little bit
- Moderately
- Quite a bit
- Extremely

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Q27 Avoiding memories, thoughts, or feelings related to the stressful experience?

- Not at all
- A little bit
- Moderately
- Quite a bit
- Extremely

Q28 Avoiding external reminders of the stressful experience (for example, people, places, conversations, activities, objects, or situations)?

- Not at all
- A little bit
- Moderately
- Quite a bit
- Extremely

Q29 Trouble remembering important parts of the stressful experience?

- Not at all
- A little bit
- Moderately
- Quite a bit
- Extremely

Q30 Having strong negative beliefs about yourself, other people, or the world (for example, having thoughts such as: I am bad, there is something seriously wrong with me, no one can be trusted, the world is completely dangerous)?

- Not at all
- A little bit
- Moderately
- Quite a bit
- Extremely

Q31 Blaming yourself or someone else for the stressful experience or what happened after it?

- Not at all
- A little bit
- Moderately
- Quite a bit
- Extremely

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Q32 Having strong negative feelings such as fear, horror, anger, guilt, or shame?

- Not at all
- A little bit
- Moderately
- Quite a bit
- Extremely

Q33 Loss of interest in activities that you used to enjoy?

- Not at all
- A little bit
- Moderately
- Quite a bit
- Extremely

Q34 Feeling distant or cut off from other people?

- Not at all
- A little bit
- Moderately
- Quite a bit
- Extremely

Q35 Trouble experiencing positive feelings (or example, being unable to feel happiness or have loving feelings for people close to you)?

- Not at all
- A little bit
- Moderately
- Quite a bit
- Extremely

Q36 Irritable behavior, angry outbursts, or acting aggressively?

- Not at all
- A little bit
- Moderately
- Quite a bit
- Extremely

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Q37 Taking too many risks or doing things that could cause you harm?

- Not at all
- A little bit
- Moderately
- Quite a bit
- Extremely

Q38 Being "superalert" or watchful or on guard?

- Not at all
- A little bit
- Moderately
- Quite a bit
- Extremely

Q39 Feeling jumpy or easily startled?

- Not at all
- A little bit
- Moderately
- Quite a bit
- Extremely

Q40 Having difficulty concentrating?

- Not at all
- A little bit
- Moderately
- Quite a bit
- Extremely

Q41 Trouble falling or staying asleep?

- Not at all
- A little bit
- Moderately
- Quite a bit
- Extremely

Q42 Beck Depression Inventory-II (BDI-II)

INSTRUCTIONS: This questionnaire consists of 21 groups of statements. Please read each group of statements carefully, and then pick out the one statement in each group that best describes the way you have been feeling during the past two weeks, including today. Choose the number beside the statement that you have picked. If several statements in the group seem to apply equally well, choose the highest number for that group. Be sure that you do not choose

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more than one statement for any group, including Item 16 (Changes in Sleeping Pattern) or Item 18 (Changes in Appetite).

Q43 Sadness

- 0 - I do not feel sad.
- 1 - I feel sad much of the time.
- 2 - I am sad all the time.
- 3 - I am so sad or unhappy that I can't stand it.

Q44 Pessimism

- 0 - I am not discouraged about my future.
- 1 - I feel more discouraged about my future than I used to be.
- 2 - I do not expect things to work out for me.
- 3 - I feel my future is hopeless and will only get worse.

Q45 Past Failure

- 0 - I do not feel like a failure.
- 1 - I have always failed more than I should have.
- 2 - As I look back, I see a lot of failures.
- 3 - I feel I am a total failure as a person.

Q46 Loss of Pleasure

- 0 - I get as much pleasure as I ever did from the things I enjoy.
- 1 - I don't enjoy things as much as I used to.
- 2 - I get very little pleasure from the things I used to enjoy.
- 3 - I can't get any pleasure from the things I used to enjoy.

Q47 Guilty Feelings

- 0 - I don't feel particularly guilty.
- 1 - I feel guilty over many things I have done or should have done.
- 2 - I feel quite guilty most of the time.
- 3 - I feel guilty all of the time.

Q48 Punishment Feelings

- 0 - I don't feel I am being punished.
- 1 - I feel I may be punished.
- 2 - I expect to be punished.
- 3 - I feel I am being punished.

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Q49 Self-Dislike

- 0 - I feel the same about myself as ever.
- 1 - I have lost confidence in myself.
- 2 - I am disappointed in myself.
- 3 - I dislike myself.

Q50 Self-Criticalness

- 0 - I don't criticize or blame myself more than usual.
- 1 - I am more critical of myself than I used to be.
- 2 - I criticize myself for all of my faults.
- 3 - I blame myself for everything bad that happens.

Q51 Crying

- 0 - I don't cry anymore than I used to.
- 1 - I cry more than I used to.
- 2 - I cry over every little thing.
- 3 - I feel like crying, but I can't.

Q52 Agitation

- 0 - I am no more restless or wound up than usual.
- 1 - I feel more restless or wound up than usual.
- 2 - I am so restless or agitated that it's hard to stay still.
- 3 - I am so restless or agitated that I have to keep moving or doing something.

Q53 Loss of Interest

- 0 - I have not lost interest in other people or activities.
- 1 - I am less interested in other people or things than before.
- 2 - I have lost most of my interest in other people or things.
- 3 - It's hard to get interested in anything.

Q54 Indecisiveness

- 0 - I make decisions about as well as ever.
- 1 - I find it more difficult to make decisions than usual.
- 2 - I have much greater difficulty in making decisions than I used to.
- 3 - I have trouble making any decisions.

Q55 Worthlessness

- 0 - I do not feel I am worthless.
- 1 - I don't consider myself as worthwhile and useful as I used to.
- 2 - I feel more worthless as compared to other people.
- 3 - I feel utterly worthless.

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Q56 Loss of Energy

- 0 - I have as much energy as ever.
- 1 - I have less energy than I used to have.
- 2 - I don't have enough energy to do very much.
- 3 - I don't have enough energy to do anything.

Q57 Changes in Sleeping Pattern

- 0 - I have not experienced any change in my sleeping pattern.
- 1a - I sleep somewhat more than usual.
- 1b - I sleep somewhat less than usual
- 2a - I sleep a lot more than usual.
- 2b - I sleep a lot less than usual.
- 3a - I sleep most of the day.
- 3b - I wake up 1-2 hours early and can't get back to sleep.

Q58 Irritability

- 0 - I am no more irritable than usual.
- 1 - I am more irritable than usual.
- 2 - I am much more irritable than usual.
- 3 - I am irritable all the time.

Q59 Changes in Appetite

- 0 - I have not experienced any change in my appetite.
- 1a - My appetite is somewhat less than usual.
- 1b - My appetite is somewhat greater than usual.
- 2a - My appetite is much less than before.
- 2b - My appetite is much greater than usual.
- 3a - I have no appetite at all.
- 3b - I crave food all the time.

Q60 Concentration Difficulty

- 0 - I can concentrate as well as ever.
- 1 - I can't concentrate as well as usual.
- 2 - It's hard to keep my mind of anything for very long.
- 3 - I find I can't concentrate on anything.

Q61 Tiredness or Fatigue

- 0 - I am no more tired or fatigued than usual.
- 1 - I get more tired or fatigued more easily than usual.
- 2 - I am too tired or fatigued to do a lot of the things I used to do.
- 3 - I am too tired or fatigued to do most of the things I used to do.

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Q62 Loss of Interest in Sex

- 0 - I have not noticed any recent change in my interest in sex.
- 1 - I am less interested in sex than I used to be.
- 2 - I am much less interested in sex now.
- 3 - I have lost interest in sex completely.

Q63 Beck Anxiety Inventory-II (BAI-II)

INSTRUCTIONS: Below is a list of common symptoms of anxiety. Please carefully read each item in the list. Indicate how much you have been bothered by each symptom during the past week, including today by choosing the space in the column next to each symptom.

Q64 Numbness or tingling.

- NOT AT ALL
- MILDLY - It did not bother me much.
- MODERATELY - It was very unpleasant, but I could stand it.
- SEVERELY - I could barely stand it.

Q65 Feeling hot.

- NOT AT ALL
- MILDLY - It did not bother me much.
- MODERATELY - It was very unpleasant, but I could stand it.
- SEVERELY - I could barely stand it.

Q66 Wobbliness in legs.

- NOT AT ALL
- MILDLY - It did not bother me much.
- MODERATELY - It was very unpleasant, but I could stand it.
- SEVERELY - I could barely stand it.

Q67 Unable to relax.

- NOT AT ALL
- MILDLY - It did not bother me much.
- MODERATELY - It was very unpleasant, but I could stand it.
- SEVERELY - I could barely stand it.

Q68 Fear of the worst happening.

- NOT AT ALL
- MILDLY - It did not bother me much.
- MODERATELY - It was very unpleasant, but I could stand it.
- SEVERELY - I could barely stand it.

