

Running head : MULTI-CRITERIA ASSESSMENT OF EMOTIONAL FILMS

**MANUSCRIPT SUBMITTED TO PUBLICATION: PLEASE DO NOT QUOTE
WITHOUT PERMISSION**

A multi-criteria assessment of emotional films

Alexandre Schaefer^{1,2}, Frédéric Nils¹, Xavier Sanchez^{1,3}, and Pierre Philippot¹

¹University of Louvain, Louvain-La-Neuve, Belgium.

²Washington University in St Louis, MO, USA.

³Edge Hill College, Liverpool, UK.

Abstract

Emotional film clips are among the most popular and effective emotion-elicitation methods. However, the criteria used in previous studies to establish the validity of emotional film stimuli were primarily concerned with the differentiation between discrete affective states. The main goal of the present study was to develop a new and comprehensive set of emotion-eliciting films, bearing in mind that the validity criterion of a set of stimuli is relative to the experimenter's specific research questions. The final result is a set of seventy emotional film excerpts from which the experimenter can make a flexible choice of stimuli suitable for a variety of research questions. Fifty film experts were asked to remember specific film scenes that elicited fear, anger, sadness, disgust, amusement, tenderness, as well as emotionally neutral scenes. For each emotion, the ten most frequently mentioned scenes were selected to create a set of seventy film clips. Next, 364 participants viewed the film clips in individual laboratory sessions and rated each film on multiple dimensions. In addition to subtle gender differences, results showed that the film clips were effective with regard to several criteria such as emotional discreteness, intensity, and positive and negative affect. Further, a principal component analysis differentiated two categories of positive films: films eliciting amusement-related feelings and films related to affective attachment. Finally, fourteen validity criterion scores were computed, and each film was given a rank according to these scores. Individual film clip scores and editing instructions were made freely available on an Internet site.

A multi-criteria assessment of emotion-eliciting films

In the realm of experimental psychology, researchers often need to induce emotional states in a laboratory context. Indeed, the effects of emotion on several cognitive, social and neural processes, as well as emotion in itself have become a widely studied phenomenon. Therefore, there is a growing need for efficient and reliable emotion elicitation techniques. Many emotion elicitation techniques have been used so far: mental imagery (Vrana, Cuthbert & Lang, 1986), exposure to emotional film excerpts (Gross & Levenson, 1995; Hagemann et al., 1999; Philippot, 1993), exposure to emotional slides (Bradley & Lang, 2000), real-life techniques (Landis, 1924; Stemmler et al., 2001), autobiographical recollection (Philippot, Schaefer & Herbette, 2003; Schaefer & Philippot, In Press), Velten mood induction technique (Velten, 1969), facial feedback (Matsumoto, 1987), respiratory feedback (Philippot, Chappelle & Blairy, 2002), among others.

Among these methods, exposure to emotional film excerpts seems to possess several major advantages: (1) It is one of the most easy-to-use techniques of emotion elicitation (2) It has been widely observed that film excerpts can elicit strong subjective and physiological changes (e.g. Frazier, Strauss & Steinhauer, 2004; Gross, 1998; Palomba, Sarlo, Grilli et al., 2000). (3) The dynamic nature of film scenes provides an optimal artificial model of reality, without the ethical and practical problems of real-life techniques. (4) It seems to be the most powerful technique to elicit emotion in a laboratory: Westermann, Spies, Stahl & Hesse (1996) showed in a meta-analysis that among several other techniques, film clips were the most potent inducers of both positive and negative mood states.

Previous studies have already tested the reliability of film clips as emotional elicitors, yielding reliable sets of stimuli (Gross & Levenson, 1995; Mc Hugo et al, 1982; Philippot, 1993). The present validation study aimed to set up a new battery of film stimuli that is as adaptable as possible to researchers' specific goals. For that purpose, seventy film excerpts have been scored on multiple criteria,

and the final validation data has been made available on Internet so that anyone can flexibly determine which film excerpts are most suited to his/her goals.

The present validation study addressed three methodological and conceptual issues that were overlooked by previous studies, although important for the topic of emotion elicitation. The first question relates to the choice of the reliability/validity criterion. What determines if a film excerpt is a valid stimulus? Previous studies have defined *validity* as the capacity of a film excerpt to elicit a discrete emotional state such as anger or fear. However, studies concerned with emotion elicitation often have research questions that go beyond emotional discreteness. Hence, a stimuli set that is valid for a given research question may not be appropriate for different questions. For instance, two films that induce differentiated feelings of sadness and happiness would not be useful for a study concerned with the effects of different levels of emotional intensity. In other words, the validity of a stimulus for a given study is determined by the nature of the research questions addressed in the study. This implies that no universal stimuli set can be suited to any and all kinds of emotion studies. A sound method, then, is to adopt an *à la carte* approach, whereby one can select the stimulus or stimuli group most suited for a specific study from a large array of stimuli rated on multiple criteria. Therefore, our participants assessed 70 film clips on well-known emotional dimensions such as overall emotional intensity, positive affect, negative affect and discreteness of several emotional categories, in addition to four emotional factors derived from a Principal Components Analysis. The best set of films to use will vary according to which of these dimensions (or combination of dimensions) is chosen as the validity criterion.

Second, previous studies used rather divergent methodological approaches. McHugo et al. (1982), Hagemann et al., 1999, and Philippot (1993) used a laboratory-based methodology with individual sessions, whereas Gross & Levenson (1995) used group-based sessions in a classroom with up to 30 participants in the same classroom. Gross & Levenson's (1995) approach has undeniable advantages on statistical power and on the number of films tested, however, their group-testing method may have

increased social conformity and/or desirability biases. The present validation study used an experimental design combining the advantages of the two aforementioned methodologies, namely, a large sample of participants, and a controlled experimental setting. Indeed, each film clip was viewed and assessed by a number of participants large enough to obtain a reliable estimation of the measured indicators (between 44 and 56 participants per film). Further, the validation was done in the controlled context of a laboratory, where each participant watched and assessed *individually* each film excerpt, in order to prevent effects of social conformity and desirability. A further attempt to prevent these biases relied on the utilization of Philippot's (1993) specific instructions (see Methods section).

