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Moment-to-Moment Changes in Feeling Moved Match Changes in Closeness, Tears, Goosebumps, and Warmth: Time Series Analyses

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Abstract

Feeling *moved* or *touched* can be accompanied by tears, goosebumps, and sensations of warmth in the center of the chest. The experience has been described frequently, but psychological science knows little about it. We propose that labelling one's feeling as being moved or touched is a component of a social-relational emotion that we term *kama muta* (its Sanskrit label). We hypothesize that it is caused by appraising an intensification of communal sharing relations. Here, we test this by investigating people's moment-to-moment reports of feeling *moved and touched* while watching six short videos. We compare these to six other sets of participants' moment-to-moment responses watching the same videos: respectively, judgments of *closeness* (indexing communal sharing), reports of weeping, goosebumps, warmth in the center of the chest, happiness, and sadness. Our eighth time series is expert ratings of communal sharing. Time series analyses show strong and consistent cross-correlations of feeling *moved and touched* and *closeness* with each other and with each of the three physiological variables and expert-rated communal sharing – but distinctiveness from happiness and sadness. These results support our model.

Keywords: being moved; crying; goosebumps; time series; relational models, kama muta

Moment-to-Moment Changes in Feeling Moved Match Changes in Closeness, Tears, Goosebumps, and Warmth: Time Series Analyses

Others' social and relational acts frequently cause feelings and emotions (Fischer & van Kleef, 2010; Keltner & Haidt, 1999; Parkinson & Manstead, 2015). One of those is often labelled *feeling moved to tears* – a potent yet under-researched emotional experience. People seem to feel it in many social relations that involve sharing communally, such as bonds between parents and children, love between romantic partners, devoted friendship, as well as religious worship and communities. Darwin (1890), James (1890), Claparède (1930), Frijda (1988), and Panksepp (1995) have pointed it out as an object worthy of study, but it has only recently attracted systematic empirical attention.

In the current research, we introduce a model that defines the emotion in question theoretically, linking labels, physical sensations, appraisal, and regulatory functions; we will call this emotion *kama muta*, using its Sanskrit label, in order to distinguish the scientific construct from the shifting denotations of any vernacular term. We then investigate how feelings, appraisal, and bodily sensations arise concurrently when this emotion unfolds.

How People Feel Moved or Touched

Past work has put forward proposals and some evidence about bodily sensations, affect, appraisals, and motivation accompanying what people often call *being touched* or *moved*. When sufficiently intense, feeling moved or touched seems to be accompanied by three *bodily sensations*: experiencing goosebumps, chills, or shivers; moist eyes or even tears; and often a warm feeling in the center of the chest (in the "heart"; see Benedek & Kaernbach, 2011; Scherer & Zentner, 2001; Strick, Bruin, Ruiter, & Jonkers, 2015; Wassiliwizky, Wagner, & Jacobsen, 2015).

The *affective tone* of this feeling seems primarily positive (Hanich, Wagner, Shah, Jacobsen, & Menninghaus, 2014), though some have argued that the emotion involves co-activation of positive and negative affect (Deonna, 2011; Menninghaus, Wagner, Hanich, & Wassiliwizky, 2015). The *appraisals* arousing feeling moved and touched are inherently social and have been described as involving themes of affiliation and social relations, important shared values, or shared moral values and virtues (Algoe & Haidt, 2009; Cova & Deonna, 2014; Menninghaus et al., 2015; Schnall, Roper, & Fessler, 2010). Attachment was emphasized by Frijda (1988, p. 88), who sketched the prototype of moving episodes like this: "Latent attachment concerns are awakened; expectations regarding their nonfulfillment are … evoked but held in abeyance; and then one is brusquely confronted with their fulfilment" (see also Kuehnast, Wagner, Wassiliwizky, Jacobsen, & Menninghaus, 2014; Tan, 2009). Often, situations appraised in this way are not experienced first-hand, but empathically through narratives, theatre, music, or movies. Nevertheless, such observations can lead to strong feelings of being moved or touched (Konečni, 2005; Scherer & Zentner, 2001; Sloboda, 1991).[1] However, we know of no published study where such appraisals have been measured.

The *Kama Muta* Model of Feeling Moved and Touched

Based on the reviewed work and our own ethnographic and interview research, we developed a model of feeling moved that addresses its appraisals, symptoms, and functions (Fiske, Schubert, & Seibt, in press). We start by observing that feelings labeled *being moved* or *touched* in English-speaking cultures have counterparts in a number of other languages that typically use the same metaphors of passive body contact (*touched*), passive displacement or internal motion (*moved, stirred*), or feelings

[1] It has also been argued that feeling moved or touched is associated with motivation to identify and empathize more with others. Because we do not investigate motivation in the present study, we do not discuss it here.

of warmth. These vernacular terms and their folk-psychological meaning can be understood as culture-specific implementations of an emotion. To prevent confusion between the folk psychological labels and the scientific concept, we term the putative emotion under investigation here *kama muta*, which was the Sanskrit label for the feeling, and literally translates into "moved by love". The vernacular terms become measures of the feeling component, because participants necessarily report their feelings in natural language.[2] In line with our qualitative research and the literature, we see kama muta as linked to experiences of tears, goosebumps, and subjective warmth in the chest.

Emotions contribute to the constitution and regulation of relationships (Fischer & van Kleef, 2010; Fiske, 2002; Keltner & Haidt, 1999). We assume that kama muta evolved to regulate behavior in a specific type of relations, namely *communal sharing* relations. The concept of *communal sharing* has been developed in Relational Models Theory, which argues that human social relations are built out of four distinct relational models (Fiske, 1992, 2004). In relations based on the model of communal sharing, people have a sense of a common identity, and they distribute resources according to need, rather than according to rank, even matching, or proportionality. Communal sharing is a psychological concept and can be reflected in, but is not restricted, to actual exchange of resources, and can also be implemented in relations to strangers or fictional characters.