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Q69 Dizzy or lightheaded.

- NOT AT ALL
- MILDLY - It did not bother me much.
- MODERATELY - It was very unpleasant, but I could stand it.
- SEVERELY - I could barely stand it.

Q70 Heart pounding or racing.

- NOT AT ALL
- MILDLY - It did not bother me much.
- MODERATELY - It was very unpleasant, but I could stand it.
- SEVERELY - I could barely stand it.

Q71 Unsteady.

- NOT AT ALL
- MILDLY - It did not bother me much.
- MODERATELY - It was very unpleasant, but I could stand it.
- SEVERELY - I could barely stand it.

Q72 Terrified.

- NOT AT ALL
- MILDLY - It did not bother me much.
- MODERATELY - It was very unpleasant, but I could stand it.
- SEVERELY - I could barely stand it.

Q73 Nervous.

- NOT AT ALL
- MILDLY - It did not bother me much.
- MODERATELY - It was very unpleasant, but I could stand it.
- SEVERELY - I could barely stand it.

Q74 Feelings of choking.

- NOT AT ALL
- MILDLY - It did not bother me much.
- MODERATELY - It was very unpleasant, but I could stand it.
- SEVERELY - I could barely stand it.

Q75 Hands trembling.

- NOT AT ALL
- MILDLY - It did not bother me much.
- MODERATELY - It was very unpleasant, but I could stand it.
- SEVERELY - I could barely stand it.

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Q76 Shaky.

- NOT AT ALL
- MILDLY - It did not bother me much.
- MODERATELY - It was very unpleasant, but I could stand it.
- SEVERELY - I could barely stand it.

Q77 Fear of losing control.

- NOT AT ALL
- MILDLY - It did not bother me much.
- MODERATELY - It was very unpleasant, but I could stand it.
- SEVERELY - I could barely stand it.

Q78 Difficulty breathing.

- NOT AT ALL
- MILDLY - It did not bother me much.
- MODERATELY - It was very unpleasant, but I could stand it.
- SEVERELY - I could barely stand it.

Q79 Fear of dying.

- NOT AT ALL
- MILDLY - It did not bother me much.
- MODERATELY - It was very unpleasant, but I could stand it.
- SEVERELY - I could barely stand it.

Q80 Scared.

- NOT AT ALL
- MILDLY - It did not bother me much.
- MODERATELY - It was very unpleasant, but I could stand it.
- SEVERELY - I could barely stand it.

Q81 Indigestion or discomfort in abdomen.

- NOT AT ALL
- MILDLY - It did not bother me much.
- MODERATELY - It was very unpleasant, but I could stand it.
- SEVERELY - I could barely stand it.

Q82 Faint.

- NOT AT ALL
- MILDLY - It did not bother me much.
- MODERATELY - It was very unpleasant, but I could stand it.
- SEVERELY - I could barely stand it.

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Q83 Face flushed.

- NOT AT ALL
- MILDLY - It did not bother me much.
- MODERATELY - It was very unpleasant, but I could stand it.
- SEVERELY - I could barely stand it.

Q84 Sweating (not due to heat).

- NOT AT ALL
- MILDLY - It did not bother me much.
- MODERATELY - It was very unpleasant, but I could stand it.
- SEVERELY - I could barely stand it.

Q85 Emotion Regulation Questionnaire (ERQ)

INSTRUCTIONS: We would like to ask you some questions about your emotional life, in particular, how you control (that is, regulate and manage) your emotions. The questions below involve two distinct aspects of your emotional life. One is your emotional experience, or what you feel like inside. The other is your emotional expression, or how you show your emotions in the way you talk, gesture, or behave. Although some of the following questions may seem similar to one another, they differ in important ways. For each item, please choose the choice that best describes your emotional experience or expression.

Q86 When I want to feel more positive emotion (such as joy or amusement), I change what I'm thinking about.

- 1 - Strongly Disagree
- 2
- 3
- 4 - Neutral
- 5
- 6
- 7 - Strongly Agree

Q87 I keep my emotions to myself.

- 1 - Strongly Disagree
- 2
- 3
- 4 - Neutral
- 5
- 6
- 7 - Strongly Agree

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Q88 When I want to feel less negative emotion (such as sadness or anger), I change what I'm thinking about.

- 1 - Strongly Disagree
- 2
- 3
- 4 - Neutral
- 5
- 6
- 7 - Strongly Agree

Q89 When I am feeling positive emotions, I am careful not to express them.

- 1 - Strongly Disagree
- 2
- 3
- 4 - Neutral
- 5
- 6
- 7 - Strongly Agree

Q90 When I'm faced with a stressful situation, I make myself think about it in a way that helps me stay calm.

- 1 - Strongly Disagree
- 2
- 3
- 4 - Neutral
- 5
- 6
- 7 - Strongly Agree

Q91 I control my emotions by not expressing them.

- 1 - Strongly Disagree
- 2
- 3
- 4 - Neutral
- 5
- 6
- 7 - Strongly Agree

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Q92 When I want to feel more positive emotion, I change the way I'm thinking about the situation.

- 1 - Strongly Disagree
- 2
- 3
- 4 - Neutral
- 5
- 6
- 7 - Strongly Agree

Q93 I control my emotions by changing the way I think about the situation I'm in.

- 1 - Strongly Disagree
- 2
- 3
- 4 - Neutral
- 5
- 6
- 7 - Strongly Agree

Q94 When I am feeling negative emotion, I make sure not to express them.

- 1 - Strongly Disagree
- 2
- 3
- 4 - Neutral
- 5
- 6
- 7 - Strongly Agree

Q95 When I want to feel less negative emotion, I change the way I'm thinking about the situation.

- 1 - Strongly Disagree
- 2
- 3
- 4 - Neutral
- 5
- 6
- 7 - Strongly Agree

Q96 20-Item Toronto Alexithymia Scale (TAS-20)

INSTRUCTIONS: Please rate your level of agreement with the sentences below.

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Q97 I am often confused about what emotion I am feeling.

- Strongly Disagree
- Somewhat Disagree
- Neither Agree nor Disagree
- Somewhat Agree
- Strongly Agree

Q98 It is difficult for me to find the right words for my feelings.

- Strongly Disagree
- Somewhat Disagree
- Neither Agree nor Disagree
- Somewhat Agree
- Strongly Agree

Q99 I have physical sensations that even doctors don't understand.

- Strongly Disagree
- Somewhat Disagree
- Neither Agree nor Disagree
- Somewhat Agree
- Strongly Agree

Q100 I am able to describe my feelings easily.

- Strongly Disagree
- Somewhat Disagree
- Neither Agree nor Disagree
- Somewhat Agree
- Strongly Agree

Q101 I prefer to analyze problems rather than just describe them.

- Strongly Disagree
- Somewhat Disagree
- Neither Agree nor Disagree
- Somewhat Agree
- Strongly Agree

Q102 When I am upset, I don't know if I am sad, frightened, or angry.

- Strongly Disagree
- Somewhat Disagree
- Neither Agree nor Disagree
- Somewhat Agree
- Strongly Agree

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Q103 I am often puzzled by sensations in my body.

- Strongly Disagree
- Somewhat Disagree
- Neither Agree nor Disagree
- Somewhat Agree
- Strongly Agree

Q104 I prefer to just let things happen rather than to understand why they turned out that way.

- Strongly Disagree
- Somewhat Disagree
- Neither Agree nor Disagree
- Somewhat Agree
- Strongly Agree

Q105 I have feelings that I can't quite identify.

- Strongly Disagree
- Somewhat Disagree
- Neither Agree nor Disagree
- Somewhat Agree
- Strongly Agree

Q106 Being in touch with emotions is essential.

- Strongly Disagree
- Somewhat Disagree
- Neither Agree nor Disagree
- Somewhat Agree
- Strongly Agree

Q107 I find it hard to describe how I feel about people.

- Strongly Disagree
- Somewhat Disagree
- Neither Agree nor Disagree
- Somewhat Agree
- Strongly Agree

Q108 People tell me to describe my feelings more.

- Strongly Disagree
- Somewhat Disagree
- Neither Agree nor Disagree
- Somewhat Agree
- Strongly Agree

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Q109 I don't know what's going on inside me.

- Strongly Disagree
- Somewhat Disagree
- Neither Agree nor Disagree
- Somewhat Agree
- Strongly Agree

Q110 I often don't know why I am angry.

- Strongly Disagree
- Somewhat Disagree
- Neither Agree nor Disagree
- Somewhat Agree
- Strongly Agree

Q111 I prefer talking to people about their daily activities rather than their feelings.

- Strongly Disagree
- Somewhat Disagree
- Neither Agree nor Disagree
- Somewhat Agree
- Strongly Agree

Q112 I prefer to watch "light" entertainment shows rather than psychological dramas.