Third, the positive film clips of previous emotion eliciting film sets enacted "individualistic" positive emotions, such as amusement or contentment, but neglected more "relational" positive emotions such as affection, love or tenderness, belonging to the "Attachment" pole. In the present study, several films eliciting both individualistic and attachment-related emotions were assessed.

In addition, the present study also addressed classical questions related to emotion elicitation: (1) *Discreteness of emotional states*. Discreteness is the degree to which one emotional state is uniquely activated while other possible emotions are less activated or absent. For instance, a high score on an anger self-report item while other items like disgust or sadness yield low scores suggests that a state of anger has been activated with a high degree of discreteness. (2) *Levels of emotional intensity of the film clips*. The intensity of a provoked emotional state is one of the most frequent criteria to determine the efficacy of a stimulus. And although subjective overall intensity remains a useful measure, it is important to keep in mind that it is likely to be a multifaceted construct (Sonnemans & Frijda, 1994). (3) *Positive and negative affect levels of the film excerpts*. Beyond looking at discrete emotions, emotions can also be placed within two independent factors of positive and negative affect, which can be estimated with the popular PANAS scales (Watson, Tellegen & Clark, 1988). (4) *Gender differences in emotion elicitation*. In previous validation studies, McHugo et al. (1982) and Philippot (1993) did not find significant gender

differences in participants' reactions to emotional films, whereas Gross & Levenson (1995) observed that women reported higher levels of target emotions than did men. This apparent contradiction is perhaps due to a difference in statistical power between studies.

Overview

The main purpose of the present study was to set up a battery of emotion-eliciting film stimuli that would be as adaptable as possible to researchers' specific needs. The validation study unfolded in three stages. The first stage consisted in selecting 70 film excerpts from a larger list of emotional film clips obtained through a preliminary survey. This set of 70 films contained film excerpts in each of 7 categories: amusement, tenderness, anger, sadness, fear, disgust and neutral state. The second stage consisted of a laboratory study testing the capability of each film excerpt to elicit emotional states in an experimental context. For this purpose, we tested a large sample of participants, using a variety of self-report measures. This second stage was guided by the following questions: (1) *Did the film excerpts elicit intense emotional states ?* (2) *Did the film excerpts elicit emotional states differentiated in terms of positive and negative affect?* (3) *Did the film excerpts elicit discrete emotional states ?* (4) *Can the positive emotional states elicited be reliably differentiated into "individualistic" and "relational" factors ?* (5) *Are there gender differences in the reactivity to the film clips ?* A subject-level analysis addressed these questions on the basis of the average scores of all the film excerpts across all the participants. The third stage involved determining the criteria that could be used to select specific subsets of films. For that, the data collected in the second stage was analyzed at the film level, i.e. taking each film as the unit of analysis.

Method

Preliminary survey and excerpt selections

The first step in the present study was the selection of a relatively large number of film excerpts corresponding to seven *a priori* emotional categories: anger, happiness, fear, disgust, sadness, tenderness and neutral. In order to provide a fairly large number of film clips, we decided to use ten films per emotional category. These 70 film excerpts had to be selected from a large initial pool of possible film scenes. For this purpose, 50 experts (i.e. independent video-store managers) were asked to fill in a brief questionnaire in which they had to recall, describe and rate for emotional intensity at least three film excerpts for each emotional category. A large initial set of 824 film excerpts was obtained with this method. For each emotional category, the 10 most frequently cited excerpts were chosen. If two or more films were quoted with the same frequency, the most intense film was chosen. The 70 selected excerpts were cut and recorded on VHS videotapes¹.

Each excerpt was in French, and the duration of each film clip ranged from 1 to 7 min. In addition, each clip was cut to make a coherent segment in order to maximize the emotional meaning of each clip. For instance, the excerpt of "American History X", in which a violent murder is shown, is cut just before the police sirens can be heard. The purpose was to prevent an attenuation of the meaning of injustice which is evoked by the scene.

Regarding neutral excerpts, as it appeared difficult for survey participants to remember specific instances of neutral scenes, 20 additional people were asked to report the categories of films or TV excerpts they usually found emotionally neutral. Therefore, several neutral scenes from the final film set come from TV programs. One setback of this method is that the choice of some of the neutral excerpts is linked to a specific location (namely, French-speaking Belgium) and difficult to use in other cultural and linguistic settings. Nevertheless, some of the most successful neutral excerpts are easily accessible in several languages, for example, the films "Blue", "The Lover" and TV programs from Euronews Channel.

The Euronews market update and weather forecast video-clips were chosen so that they depict normal situations (a quiet day in the markets and mild temperatures). Finally, we decided not to use animated film excerpts, in order to maximize the realism of the film stimuli.

Participants and Design

Three hundred and sixty-four undergraduate students (294 females and 70 males, mean age: 19.6, $SD = 3.11$) from the University of Louvain took part in the experiment for course credit. Participants were pseudo-randomly assigned to 7 groups, such that each group had an equal proportion of male participants. Each group had an average of 52 participants (max: 56 and min: 44). Within each group, 10 subgroups were created, differing only according to the order of presentation of the stimuli, to control for potential order effects. The order of presentation was also set in such a way that (a) two films targeting the same emotion were not shown consecutively, and (b) participants never watched more than two films of the same valence consecutively. A set of 10 different film excerpts was assigned to each group. Within each 10 film-set, 7 emotional categories (anger, happiness, fear, disgust, sadness, tenderness and neutral) were represented. Consequently, three emotional categories were represented twice in each group. The emotional categories repeated were fully counterbalanced across the seven groups.

Procedure

The participants came to the laboratory in subgroups of 3 to 5 people. Upon their arrival, participants were instructed that they would see several emotional film excerpts. Participants were told that they would go through a relaxation procedure before each excerpt, and that they would have to report their emotional reactions to the film after each excerpt by filling out questionnaires. Participants were encouraged to report (1) what they had actually felt and not what they believed people should feel in reaction to the movies (in order to strengthen this point, the importance of individual differences in reactions to films was stressed); (2) How they felt at the specific time they were watching the video

excerpt, and not their general mood of the day. Finally, (3) participants were informed that their responses would remain totally anonymous. Moreover, they were told that they could stop their participation in the experiment at any time. All participants gave their consent to participate.