- Strongly Disagree
- Somewhat Disagree
- Neither Agree nor Disagree
- Somewhat Agree
- Strongly Agree

Q113 It is difficult for me to reveal my innermost feelings, even to close friends.

- Strongly Disagree
- Somewhat Disagree
- Neither Agree nor Disagree
- Somewhat Agree
- Strongly Agree

Q114 I can feel close to someone, even in moments of silence.

- Strongly Disagree
- Somewhat Disagree
- Neither Agree nor Disagree
- Somewhat Agree
- Strongly Agree

LIBRARY OF AFFECTIVE FILMS (LAF)

Q115 I find examination of my feelings useful in solving potential problems.

- Strongly Disagree
- Somewhat Disagree
- Neither Agree nor Disagree
- Somewhat Agree
- Strongly Agree

Q116 Looking for hidden meanings in movies or plays distracts from their enjoyment.

- Strongly Disagree
- Somewhat Disagree
- Neither Agree nor Disagree
- Somewhat Agree
- Strongly Agree

Q117 Affect Ability Modulation Questionnaire (AMAQ)

Instructions: Using the scale below, please indicate whether you agree or disagree with each of the following statements. Generally speaking...

Q118 If I'm attracted to someone else, I am able to hide my feelings if it's appropriate to do so.

- Strongly Disagree
- Disagree
- Somewhat Disagree
- Neither Agree nor Disagree
- Somewhat Agree
- Agree
- Strongly Agree

Q119 When I'm happy about my performance (on a test or work-related project, for example), I'm good at hiding my happiness in front of others.

- Strongly Disagree
- Disagree
- Somewhat Disagree
- Neither Agree nor Disagree
- Somewhat Agree
- Agree
- Strongly Agree

LIBRARY OF AFFECTIVE FILMS (LAF)

Q120 I can make a person feel like I'm disgusted with them, even if they only mildly offended me.

- Strongly Disagree
- Disagree
- Somewhat Disagree
- Neither Agree nor Disagree
- Somewhat Agree
- Agree
- Strongly Agree

Q121 If someone does something disgusting, I can make it seem like I'm not "grossed out."

- Strongly Disagree
- Disagree
- Somewhat Disagree
- Neither Agree nor Disagree
- Somewhat Agree
- Agree
- Strongly Agree

Q122 I would have trouble hiding a smile if I beat someone in a head-to-head competition.

- Strongly Disagree
- Disagree
- Somewhat Disagree
- Neither Agree nor Disagree
- Somewhat Agree
- Agree
- Strongly Agree

Q123 If it would help get me results, I could make myself look a lot angrier than I really am.

- Strongly Disagree
- Disagree
- Somewhat Disagree
- Neither Agree nor Disagree
- Somewhat Agree
- Agree
- Strongly Agree

LIBRARY OF AFFECTIVE FILMS (LAF)

Q124 If a friend were to tell me an ok joke, I could make them think it was funnier than it actually was.

- Strongly Disagree
- Disagree
- Somewhat Disagree
- Neither Agree nor Disagree
- Somewhat Agree
- Agree
- Strongly Agree

Q125 It would be difficult for me to look more engaged in a conversation when, in fact, it's only mildly interesting.

- Strongly Disagree
- Disagree
- Somewhat Disagree
- Neither Agree nor Disagree
- Somewhat Agree
- Agree
- Strongly Agree

Q126 I find it easy to maintain normal behavior when a bad situation arises.

- Strongly Disagree
- Disagree
- Somewhat Disagree
- Neither Agree nor Disagree
- Somewhat Agree
- Agree
- Strongly Agree

Q127 If I'm very upset, there's no way I could appear contented.

- Strongly Disagree
- Disagree
- Somewhat Disagree
- Neither Agree nor Disagree
- Somewhat Agree
- Agree
- Strongly Agree

LIBRARY OF AFFECTIVE FILMS (LAF)

Q128 I can 'act myself' even when I'm extremely upset about something.

- Strongly Disagree
- Disagree
- Somewhat Disagree
- Neither Agree nor Disagree
- Somewhat Agree
- Agree
- Strongly Agree

Q129 I can make people believe that I feel guilty about something I did when I really don't feel very guilty.

- Strongly Disagree
- Disagree
- Somewhat Disagree
- Neither Agree nor Disagree
- Somewhat Agree
- Agree
- Strongly Agree

Q130 When I'm nervous or anxious, I can keep it from showing.

- Strongly Disagree
- Disagree
- Somewhat Disagree
- Neither Agree nor Disagree
- Somewhat Agree
- Agree
- Strongly Agree

Q131 If someone were to make me feel afraid, I could appear calm in front of them.

- Strongly Disagree
- Disagree
- Somewhat Disagree
- Neither Agree nor Disagree
- Somewhat Agree
- Agree
- Strongly Agree

LIBRARY OF AFFECTIVE FILMS (LAF)

Q132 I like to make others think I am happier than I really am.

- Strongly Disagree
- Disagree
- Somewhat Disagree
- Neither Agree nor Disagree
- Somewhat Agree
- Agree
- Strongly Agree

Q133 I wouldn't be able to make myself cry if I was only moderately upset.

- Strongly Disagree
- Disagree
- Somewhat Disagree
- Neither Agree nor Disagree
- Somewhat Agree
- Agree
- Strongly Agree

Q134 When I'm very interested in something but I don't want to show it, I can appear to be uninterested.

- Strongly Disagree
- Disagree
- Somewhat Disagree
- Neither Agree nor Disagree
- Somewhat Agree
- Agree
- Strongly Agree

Q135 If someone were to tell me of a recent accomplishment, I could appear more impressed than I actually was.

- Strongly Disagree
- Disagree
- Somewhat Disagree
- Neither Agree nor Disagree
- Somewhat Agree
- Agree
- Strongly Agree

LIBRARY OF AFFECTIVE FILMS (LAF)

Q136 I can make people believe that something I experienced was worse than it actually was.

- Strongly Disagree
- Disagree
- Somewhat Disagree
- Neither Agree nor Disagree
- Somewhat Agree
- Agree
- Strongly Agree

Q137 When I feel sad or blue, I can make it seem like everything is just fine.

- Strongly Disagree
- Disagree
- Somewhat Disagree
- Neither Agree nor Disagree
- Somewhat Agree
- Agree
- Strongly Agree

Q138 If I feel embarrassed about something, I have a hard time hiding it.

- Strongly Disagree
- Disagree
- Somewhat Disagree
- Neither Agree nor Disagree
- Somewhat Agree
- Agree
- Strongly Agree

Q139 If I were to win a coveted award in front of other nominees, I could accept it without appearing too happy.

- Strongly Disagree
- Disagree
- Somewhat Disagree
- Neither Agree nor Disagree
- Somewhat Agree
- Agree
- Strongly Agree

LIBRARY OF AFFECTIVE FILMS (LAF)

Q140 It is easy for me to “grin and bear it”.

- Strongly Disagree
- Disagree
- Somewhat Disagree
- Neither Agree nor Disagree
- Somewhat Agree
- Agree
- Strongly Agree

Q141 Even if someone were really funny, I could hide my laughter.

- Strongly Disagree
- Disagree
- Somewhat Disagree
- Neither Agree nor Disagree
- Somewhat Agree
- Agree
- Strongly Agree

Q142 When I feel like crying, I can hold back my tears.

- Strongly Disagree
- Disagree
- Somewhat Disagree
- Neither Agree nor Disagree
- Somewhat Agree
- Agree
- Strongly Agree

Q143 It is easy for me to make others believe I’m happier than I really am.

- Strongly Disagree
- Disagree
- Somewhat Disagree
- Neither Agree nor Disagree
- Somewhat Agree
- Agree
- Strongly Agree

LIBRARY OF AFFECTIVE FILMS (LAF)

Q144 I am good at staying calm when I hear about good news, especially if my excitement were to offend others.

- Strongly Disagree
- Disagree
- Somewhat Disagree
- Neither Agree nor Disagree
- Somewhat Agree
- Agree
- Strongly Agree

Q145 When I accomplish something, I am unable to hide my excitement.

- Strongly Disagree
- Disagree
- Somewhat Disagree
- Neither Agree nor Disagree
- Somewhat Agree
- Agree
- Strongly Agree

Q146 I always try to find the 'good' aspects of a grim situation to keep from getting upset.

- Strongly Disagree
- Disagree
- Somewhat Disagree
- Neither Agree nor Disagree
- Somewhat Agree
- Agree
- Strongly Agree

Q147 I could make a friend think I sympathize (empathize) with them more than I actually do.

- Strongly Disagree
- Disagree
- Somewhat Disagree
- Neither Agree nor Disagree
- Somewhat Agree
- Agree
- Strongly Agree

LIBRARY OF AFFECTIVE FILMS (LAF)

Q148 I can appear strong and confident, even if I'm not very sure of myself inside.

- Strongly Disagree
- Disagree
- Somewhat Disagree
- Neither Agree nor Disagree
- Somewhat Agree
- Agree
- Strongly Agree

Q149 I can look as if I've been really offended by someone, even if I was only slightly insulted.

- Strongly Disagree
- Disagree
- Somewhat Disagree
- Neither Agree nor Disagree
- Somewhat Agree
- Agree
- Strongly Agree

Q150 Even if I was only slightly wronged by someone, I would be able to act very bitter towards that person if it helped me in the long run.

- Strongly Disagree
- Disagree
- Somewhat Disagree
- Neither Agree nor Disagree
- Somewhat Agree
- Agree
- Strongly Agree

Q151 I could act hostile toward someone even if I was not very upset.

- Strongly Disagree
- Disagree
- Somewhat Disagree
- Neither Agree nor Disagree
- Somewhat Agree
- Agree
- Strongly Agree

LIBRARY OF AFFECTIVE FILMS (LAF)

Q152 When I need to convince someone that I'm excited about something, I can.

- Strongly Disagree
- Disagree
- Somewhat Disagree
- Neither Agree nor Disagree
- Somewhat Agree
- Agree
- Strongly Agree

Q153 When someone compliments me, I can look "cool" on the outside even though I'm excited on the inside.

- Strongly Disagree
- Disagree
- Somewhat Disagree
- Neither Agree nor Disagree
- Somewhat Agree
- Agree
- Strongly Agree

Q154 Thank you for participating. In case of psychological distress, following is a list of local mental health service providers and their cost. If you have any questions, please contact the researchers at lajkirby@auburn.edu.

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Q155

Referral List

Mental Behavioral Providers in Auburn/Opelika

Provider	Services	Phone Number	Cost/Hour
24-Hour Crisis Hotline	Phone counseling, referral	1-800-773-TALK	No charge
Crisis Center	Phone counseling	334-821-8600	No charge
Auburn University Student Counseling Services	Individual and group therapy for Auburn students	334-844-5123	No charge
Safe Harbor (at Auburn University)	Counseling for Auburn students who are victims, and friends of victims, of rape and dating violence	334-844-5123	No charge
Auburn University Psychological Services Center	Individual, couples, and family therapy	334-844-4889	\$75, first appointment \$25-55, other appointments (based on income)
Clinical psychologists	Individual, couples, family, and group therapy	334-821-3350	\$130, first appointment \$120, other appointments
Psychological Associates	Individual, couples, family, and group therapy	334-826-1699	\$140, first appointment \$120, other appointments
East Alabama Mental Behavioral Center	Individual therapy	334-742-2700 334-742-2877 (after hours)	\$8-\$80 (based on income)

Appendix B: Study 1 Measures

Film Rating

Q1 Information Letter

Q12 Please enter your e-mail address with which you registered for Phase 1 (psychological pre-screening) of this study on SONA. NOTE: This identifying information will only be used to link your responses from Phase 1 to Phase 2 of the study and will be deleted once the files are linked. Confidentiality will be kept and your identifying information will be safe.

[FILM EMBEDDED; the following items other than the referral sheet were repeated 8 times for each participant, once per film they watched in Study 1.]

Please watch the embedded film as a passive third-person viewer, that is, without attempting to actively identify with any character in particular.

Q2 Did you watch the entire film clip?

- I watched the whole segment.
- I skipped parts of the film.
- I stopped the film and started it back again.
- I stopped the film and did not start it again.
- I chose not watch the film.
- I did not watch the film due to technical problems.

Q3 Have you ever seen this film clip before?

- Yes
- No
- Not sure

Q4 Were you able to hear any audio in the film clip?

- Yes
- No

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Q5 How pleasant or unpleasant did the movie make you feel? Select the choice next to the figure that best describes how the movie made you feel. The figures also allow you to describe intermediate feelings of pleasure by selecting the choice between any of the pictures.



- 1
- 2



- 3
- 4



- 5
- 6



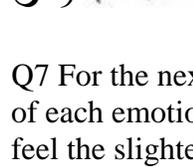
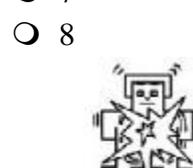
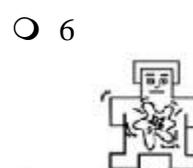
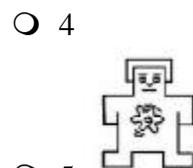
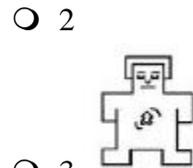
- 7
- 8



- 9

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Q6 How excited or calm did the movie make you feel? Select the choice next to the figure that best describes how the movie made you feel. The figures also allow you to describe intermediate feelings of arousal by selecting the choice between any of the pictures.



Q7 For the next 7 questions, please indicate the number that best describes the greatest amount of each emotion you felt at any time during the film clip. On this scale, 1 means you did not even feel the slightest bit of the emotion, and 9 is the most you have ever felt the emotion in your life.

Q8 anger

- 1
- 2
- 3
- 4
- 5
- 6
- 7
- 8
- 9

LIBRARY OF AFFECTIVE FILMS (LAF)

Q9 anxiety

- 1
- 2
- 3
- 4
- 5
- 6
- 7
- 8
- 9

Q10 disgust

- 1
- 2
- 3
- 4
- 5
- 6
- 7
- 8
- 9

Q11 fear

- 1
- 2
- 3
- 4
- 5
- 6
- 7
- 8
- 9

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Q12 happiness

- 1
- 2
- 3
- 4
- 5
- 6
- 7
- 8
- 9

Q13 humor (amusement)

- 1
- 2
- 3
- 4
- 5
- 6
- 7
- 8
- 9

Q14 sadness

- 1
- 2
- 3
- 4
- 5
- 6
- 7
- 8
- 9

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Q15 If you encountered technical difficulties in viewing the film, please describe the problem below:

Q16 Thank you for participating. Below is a list of local mental health providers you can contact should you experience any significant psychological distress from your film-viewing.

Referral List

Mental Behavioral Providers in Auburn/Opelika

Provider	Services	Phone Number	Cost/Hour
24-Hour Crisis Hotline	Phone counseling, referral	1-800-773-TALK	No charge
Crisis Center	Phone counseling	334-821-8600	No charge
Auburn University Student Counseling Services	Individual and group therapy for Auburn students	334-844-5123	No charge
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East Alabama Mental Behavioral Center	Individual therapy	334-742-2700 334-742-2877 (after hours)	\$8-\$80 (based on income)

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Table 1
Descriptions and Features of the Film Clips

Film Title	Citation	Length*	Description	Color	Sound
<i>Enter the Void</i>	Noé and Hadzilhalovic (2009)	4:10	An abortion is performed.	Full color	Sound track
<i>Dancer in the Dark</i>	Windeløv, Jensen, and von Trier (2000)	2:41	A singing woman is executed by hanging.	Full color	Sound track
<i>Do pivnice</i>	Svankmajer (1983)	1:40	A young girl encounters supernatural terrors in a cellar.	Full color	Sound track
<i>Dogtooth</i>	Mavrinds, Tsangari, Tsourianis, and Lanthamos (2009)	1:13	A woman knocks out her own teeth with a dumbbell.	Black and white	Sound track
<i>Duck Soup</i>	Mankiewicz and McCarey (1933)	2:51	Two men pretend to be each other's reflections.	Full color	Silent
<i>Jeanne Dielman, 23 quai du Commerce, 2080 Bruxelles</i>	Lépart, Paul, and Akerman (1975)	2:10	A housewife cooks potatoes.	Full color	Sound track
<i>La chambre</i>	Akerman (1972)	2:20	A camera spins about a center point in an apartment, revealing all the furniture and a woman lying on the bed.	Full color	Silent
<i>Oldboy</i>	Im, Kim, and Park (2003)	1:19	A man eats a live octopus and then dies.	Black and white	Sound track, score
<i>Shame</i>	Bergman (1968)	2:00	A man and woman drive upon a burning building and the bodies of murder victims.	Black and white	Sound track
<i>Sherlock, Jr.</i>	Schenk and Keaton (1924)	1:40	A slapstick comedy scene involving a man and his detective "shadow" ensues.	Black and white	Score only
<i>The Virgin Spring</i>	Bergman and Isaksson (1960)	1:32	A man murders another man and a young boy.	Full color	Sound track
<i>Three Colors: Blue</i>	Karmitz and Kieślowski (1993)	1:56	A family is involved in a serious car accident.	Full color	Sound track
<i>Voci nel tempo</i>	Piavoli (1996)	2:11	Children joyfully play outdoors.	Full color	Sound track
<i>We Need to Talk About Kevin (Clip 1)</i>	Fox, Boeg, Salerno, and Ramsay (2011)	1:14	An exhausted woman is unable to console a crying baby.	Full color	Sound track
<i>We Need to Talk About Kevin (Clip 2)</i>	Fox, Boeg, Salerno, and Ramsay (2011)	1:08	A woman avoids unwanted, hostile social interaction in a grocery store.	Full color	Sound track, diegetic music
<i>Window Water Baby Moving</i>	Brakhage (1959)	1:35	A couple celebrates the imminent birth of their child.	Full color	Silent

*Note: these lengths follow the natural event segmentation of the scenes as used in Study 1. For study 2, all films were cropped to 1:08 to match the shortest film clip, *We Need to Talk About Kevin*, Clip 2.