Participants were then separated by partitions so that they viewed the excerpts individually, on individual screens, so that they could not see the other participants' reactions to the movie excerpts, or communicate with the other participants. When all participants were ready to start the experiment, the room's lighting was dimmed, and pre-recorded relaxation instructions were given: Participants had to close their eyes, to relax every muscle (including the face), and breath deeply and regularly for about 2.5 min. As soon as the relaxation was over, participants were informed that the first film clip would be displayed. Participants were instructed to watch the whole scene attentively, without diverting their attention from the screen. The films were displayed on 17" color screens. After each film excerpt, participants completed questionnaires about their emotional state (see "Measures" section).

Measures

Self-reported emotional intensity.

The global intensity of the emotions felt during the recollection stage was assessed using a 7-point scale: "*While I was watching the film... 1 = I felt no emotions at all, 7 = I felt very intense emotions.*" The participants were encouraged to answer this question according to what they actually felt during the task and not according to what they thought they should feel when watching the film.

Discrete emotions questionnaire.

To assess discrete emotional dimensions, we used a modified version of The Differential Emotions Scale (DES; Izard, Dougherty, Bloxom, & Kotsch, 1974), translated to French by Philippot (1993). Each item consisted of groups of emotional adjectives: (1) *interested, concentrated, alert*; (2) *joyful, happy, amused*; (3) *sad, downhearted, blue*; (4) *angry, irritated, mad*; (5) *fearful, scared, afraid*;

(6) *anxious, tense, nervous*; (7) *disgusted, turned off, repulsed*; (8) *disdainful, scornful, contemptuous*; (9) *surprised, amazed, astonished*; (10) *warmhearted, gleeful, elated*.

In order to extend the range of emotional dimensions assessed, we used a modified version of the DES in which the following items were added: (11) *loving, affectionate, friendly*; (12) *guilty, remorseful*; (13) *moved*; (14) *satisfied, pleased*; (15) *calm, serene, relaxed*. (16) *Ashamed, embarrassed*. This modified version of the DES has already been successfully used in previous studies (Schaefer, et al., 2003; Schaefer & Philippot, in Press). For each group of adjectives, participants used a 7-point scale (1 = "not at all", 7 = "very intense") to rate the extent to which they felt each state as they were watching the film clip.

PANAS.

A French translation (Gaudreau, Sanchez & Blondin, submitted) of the Positive and Negative Affect Schedule (PANAS; Watson, Clark, & Tellegen, 1988) was used. The PANAS is a self-reported adjective checklist that contains two 10-item subscales designed for the assessment of Positive Affect (PA: *active, alert, attentive, determined, enthusiastic, excited, inspired, interested, proud, and strong*) and Negative Affect (NA: *afraid, ashamed, distressed, guilty, hostile, irritable, jittery, nervous, scared, and upset*). For each of the 20 emotion-related words, participants used a 5-point scale (1 = "very slightly or not at all", 5 = "extremely") to rate the extent to which they felt each state as they were watching the film clip.

Results

Results are presented first at a Subject-level of analysis and next at a Film-level of analysis. The first part is aimed at evaluating the general effectiveness of this study's film set to elicit emotion in an experimental setting. More specifically, the subject-level analysis was guided by the questions outlined in the Overview section, taking participants' individual responses as the unit of analysis. Questions 1 and 2 were addressed by Analyses of Variance (ANOVA) performed on the subjective intensity and PANAS scores. These ANOVAs also enabled us to address the Gender question. Question 3 - discreteness - was addressed by a set of planned comparisons between target and non-target emotion scores, using a Bonferroni correction for multiple comparisons and a stringent significance threshold. Question 4 was addressed through a Principal Components Analysis (PCA), with the hypothesis that two different factors should come up for positive emotions, one for individualistic positive emotions, and another one related to the theme of attachment. Further, the PCA approach also enabled us to estimate the general factor structure of the feelings elicited by emotional films. The second part of the analysis focused on methods of ranking films according to several criteria, taking averages of scores per film as the unit of analysis.

Subject-level analysis

Emotional Intensity

A 7 X 2 ANOVA with Emotion (anger vs. happiness vs. fear vs. disgust vs. sadness vs. affection vs. neutral) and Gender was computed on the self-rated emotional intensity scores across all the 70 films viewed by the subjects. Due to the large sample size ($N=364$), we decided to consider as significant the effects that fulfilled two criteria: a p -value $< .001$, and an eta-square of at least .05.

A main effect of Emotion was observed, $F(6, 2172) = 187.5, p < .00001, \eta^2 = .34$, as well as a main effect of Gender, $F(1, 362) = 30.1, p < .0001, \eta^2 = .08$, suggesting that women reported higher

levels of emotional intensity than men when viewing video-clips. The Emotion X Gender interaction failed to pass the effect size criterion, $F(6, 2172) = 4.03, p = .0005, \eta^2 = .01$.

In order to verify whether each category of emotional films had generated higher intensity scores than the neutral category, we computed Bonferroni comparisons between the mean intensity of each emotional film category and the neutral category. Due to sample size issues, only Bonferroni tests at $p < .001$ were considered as significant. All the comparisons were highly significant at $p < .00001$.

We also computed Bonferroni tests to compare intensity scores between female and male subjects for each of the seven emotional categories. Results depicted in Fig. 1 show that women reported significantly higher intensity scores for tenderness and sadness, and trends in the same direction ($p < .005$) were observed for both disgust and fear.

PANAS

Scores were computed for Positive Affect (PA) and Negative Affect (NA) for each emotional condition, averaging the PANAS subscales' items (Alpha scores are reported for each condition in Table 1). Two 7 X 2 ANOVA's with Emotion (anger vs. happiness vs. fear vs. disgust vs. sadness vs. tenderness vs. neutral) and Gender were computed separately on PA and NA scores across all the 70 films viewed by the subjects. We used the same significance criteria explained in the previous section.