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Table 2

Four-letter Codes to Abbreviate Each Film

Film Name	Film Code
Enter the Void	VOID
The Virgin Spring	SPRI
We Need to Talk About Kevin	
- Clip 1	KEVA
We Need to Talk About Kevin	
- Clip 2	KEVB
Dogtooth	DOGT
Oldboy	OLDB
Do pivnice	PIVN
Shame	SHAM
Voci nel tempo	VOCI
Window Water Baby Moving	WIND
Duck Soup	DUCK
Sherlock, Jr.	SHER
Jeanne Dielman	JEAN
La Chambre	CHAM
Dancer in the Dark	DANC
Three Colors Trilogy: Blue	BLUE

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Table 3

Pseudo-Counterbalanced Film Sequences

Sequence 1	Sequence 2	Sequence 3	Sequence 4
VOID	BLUE	SHAM	VOCI
SPRI	DANC	PIVN	WIND
KEVA	JEAN	DOGT	DUCK
KEVB	CHAM	OLDB	SHER
DOGT	SHER	KEVB	JEAN
OLDB	DUCK	KEVA	CHAM
PIVN	VOCI	VOID	BLUE
SHAM	WIND	SPRI	DANC
VOCI	SHAM	BLUE	VOID
WIND	PIVN	DANC	SPRI
DUCK	DOGT	JEAN	KEVB
SHER	OLDB	CHAM	KEVA
JEAN	KEVB	SHER	SHAM
CHAM	KEVA	DUCK	PIVN
DANC	VOID	VOCI	DOGT
BLUE	SPRI	WIND	OLDB

Appendix C: Study 1 Results

Table 4

Means and Standard Deviations of Valence, Arousal, and Affective Ratings of Films

Film	Valence		Arousal		Anger		Anxiety		Disgust	
	<i>M</i>	<i>SD</i>	<i>M</i>	<i>SD</i>	<i>M</i>	<i>SD</i>	<i>M</i>	<i>SD</i>	<i>M</i>	<i>SD</i>
VOID	2.15	1.34	4.52	2.38	4.31	2.88	4.13	2.57	6.04	2.59
SPRI	2.706	1.48	4.1	2.22	4.049	2.57	3.84	2.54	1.21	0.81
KEVA	3.42	1.65	3.15	1.97	2.65	2.28	3.27	2.17	2.29	2.15
KEVB	3.96	1.29	3	1.92	1.91	1.68	3.22	2.16	1.87	1.76
DOGT	1.87	1.3	5.34	2.61	3.27	2.61	5.21	2.72	7	2.38
OLDB	2.63	1.7	3.72	2.35	2.11	1.99	3.06	2.21	6.55	2.47
PIVN	3.1	1.32	3.73	2.04	2.78	2.09	4.12	2.22	2.99	2.2
SHAM	3.1	1.36	3.29	1.75	2.34	1.63	3.24	1.98	2.87	2.05
VOCI	5.09	1.71	2.51	1.8	1.18	0.65	1.42	1	1.11	0.49
WIND	4.52	1.68	2.89	2.02	1.33	0.9	2.11	1.51	2.81	1.95
DUCK	5.96	1.78	2.47	1.68	1.19	0.79	1.33	0.99	1.27	1.11
SHER	6.21	1.69	2.68	1.82	1.21	0.81	1.41	0.9	1.1	0.38
JEAN	4.61	1.24	1.94	1.44	1.25	0.87	1.99	1.74	1.18	0.78
CHAM	4.24	1.27	2.41	1.6	1.31	0.97	2.84	2.14	1.35	1
DANC	2.26	1.66	5.14	2.53	3.07	2.55	4.92	2.52	4.7	2.84
BLUE	3.22	1.39	3.64	1.9	1.73	1.28	3.46	2.1	2.16	1.73
Film	Fear		Happiness		Humor		Sadness			
	<i>M</i>	<i>SD</i>	<i>M</i>	<i>SD</i>	<i>M</i>	<i>SD</i>	<i>M</i>	<i>SD</i>		
VOID	3.31	2.43	1.24	0.89	1.21	0.85	5.1	2.813		
SPRI	1.25	0.9	4.95	2.52	1.21	0.85	5.1	2.81		
KEVA	2.44	2.09	1.23	0.69	1.4	1.09	2.86	2.17		
KEVB	2.63	2.27	1.17	0.77	1.37	1.03	2.17	1.85		
DOGT	1.22	0.93	1.36	1.27	4.27	2.81	4.27	2.81		
OLDB	2.74	2.5	1.22	0.74	1.37	1.11	2.29	1.75		
PIVN	3.93	2.21	1.16	0.54	1.12	0.51	3.18	2.37		
SHAM	3.22	20.4	1.22	0.69	1.19	0.74	4.54	2.18		
VOCI	1.14	0.54	3.73	2.27	2.66	1.82	1.11	0.46		
WIND	1.55	1	2.29	1.6	1.44	0.82	1.18	0.54		
DUCK	1.28	1.08	3.73	2.08	4.2	2.22	1.14	0.62		
SHER	0.21	0.72	3.73	2.01	4.24	2.09	1.16	0.62		
JEAN	1.61	1.47	1.39	1.03	1.17	0.69	1.28	0.88		
CHAM	2.27	1.71	1.17	0.72	1.16	0.72	1.66	1.3		
DANC	4.75	2.6	1.25	0.92	1.34	1.11	5.06	2.71		
BLUE	3.49	2.26	1.19	0.69	1.17	0.75	3.91	2.27		

Appendix D: Study 2 Results

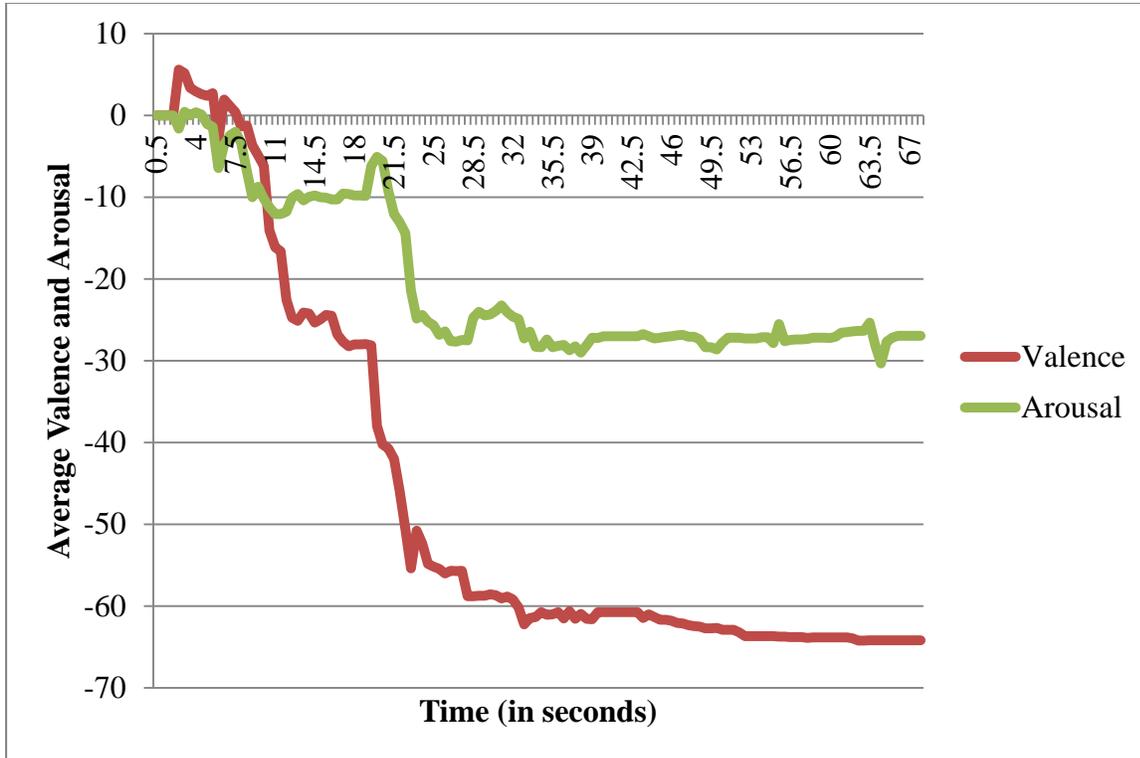


Figure 5. *The Virgin Spring* dynamic self-report valence and arousal over time.

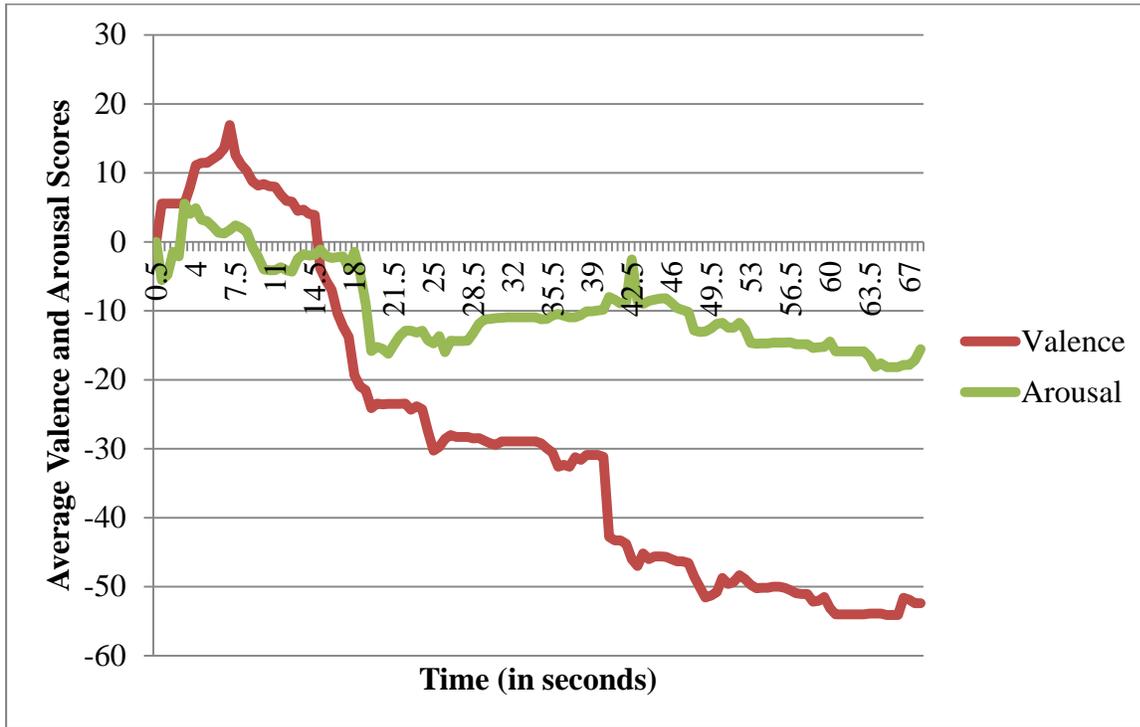


Figure 6. *We Need to Talk About Kevin* (Clip 1) dynamic self-report valence and arousal over time.

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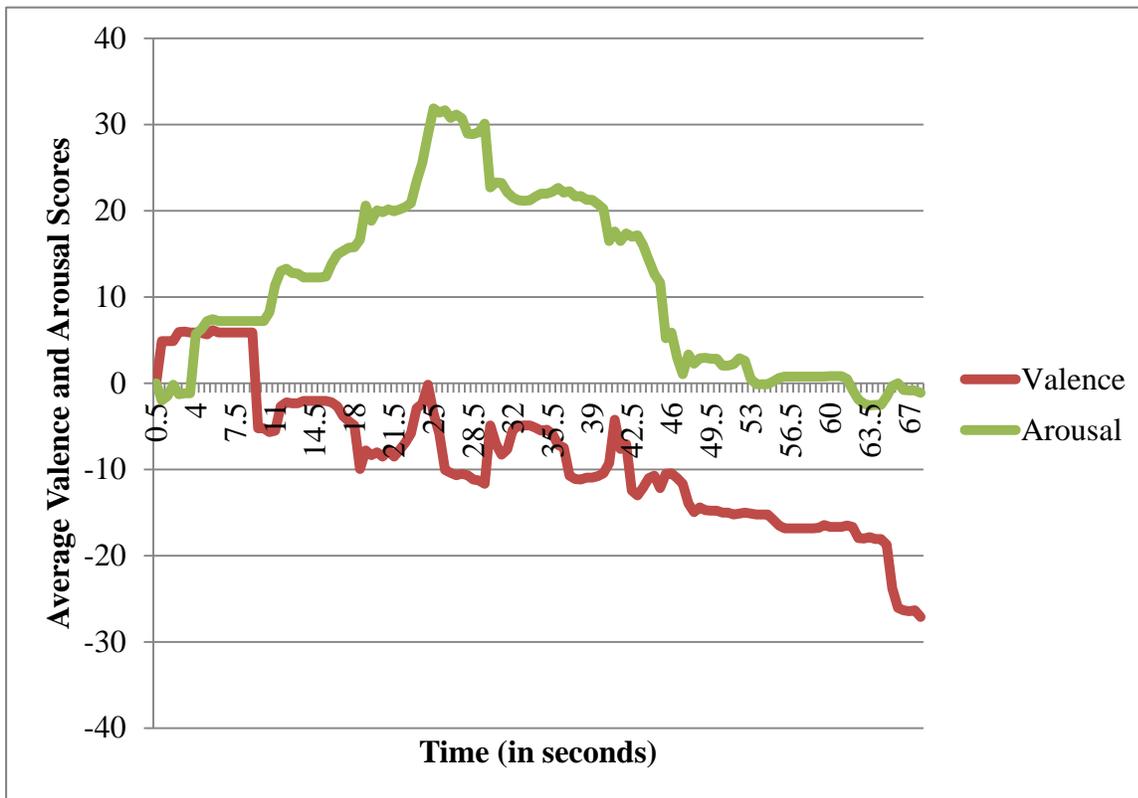


Figure 7. *We Need to Talk About Kevin* (Clip 2) dynamic self-report valence and arousal over time.

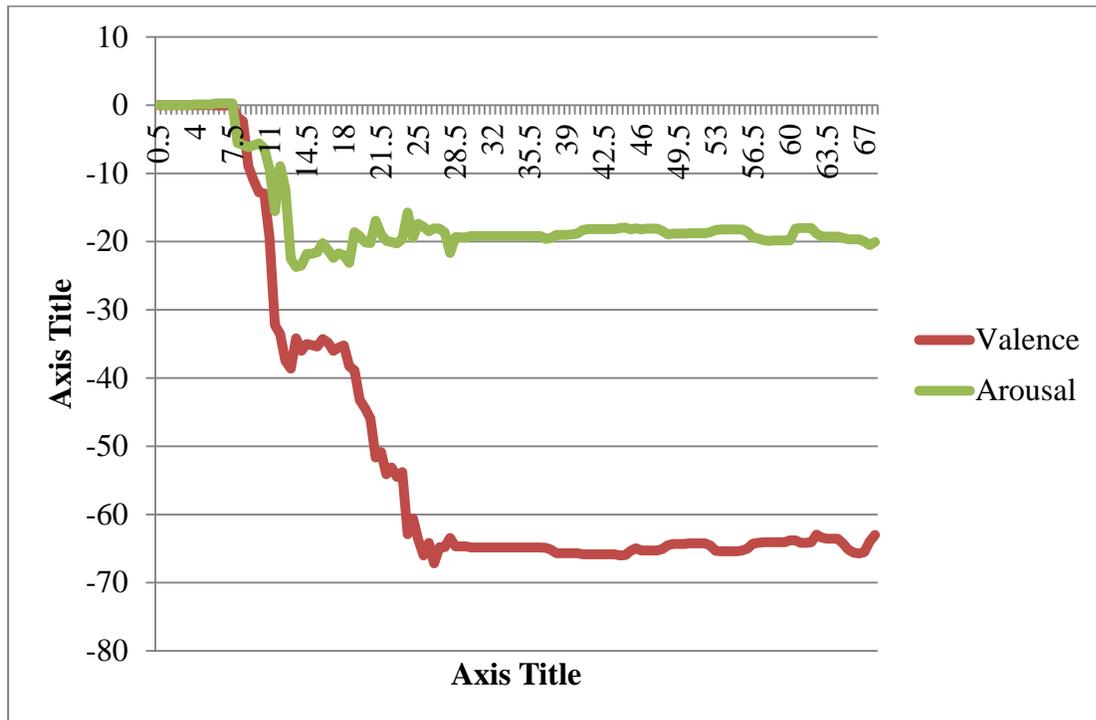


Figure 8. Dogtooth dynamic self-report valence and arousal over time.