For NA, a main effect of Emotion was observed, $F(6, 2172) = 171.8, p < .001, \eta^2 = .32$, as well as a main effect of Gender, $F(1, 362) = 28.7, p < .001, \eta^2 = .07$, indicating that women reported a higher NA level than men when viewing video clips. The Emotion X Gender interaction failed to pass the significance criteria. For PA, a main effect of Emotion was observed, $F(6, 2172) = 74.6, p < .001, \eta^2 = .17$. The effects of Gender and the interaction failed to pass the significance criteria. The effect size of the main effect of emotional category is weaker for PA than NA, which is possibly due to the fact that there is

a strong “Arousal” component in Watson et al’s (1998) PA factor which is very likely to be activated by highly negative films. A look at Fig. 1 suggests that the films more likely to reliably activate the PA factor are to be found in the category of Tenderness.

In order to verify whether the *a priori* categories of films were validated by the PANAS scores, we averaged the scores of the 4 negative categories (anger, sadness, fear and disgust), as well as the scores of the two positive categories (amusement and affection/tenderness), separately for PA and NA. Bonferroni tests showed that the PA scores for the positive categories were significantly higher than the PA scores of the negative categories, $t(363) = 10.6, p < .001$, and NA scores for the negative categories were significantly higher than the NA scores of the positive categories, $t(363) = 32.5, p < .001$. Figures 2 and 3 display the PANAS scores for each emotional category by gender.

Differentiation between emotional states

In order to investigate the issue of the differentiation of discrete emotional states, paired *t*-test comparisons between the DES items were computed separately for each emotional state. More specifically, for each category of emotional films, a set of 6 predefined *t*-tests contrasting the target state and each non-target state was computed. For instance: for the category of films evoking *fear*, one target DES item was chosen (*fearful, scared, afraid*) and compared to 6 non-target items, which are targets to the other 6 emotional categories (namely: anger, sadness, amusement, tenderness, neutral, disgust). Due to the large sample size and to the large number of planned comparisons, we decided to (a) apply Bonferroni corrections for multiple comparisons, and (b) to set a stringent significance threshold of $p < 0.0001$. Therefore, only *t*-values > 4.7 were considered significant. Table 2 shows that most *t*-values are highly significant, generally suggesting a high degree of differentiation between states.

An exception was found for the difference between fear and anger, which does not reach the significance criterion during an anger state (although the same difference is highly significant during a

fear state). To further analyze this issue, we chose the five film excerpts with the higher level of anger discreteness (see the “Film-level” section for the calculation of this coefficient), and tested the difference between anger and fear separately for each excerpt. The differences were significant ($p < 0.005$) for all but one of them (*American History X*), indicating that a fairly good number of anger excerpts yielded a high level of differentiation between anger and fear when they were analyzed individually. Likewise, differences between calmness and positive states during a positive state did not reach the significance criteria (whereas they did during a neutral state). Individual analyses of the five films with the higher coefficient of tenderness discreteness revealed that the differences between calmness and tenderness were significant for all the five excerpts ($p < 0.001$). Regarding amusement, only the excerpt from “*The dinner game*” yielded a significant difference between amusement and calmness ($p < 0.001$). This probably reflects the relationship between humor/laugh and feelings of relaxation.

Principal Components Analysis

A principal components analysis of the Discrete Emotions questionnaire items was conducted across all conditions to examine the general factor structure of the participants’ responses. A fixed number of 7 *a priori* factors was chosen in order to match the number of *a priori* emotional categories used in this study. The intercorrelation matrix (see Table 3) had a Kaiser-Meyer-Olkin (KMO) measure of sample adequacy of 0.852. The seven extracted factors accounted for 78.7 % of the variance. Table 4 shows the five first factors of the component matrix after a Varimax rotation (the rotation converged in 7 iterations).

Factor I includes three general positive scales: satisfaction, amusement and happiness. Factor II reflects a “Threat” component, with high loadings for anxiety and fear, and a high negative loading for calmness. Factor III includes rejection-related emotions: anger, disdain, disgust. Factor IV has high loadings for tenderness and affection, reflecting a component of positive affect different from Factor I. Interestingly, sadness is also included in Factor IV. Factor V seems to reflect self-blame (Lazarus &

Smith, 1991) emotions: guilt and shame. The two last factors reflect single scales, namely, attentiveness and surprise. However, each of these two last factors explained less than 5 % of the variance (respectively 4.5% and 4.3%), hence they have not been considered further.

Film-level analysis

In order to rank films according to specific criteria, we performed analyses taking each one of the 70 films as units of analysis. We therefore computed for each film a mean of each measured variable, obtaining a final data matrix with 70 rows corresponding to the list of films, and 19 variables, corresponding to the intensity scale, the positive and negative affect scores, and the 16 DES items.

Principal Component Analysis

A PCA was conducted on the DES film-level scores. Similar to the subject-level PCA (see above), a maximum number of 7 a priori factors was set, and a Varimax rotation was used. The intercorrelation matrix had a KMO measure of sample adequacy of 0.818, and the rotation converged in 9 iterations. Six factors were extracted that accounted for 93.5% of the variance, with the four initial factors accounting for most of it (88.2%). Table 6 displays the rotated component matrix for these four factors. The factors extracted are very similar to those obtained from the subject-level PCA. Factor I reflects a general positive affect factor, Factor II reflects a “Threat” component, Factor III reflects a general negative affect factor, including both self- and other-blame emotions. Affection and tenderness constitute Factor IV, therefore forming a factor independent from the general positive affect factor. The two remaining factors account both for less than 5% of the variance (3.4% and 2.3%).

Ranking scores

Next, we computed a discreteness coefficient for each one of the 6 relevant emotional categories: the mean score of the scale targeting one particular emotion minus the averaged mean scores of the scales targeting the other 5 emotions. Hence, we obtained 6 discreteness coefficients, one for each emotion (amusement, tenderness, anger, sadness, disgust and fear). Regarding the choice of emotionally neutral clips, we sorted the 70 clips combining 3 criteria: (1) The lowest global intensity, (2) The lowest negative affect and (3) The lowest positive affect.