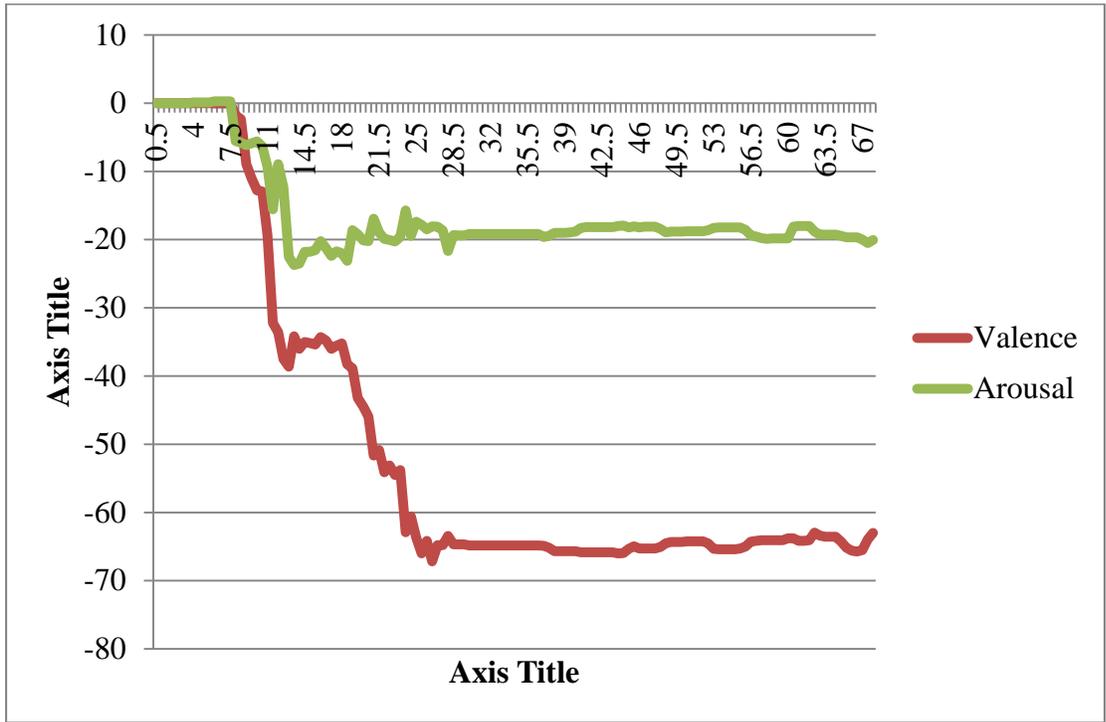


Figure 9. *Oldboy* dynamic self-report valence and arousal over time.

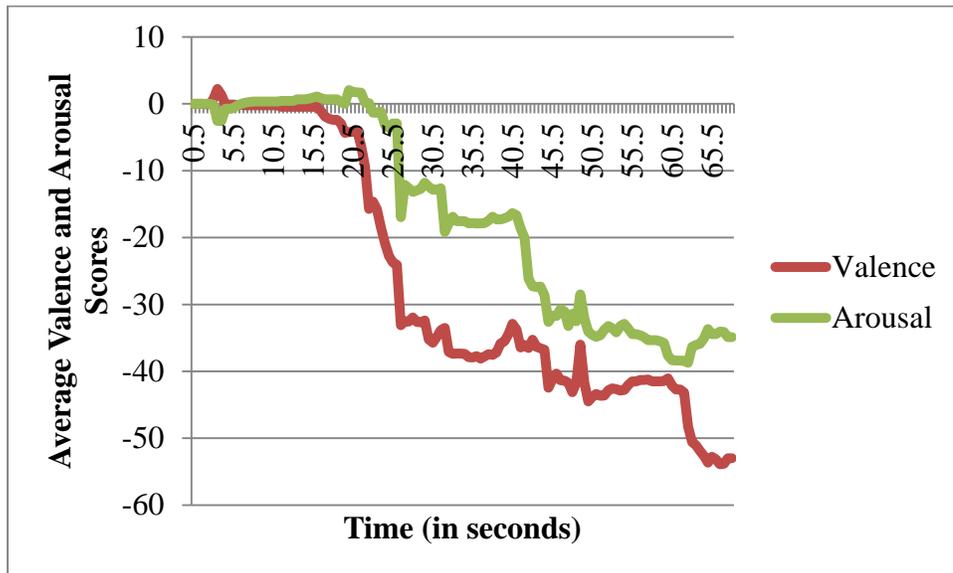


Figure 10. *Do pivnice* dynamic self-report valence and arousal over time

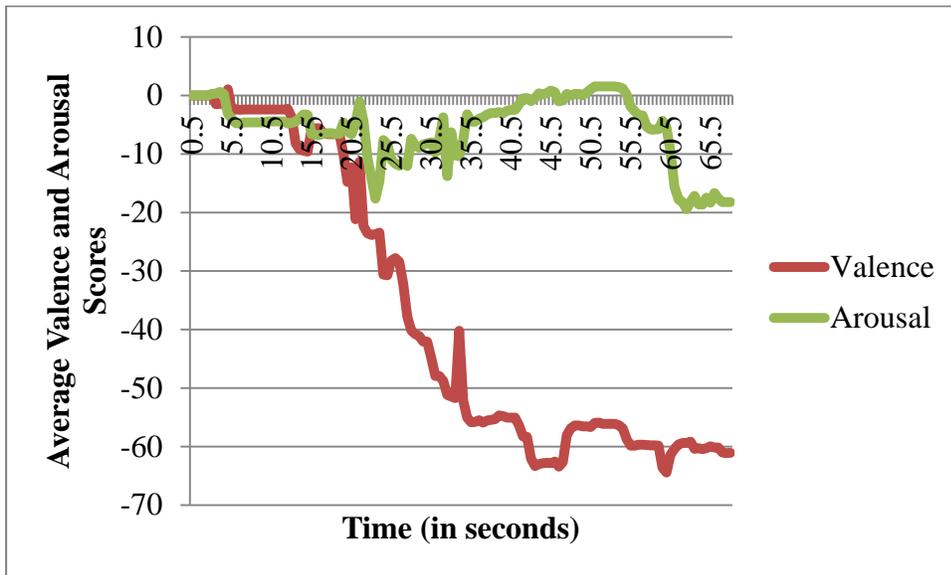


Figure 11. Shame dynamic self-report valence and arousal over time.

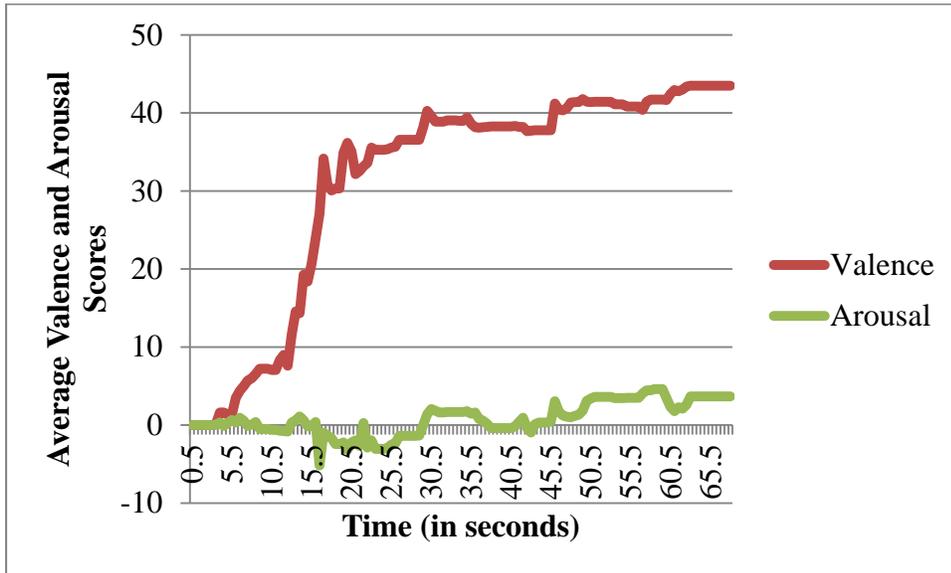


Figure 12. *Voci nel tempo* dynamic self-report valence and arousal over time.