The final ranking criteria were then: (1) The subjective intensity scores, (2) PA and NA scores, (3) the 6 discreteness scores, (4) the level of neutrality (5) the four PCA-derived factor scores. We ranked the 70 films for each of these criteria, and we report in Table 5 the ten highest-ranking films for each of these criteria. The scores for all the 70 film excerpts are available on the Internet¹

Discussion

The present study tested the effectiveness of a set of 70 film clips to elicit emotions in an experimental context according to different validity criteria. Several questions were addressed by the data analysis. First, ANOVAs showed that the films were capable of eliciting significantly intense emotions and differentiated responses in terms of positive and negative affect. Second, Bonferroni comparisons yielded fairly high levels of discreteness for the 7 target states for each category of film. Third, gender differences in reactivity to the films were observed. More specifically, women seemed to report higher levels of subjective intensity than men, and higher levels of negative affect. No significant gender differences were found in positive affect. Although these gender differences had a smaller effect size than the other effects, they were significant with stringent significance thresholds. Fourth, a Principal Component Analysis (PCA) unveiled the internal structure of the reported responses to films. Regarding

positive emotions, both general and film-level PCA analyses generated a similar pattern which confirmed our initial hypothesis, that positive emotions could be differentiated into at least 2 factors reflecting the contrast between an individualistic and an “attachment” pole. In both PCA analyses, one component included the items “*joyful, happy, amused*”, “*warmhearted, gleeful, elated*” and “*Satisfied, pleased*”; and a second component including the items “*loving, affectionate, friendly*” and “*moved*”. Interestingly, the target item for sadness was included in the “attachment” component, at least in the subject-level analysis. This may have been caused by the frequent portrayal of interpersonal relationships in the sadness films. The observed difference between the two positive factors deserves more consideration in emotion research since it is possible that these two categories of states may have different effects on cognition and social behavior. In addition, the finding of an “attachment” factor dissociated from a more general positive factor is consistent with the existence of specific neurophysiological mechanisms determining attachment-related behaviors (Panksepp, 1998).

Regarding negative emotions, both the subject-level and film-level PCAs yielded a strong component of “Threat” differentiated from the other states. This finding is consistent with the widely supported notion that threat-related processes are idiosyncratic relative to other emotional phenomena, because of their obvious biological relevance. For instance, threat-related stimuli elicit a particular mode of attentional orientation (Mathews, Mackintosh & Fulcher, 1997), and threat processing relies on a specific neural circuitry (LeDoux, 1996). The subject-level analysis also differentiated components related to rejection meanings (anger, disdain, disgust) versus self-oriented meanings (guilt, shame). These two components are consistent with the appraisal components of “other-blame” and “self-blame”, proposed by Smith & Lazarus (1993).

Two caveats concerning this study have to be considered. First, due to the particular gender distribution of the pool of Psychology undergraduates, the sample included a larger number of female participants. Even though care was taken to keep an equal proportion of male participants in each group,

the present study's results on gender differences should be interpreted cautiously. Second, this validation study was conducted in a specific cultural context that may have influenced the choice and evaluation of films for some emotional categories. In our experience with the multi-cultural utilization of a previous film set (Philippot, 1993), this has been proven to be problematic only for the elicitation of amusement states. This may be a pervasive issue regarding stimuli based on humor, since this is likely to be a highly culturally-dependent phenomenon (Davies, 1998; Tamaoka & Takahashi, 1994). This problem might arise somewhat in the current set of film excerpts as many of the amusement films are derived from the French cinema. Nevertheless, it is worth noting that this is not the case for five excerpts of the ten highest ranked amusement excerpts, which were taken from worldwide distributed films such as "*When Harry met Sally*", "*A fish called Wanda*", etc.

Beyond using films as elicitors of affective states that can modulate cognition and social behavior, we believe that several pathways are open for future research on emotional responsiveness to films *per se*. For instance, in combination with psychophysiological and neuroimaging techniques (e.g. fMRI, ERP, MEG, eye-tracking techniques, etc.) research may yield interesting insights about the perceptual and attentional processes involved in emotional processing, as well as the neuroanatomical and neurochemical correlates of emotional processes. Likewise, using film excerpts could help further our understanding of the time course of an emotional state, that is, how an emotional reaction unfolds over a given period, and what factors determine its maintenance or decline.

In sum, the main goal of this study was to build a *flexible* tool for emotion research, that is, a set of film clips from which different subsets of stimuli can be chosen according to specific criteria. For this purpose, we gathered a comprehensive set of films which successfully fulfilled different validity criteria. Next, we created 14 different indices along which films were ranked. The entire database was made freely available on Internet, including the film-level matrix, as well as the individual ratings for each specific film and the editing instructions for each excerpt, so that anyone can download and analyze the data in

order to flexibly select a set of stimuli. It is worth noting that data from additional film excerpts can be added by researchers who wish to validate other film excerpts using similar methods and measures. The comparison with the original database could provide an index of external validity to the newly added film excerpts.

References

- Bradley, M.M. & Lang, P.J. (2000). Measuring emotion: behavior, feeling and physiology. In R.D. Lane and L.Nadel (Eds.), *Cognitive Neuroscience of emotion*. (pp. 242-276). Oxford University Press.
- Davies, C. (1998). The dog that didn't bark in the night: A new sociological approach to the cross-cultural study of humor. In W. Ruch (Ed.), *The sense of humor: Explorations of a personality characteristic* (Humor Research Series, vol. 3, pp. 293-306). Berlin: Mouton de Gruyter.
- Frazier, T.W. ; Strauss, M.E. ; Steinhauer, S.R. (2004). Respiratory sinus arrhythmia as an index of emotional response in young adults. *Psychophysiology* 41(1): 75-83.
- Gaudreau, P., Sanchez, X., & Blondin, J.-P. (submitted). Positive and negative affective states in a performance-related setting: Testing the factorial validity of the PANAS across two samples of French-Canadian athletes.
- Gross, J.J. (1998). Antecedent- and response-focused emotion regulation: Divergent consequences for experience, expression, and physiology. *Journal of Personality and Social Psychology*, 74, 224-237.
- Gross, J.J., & Levenson, R.W. (1995). Emotion elicitation using films. *Cognition and Emotion*, 9, 87-108.