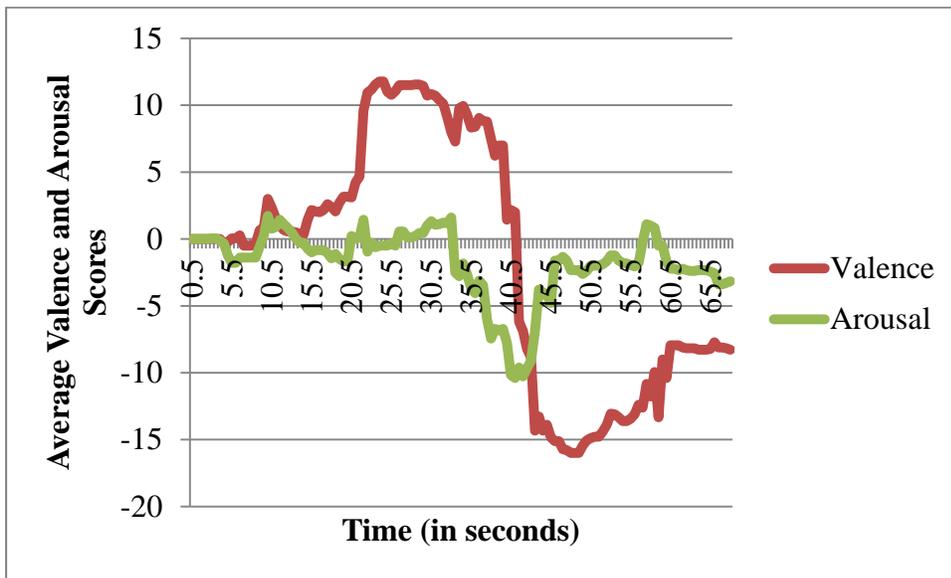


Figure 13. *Window Water Baby Moving* dynamic self-report valence and arousal over time.

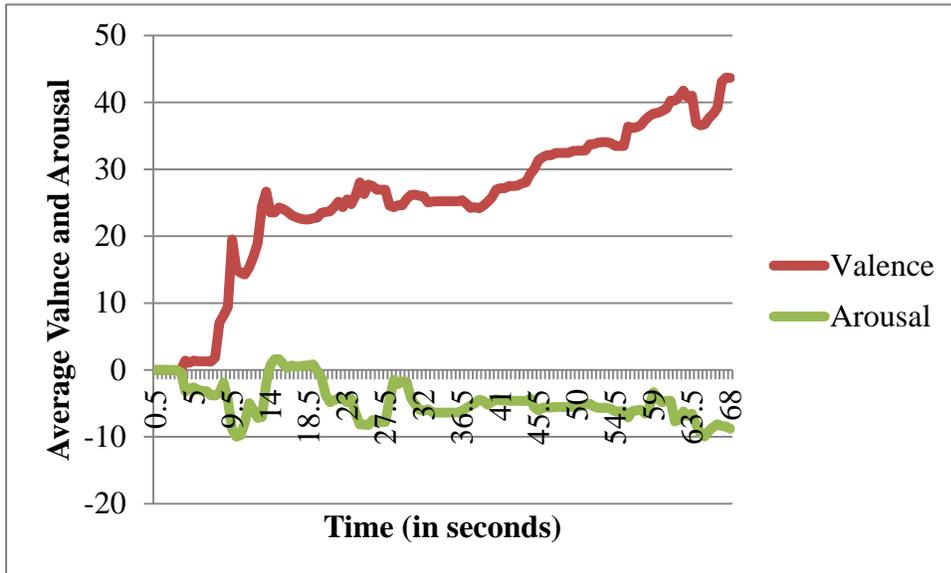


Figure 15. *Sherlock, Jr.* dynamic self-report valence and arousal over time.

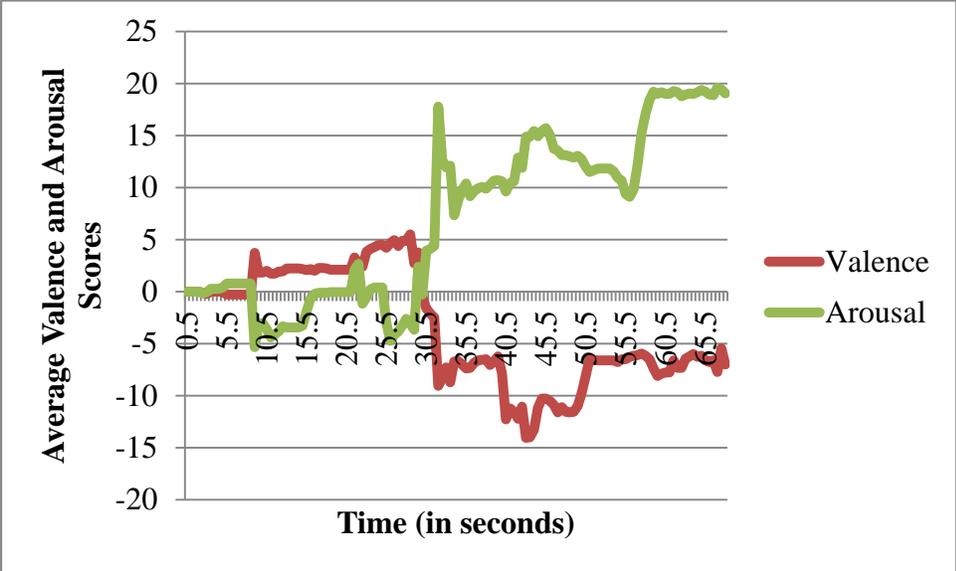


Figure 17. La chambre dynamic self-report valence and arousal over time.

LIBRARY OF AFFECTIVE FILMS (LAF)

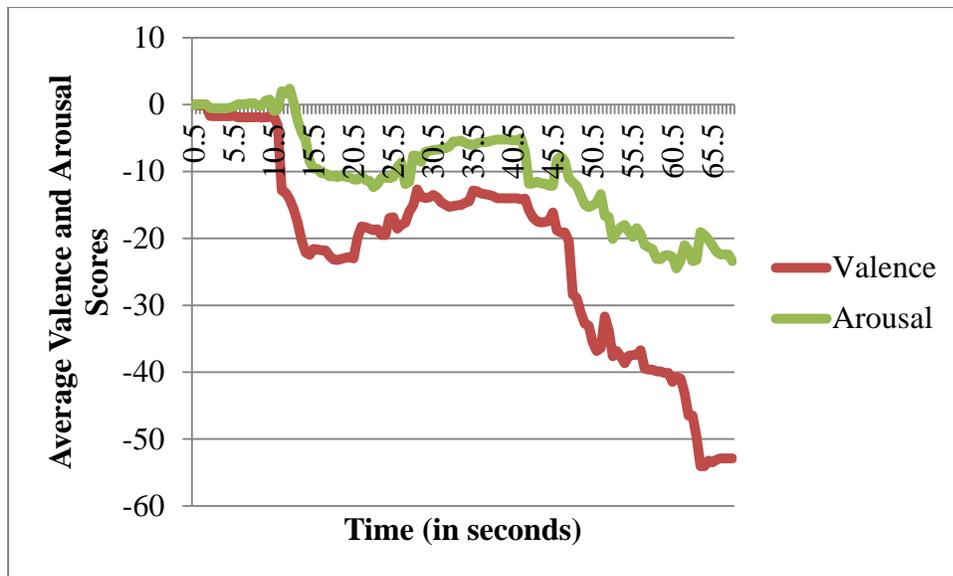


Figure 18. *Dancer in the Dark* dynamic self-report valence and arousal over time.

LIBRARY OF AFFECTIVE FILMS (LAF)

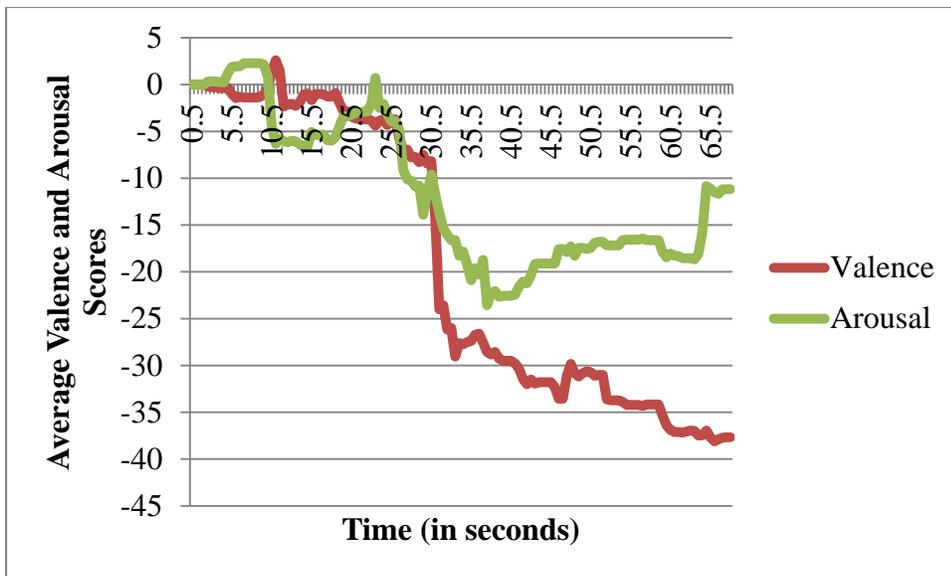


Figure 19. *Three Colors: Blue* dynamic self-report valence and arousal over time.