- Hagemann, D.; Naumann, E.; Maier, S.; Becker, G.; Lurken, A.; Bartussek, D. (1999). The assessment of affective reactivity using films: validity, reliability and sex differences. *Personality and Individual Differences*, 26, 627 – 639.
- Izard, C.E., Dougherty, F.E., Bloxom, B.M., & Kotsch, N.E. (1974). *The Differential Emotions Scale: A method of measuring the meaning of subjective experience of discrete emotions*. Nashville: Vanderbilt University, Department of Psychology.
- Landis, C. (1924). Studies of emotional reactions. II. General behavior and facial expression. *Journal of Comparative Psychology*, 4, 447-509.
- Lazarus, R.S. and Smith, C.A. (1991). Emotion and adaptation. In L.A. Pervin (Ed.). *Handbook of personality: theory and research*. (pp. 609-637). NY: Guilford Press.
- Le Doux, J.E. (1996). *The emotional brain: the mysterious underpinnings of emotional life*. New York: Simon & Schuster.
- Mathews, A.; Mackintosh, B. and Fulcher, E.P. (1997) Cognitive biases in anxiety and attention to threat. *Trends in Cognitive Sciences*, 1, 340-345.
- Matsumoto, D. (1987). The role of facial responses in the experience of emotion: More methodological problems and a meta-analysis. *Journal of Personality and Social Psychology*, 52, 769-774.
- McHugo, G.J. ; Smith, C.A. ; Lanzetta, J.T. (1982). The structure of self-reports of emotional responses to film segments. *Motivation & Emotion* 6(4): 365-385.
- Palomba, D. ; Sarlo, M. ; Angrilli, A. ; Mini, A. ; Stegagno, L. (2000). Cardiac responses associated with affective processing of unpleasant film stimuli. *International Journal of Psychophysiology* 36(1): 45-57.
- Panksepp, J. (1998). *Affective Neuroscience*. New York: Oxford University Press.
- Philippot, P. (1993). Inducing and assessing differentiated emotional feeling states in the laboratory. *Cognition and Emotion*, 7, 171-193.

- Philippot, P., Chapelle, C. & Blairy, S. (2002). Respiratory feedback in the generation of emotion. *Cognition & Emotion*, 16, 605-627.
- Philippot, P., Schaefer, A., & Herbertte, G. (2003). Consequences of specific processing of emotional information: Impact of general versus specific autobiographical memory priming on emotion elicitation. *Emotion*, 3, 270-283.
- Schaefer, A. & Philippot, P. (In Press). Selective effects of emotion on the phenomenal characteristics of autobiographical memories. *Memory*.
- Schaefer, A., Collette, F., Philippot, P., Vanderlinden, M., Laureys, S., Delfiore, G., Degueldre, C., Maquet, P., Luxen, A. & Salmon, E. (2003). Neural correlates of "hot" and "cold" emotional processing: A multilevel approach to the functional anatomy of emotions. *Neuroimage*, 18, 938-949.
- Smith, C.S. & Lazarus, R.S. (1993). Appraisal components, core relational themes, and the emotions. *Cognition and Emotion*, 7, 233-269.
- Sonnemans, J.; Frijda, N. H. (1995). The determinants of subjective emotional intensity. *Cognition & Emotion* 9(5): 483-506.
- Stemmler, G., Heldmann, M., Pauls, C.A., & Scherer, T. (2001). Constraints for emotion specificity in fear and anger: The context counts. *Psychophysiology*, 38, 275-291.
- Tamaoka, K. & Takahashi, T. (1994). Understanding humour from another culture: Comprehension of parental brain twisters by Japanese university students learning English as a second language. *Psychologia* 37(3): 150-157.
- Velten, E. (1968). A laboratory task for induction of mood states. *Behavior Research and Therapy*, 6, 473-482.
- Vrana, S.R., Cuthbert, B.N., Lang, P.J. (1986). Fear imagery and text processing. *Psychophysiology*, 23, 247-253.

Watson, D. ; Clark, L. A. ; Tellegen, A. (1988). Development and validation of brief measures of positive and negative affect: The PANAS scales. *Journal of Personality & Social Psychology* 54(6): 1063-1070.

Westermann, R.; Spies, K.; Stahl, G. & Hesse (1996). Relative effectiveness and validity of mood induction procedures: A meta-analysis. *European Journal of Social Psychology*, 26(4), 557-580.

Authors' notes

The writing of this article has been facilitated by grants from the “Fonds National de la Recherche Scientifique” (FNRS) 8.4510.99 and 8.4510.00. The authors thank Deanna Barch, Todd Braver and Jeremy Gray for their helpful comments on an earlier draft of this manuscript. The authors also wish to thank Sylvie De Coninck and Cécile Misonne for their contribution to the data collection. Correspondence regarding this manuscript should be addressed to Alexandre Schaefer who is now at the Dept. of Psychology of Washington University, One Brookings Drive, Campus Box 1125, St. Louis, MO 63130, USA. Email: aschaefer@artsci.wustl.edu, or to Pierre Philippot, Université Catholique de Louvain, Faculté de Psychologie, 10, Place du Cardinal Mercier, 1348-Louvain-La-Neuve, Belgium. Email : Pierre.Philippot@psp.ucl.ac.be.

Footnotes

1. Detailed information about the film excerpts used in this study is available at the following URL: <http://www.psp.ucl.ac.be/emotion/FilmStimuli/>. Information about the original movies and instructions to cut and edit the relevant excerpts, as well as all the film-level scores and the individual data files for each film excerpt can be found at this URL.

Table 1: Cronbach's Alpha for PA and NA factors as a function of emotional condition.

	<i>NA</i>	<i>PA</i>
<i>Anger</i>	.88	.71
<i>Tenderness</i>	.80	.81
<i>Sadness</i>	.88	.68
<i>Fear</i>	.88	.75
<i>Disgust</i>	.88	.74
<i>Amusement</i>	.57	.84
<i>Neutral</i>	.69	.76

Note. NA = Negative Affect, PA = Positive Affect

Table 2 : Paired comparisons between DES target and non-target items by emotional state.

<i>Measures</i>	<i>Emotional States</i>						
	Amusement	Disgust	Tenderness	Sadness	Anger	Fear	Neutral
Amusement	0	16.54*	15.27*	27.03*	16.72*	17.7*	17.93*
Disgust	26.01*	0	37.97*	11.51*	5.7*	8.31*	34.70*
Tenderness	29.95*	27.37*	0	5.35*	18.2*	26.75*	34.79*
Sadness	37.62*	24.24*	27.53*	0	14.8*	25.07*	33.48*
Anger	34.97*	23.8*	38.84*	13.36*	0	22.99*	32.43*
Fear	39.14*	15.74*	41.85*	13.85*	3.86	0	34.78*
Neutral	0.98	7.96*	2.63	6.76*	7.23*	7.5*	0

Notes. For each emotional state, the DES item targeting the given state was contrasted with the measures relevant to the other 6 states.

* t -value significant at $p < .0001$, with Bonferroni correction for multiple comparisons.

Table 3. Intercorrelations between DES measures (Subject-level).

	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15
<i>1. interested, concentrated, alert</i>															
<i>2. fearful, scared, afraid</i>	.342														
<i>3. fearful, scared, afraid</i>	.363	.802													
<i>4. moved</i>	.192	-.188	-.159												
<i>5. angry, irritated, mad</i>	.222	.485	.492	.005											
<i>6. ashamed, embarrassed</i>	.085	.199	.238	-.018	.373										
<i>7. warmhearted, gleeful, elated</i>	.060	-.331	-.353	.405	-.238	-.045									
<i>8. joyful, happy, amused</i>	-.062	-.376	-.410	.148	-.295	-.001	.696								
<i>9. sad, downhearted, blue</i>	.254	.268	.303	.335	.405	.157	-.122	-.302							
<i>10. satisfied, pleased</i>	.062	-.319	-.323	.325	-.222	-.036	.776	.688	-.160						
<i>11. surprised, amazed, astonished</i>	.085	.273	.240	-.158	.094	.173	-.023	.070	-.040	.013					
<i>12. loving, affectionate, friendly</i>	.120	-.152	-.149	.582	-.050	-.004	.440	.214	.187	.358	-.059				
<i>13. guilty, remorseful</i>	.124	.217	.264	.112	.381	.389	-.063	-.112	.337	-.072	.096	.094			
<i>14. disgusted, turned off, repulsed</i>	.247	.612	.566	-.212	.569	.344	-.323	-.319	.236	-.295	.227	-.172	.254		
<i>15. disdainful, scornful, contemptuous</i>	.112	.344	.352	-.115	.535	.311	-.196	-.205	.177	-.174	.127	-.111	.228	.514	
<i>16. calm, serene, relaxed</i>	-.149	-.500	-.556	.140	-.359	-.178	.362	.384	-.230	.369	-.117	.146	-.168	-.424	-.263

Table 4: Subject-level rotated PCA matrix for the 5 first factors.

<i>DES items</i>	<i>Factor I</i>	<i>Factor II</i>	<i>Factor III</i>	<i>Factor IV</i>	<i>Factor V</i>
<i>satisfied, pleased</i>	.858	-.172	-.079	.188	-.030
<i>joyful, happy, amused</i>	.848	-.222	-.139	-.044	.024
<i>warmhearted, gleeful, elated</i>	.845	-.159	-.110	.292	-.032
<i>calm, serene, relaxed</i>	.236	-.858	-.116	.000	-.099
<i>anxious, tense, nervous</i>	-.243	.701	.274	-.050	.144
<i>fearful, scared, afraid</i>	-.221	.667	.316	-.076	.074
<i>disdainful, scornful, contemptuous</i>	-.074	.083	.893	-.042	.091
<i>angry, irritated, mad</i>	-.185	.254	.691	.120	.322
<i>disgusted, turned off, repulsed</i>	-.174	.406	.629	-.136	.174
<i>moved</i>	.192	-.118	-.063	.829	.033
<i>loving, affectionate, friendly</i>	.308	-.001	-.063	.795	-.018
<i>sad, downhearted, blue</i>	-.360	.098	.197	.586	.275
<i>guilty, remorseful</i>	-.113	.066	.082	.178	.828
<i>Ashamed, embarrassed</i>	.116	.135	.284	-.087	.759
<i>interested, concentrated, alert</i>	.075	.150	.084	.126	.033
<i>surprised, amazed, astonished</i>	.051	.110	.073	-.073	.085

Note: Loadings ≥ 0.50 are in bold.

Table 5. Sets of ten first ranked film excerpts for 14 selection criteria.

Rank	Selection Criteria				
	Intensity	Positive Affect	Negative Affect	Amusement (<i>d</i>)	Tenderness (<i>d</i>)
1	<i>Misery</i>	<i>The dead Poets Society (2)</i>	<i>American History X</i>	<i>"Les trois frères"</i>	<i>Forrest Gump</i>
2	<i>Schindler's list (1)</i>	<i>The dinner game</i>	<i>Schindler's list (1)</i>	<i>The dinner game</i>	<i>Life is beautiful (2)</i>
3	<i>Dead Man Walking</i>	<i>Life is beautiful (4)</i>	<i>The Piano</i>	<i>"La cité de la peur"</i>	<i>Life is beautiful (3)</i>
4	<i>American History X</i>	<i>Forrest Gump</i>	<i>Misery</i>	<i>The visitors</i>	<i>The eighth day</i>
5	<i>Life is beautiful (2)</i>	<i>Life is beautiful (2)</i>	<i>Sleepers</i>	<i>A fish called Wanda</i>	<i>Life is beautiful (4)</i>
6	<i>A perfect World</i>	<i>When Harry met Sally</i>	<i>Scream 1</i>	<i>Benny and Joone</i>	<i>The dead Poets Society (2)</i>
7	<i>Saving Private Ryan</i>	<i>"Les trois frères"</i>	<i>Schindler's list (2)</i>	<i>Something about Mary (2)</i>	<i>Ghost</i>
8	<i>Seven (1)</i>	<i>Benny and Joone</i>	<i>The Blair Witch Project</i>	<i>Something about Mary (1)</i>	<i>E.T.</i>
9	<i>The Piano</i>	<i>"La cité de la peur"</i>	<i>The Shining</i>	<i>When Harry met Sally</i>	<i>When a man loves a woman</i>
10	<i>The dead Poets Society (2)</i>	<i>Life is beautiful (3)</i>	<i>Saving Private Ryan</i>	<i>"Le Pari"</i>	<i>The Professional(1)</i>

Notes. In each column, the films listed correspond to the 10 movies that obtained the highest score on a given criterion, except for the neutral state criterion (see results section). The ranks are in a descending order (e.g. *Misery* is the most intense film excerpt). *d* indicates that movies are ranked according to their score of discreteness in a given emotional dimension. The last four criteria correspond to the four first factors unveiled by the film-level PCA.

Numbers in parentheses correspond to different scenes of the same film¹.

Table 5. Sets of ten first ranked film excerpts for 14 selection criteria (continuation).

Rank	<i>Selection Criteria</i>				
	<i>Anger (d)</i>	<i>Sadness (d)</i>	<i>Fear (d)</i>	<i>Disgust (d)</i>	<i>Neutral</i>
1	<i>Schindler's list (2)</i>	<i>City of angels</i>	<i>The Blair Witch Project</i>	<i>Trainspotting (2)</i>	<i>Euronews Market update</i>
2	<i>Sleepers</i>	<i>Dangerous mind</i>	<i>The Shining</i>	<i>Seven (3)</i>	<i>Euronews Weather forecast</i>
3	<i>Leaving Las Vegas</i>	<i>Philadelphia</i>	<i>Scream 1</i>	<i>Hellraiser</i>	<i>"Question d'argent"</i>
4	<i>American History X</i>	<i>The dead Poets Society</i>	<i>Misery</i>	<i>Man Bites Dog (1)</i>	<i>Blue (2)</i>
5	<i>Schindler's list (1)</i>	<i>The dreamlife of Angels</i>	<i>Scream 2</i>	<i>Seven (2)</i>	<i>"Jardins et loisirs"</i>
6	<i>Schindler's list (3)</i>	<i>Dead Man Walking</i>	<i>Child's Play (Chucky 1)</i>	<i>The dentist</i>	<i>Blue (1)</i>
7	<i>Man Bites Dog (1)</i>	<i>The Professional(1)</i>	<i>Copycat</i>	<i>American History X</i>	<i>The lover</i>
8	<i>In the name of the father</i>	<i>Schindler's list (1)</i>	<i>The dentist</i>	<i>Sleepers</i>	<i>Blue (3)</i>
9	<i>Seven (1)</i>	<i>A perfect World</i>	<i>The Exorcist</i>	<i>Misery</i>	<i>"A vrai dire"</i>
10	<i>A perfect world</i>	<i>Life is beautiful (1)</i>	<i>Seven (2)</i>	<i>The silence of the lambs</i>	<i>TV shopping</i>

Table 5. Sets of ten first ranked film excerpts for 14 selection criteria (continuation).

Rank	<i>Selection Criteria</i>			
	Factor I	Factor II	Factor III	Factor IV
1	<i>"Les trois frères"</i>	<i>Misery</i>	<i>Schindler's list (1)</i>	<i>Ghost</i>
2	<i>The dinner game</i>	<i>Scream 1</i>	<i>Man Bites Dog (1)</i>	<i>Life is beautiful (2)</i>
3	<i>"La cité de la peur"</i>	<i>Scream 2</i>	<i>Schindler's list (2)</i>	<i>Forrest Gump</i>
4	<i>The visitors</i>	<i>The Shining</i>	<i>American History X</i>	<i>When a man loves a woman</i>
5	<i>Benny and Joone</i>	<i>The Blair Witch Project</i>	<i>Leaving Las Vegas</i>	<i>City of angels</i>
6	<i>When Harry met Sally</i>	<i>Seven (1)</i>	<i>Sleepers</i>	<i>Life is beautiful (4)</i>
7	<i>"Le Pari"</i>	<i>The Piano</i>	<i>Trainspotting (3)</i>	<i>The Professional(1)</i>
8	<i>Something about Mary (1)</i>	<i>Copycat</i>	<i>When Harry met Sally</i>	<i>Life is beautiful (3)</i>
9	<i>Life is beautiful (4)</i>	<i>The Exorcist</i>	<i>Schindler's list (3)</i>	<i>The eighth day</i>
10	<i>A fish called Wanda</i>	<i>The professional</i>	<i>Dead Man Walking</i>	<i>The dead poets Society (2)</i>

Table 6: Film-level rotated PCA matrix for the 4 first factors.

<i>DES items</i>	<i>Factor I</i>	<i>Factor II</i>	<i>Factor III</i>	<i>Factor IV</i>
<i>satisfied, pleased</i>	.920	-.159	-.172	.242
<i>joyful, happy, amused</i>	.917	-.259	-.105	.016
<i>warmhearted, gleeful, elated</i>	.888	-.169	-.160	.345
<i>interested, concentrated, alert</i>	.072	.888	.158	.215
<i>anxious, tense, nervous</i>	-.490	.783	.216	-.167
<i>fearful, scared, afraid</i>	-.457	.757	.260	-.226
<i>calm, serene, relaxed</i>	.507	-.741	-.318	.142
<i>Ashamed, embarrassed</i>	.007	.075	.932	-.018
<i>disdainful, scornful, contemptuous</i>	-.287	.309	.812	-.243
<i>angry, irritated, mad</i>	-.293	.380	.720	-.072
<i>disgusted, turned off, repulsed</i>	-.345	.507	.629	-.294
<i>loving, affectionate, friendly</i>	.229	-.103	-.109	.932
<i>moved</i>	.223	.018	-.115	.859
<i>sad, downhearted, blue</i>	-.383	.273	.225	.344
<i>guilty, remorseful</i>	-.190	.226	.605	.109
<i>surprised, amazed, astonished</i>	-.133	.110	.091	-.377

Note: Loadings ≥ 0.50 are in bold.

Figure captions

Figure 1. Subject-level mean self-reported emotional intensity as a function of gender and emotional category.

Figure 2. Subject-level mean Positive Affect (Watson et al., 1988) as a function of gender and emotional category. AM=Amusement; TEND=Tenderness; DISG=Disgust, ANG=Anger; SAD=Sadness; NEUT=Neutral.

Figure 3. Subject-level mean Negative Affect (Watson et al., 1988) as a function of gender and emotional category.