Based on this theoretical background, we specify the notion that being moved arises from the activation of "attachment concerns" (Frijda, 1988; Tan & Frijda, 1999), and propose that kama muta arises from *appraising increases in the strength of a*

[2] Consequently, in this manuscript, we use the terms "feeling moved/touched" and "being moved/touched" only when referencing other work that used those terms, and when referring to our actual measures that used these terms. When we denote the emotion (a scientific concept), we call it "kama muta."

communal sharing relation, or other contrasts between a vivid communal sharing relation and a background of need, separation, or loss. Kama muta orients the individual to communal affordances. Intensifications of communal sharing are typically subjectively experienced and reported as increases in *closeness* (Aron, Aron, & Smollan, 1992).[3]

In sum, our model proposes that people feel what they typically label in English with lexemes such as *being moved*, *touched*, *heart-warming*, *stirring* (and sometimes other terms) when communal sharing relations intensify, and that these intensifications are described as, and can be operationalized by, experienced increases in what English speakers often call *closeness*. The central hypotheses of the kama muta model to be tested in the current research are thus that feeling moved and touched is associated with appraisals of increased closeness, and the physical signature sensations of tearing up, goosebumps, and physical warmth, because these are all components of the kama muta emotion. Our model is more specific about the appraisals than previous conceptualizations regarding fulfillment of latent attachment concerns. We know of no previous similar attempt to measure the complete set of constructs involved in this emotion, or even closeness appraisals.[4]

The Current Study: A Time Series Approach

Emotional episodes are unfolding processes in which the variables of interest change over time, sometimes rapidly (Scherer, 2009). To capture those dynamics, continuous measures of emotional experiences have been used, both for general affect

[3] Communal sharing should not be confused with other notions of social sharing, although these are important - see the General Discussion.

[4] Note that we are not aiming to map the denotations of *being moved* and *touched* or similar terms in English or other languages. There certainly are situations in which people say that they are *moved* or *touched* that do not fit our concept kama muta, and there are definitely instances of kama muta that people do not label *being moved* or *touched*.

and for specific emotional states (for an overview, see Ruef & Levenson, 2007). We follow this approach here, measuring the target variables continuously while participants watch short video clips. Popular culture promotes kama muta, for instance through moving themes in movies, talk shows, and commercials. Short clips of such productions are widely shared on social media. Judging from the comments on those clips, they seem to be very effective in eliciting feelings that people refer to as *being moved,* with the accompanying physical sensations (cf. Strick et al., 2015), so we use them here.

We continuously assess seven variables. Operationalizing the feeling component of kama muta, we ask how *moved or touched* participants were. Operationalizing the hypothesized appraisal of communal sharing, participants judged *closeness* between the protagonists in the video. We assess reports of three physical sensations: *crying, goosebumps,* and *sensations of a warm chest*. To assess discriminant validity, we collect feelings of *happiness* and *sadness*, expecting that both, but especially sadness, differ from feeling *moved*. As an eighth variable, we asked four experts in Relational Models Theory to continuously rate the *strength of communal sharing relations* in the same video clips. This will additionally validate participants' *closeness* ratings as an index of communal sharing.

We assess each of these ratings from different samples, always sampling a sizable group. This prevents any possibility that the participant's ratings on one variable could influence her ratings on another variable – each participant rates only one variable. We then average across the participants in each group and compare the resulting time series of the eight variables. We do this for six different videos that all elicit a high degree of feeling *moved or touched* but differ in other respects; this enables us to sample various dynamic sequences.

We analyze these time series by regressing them on time (testing intercept and linear and quadratic slopes), and then compute their cross-correlations. We have the following predictions:

1. A successful elicitation of feelings of *being moved and touched* in any video clip will be indicated if the regression of that series on time shows at least one significant and positive regression estimate (linear or quadratic; which one depends on the shape of the narrative). This serves as a manipulation check.
2. We predict the time series of feeling *moved or touched* to be cross-correlated with each of the series of crying, goosebumps, and sensations of warmth in the chest.
3. We predict the time series of feeling *moved or touched* to be cross-correlated with appraisals of social *closeness* between the protagonists of the clip, and also the expert CS ratings.

In addition, we explore the cross-correlations between feeling *moved, happiness,* and *sadness,* and of happiness and sadness with the physical sensations. We expect feeling *moved* to be cross-correlated more with happiness than sadness because it is typically described as a positive feeling.

Method

All data was collected online. Each sample was asked for continuous reports of *only one* variable, without any mention of any of the other variables. Participants were asked to watch one video at a time while continuously reporting one feeling or judgment, and then, after completing all their video clips, to fill out a final questionnaire with additional measures. Each participant rated the same one variable throughout.

The majority of the data was collected using surveys that included five videos for a specific variable. We only asked and paid for rating two videos in these surveys, but participants could watch and rate more. Additional smaller surveys including a sixth video (to increase the range of stimuli) and increasing the data base for the five videos supplemented the main sample. Order of videos was randomized for each participant.

Based on recent recommendations for cell sizes in experimental studies, we aimed for at least $N = 40$ per cell of the 7 (variable) x 6 (video) design. We only fell short of that number in two of the forty-two cells because of excluded participants (reaching 35 and 39), and oversampled in many (see Supplementary Material).

Participants

Participants for all samples of this study were recruited on MTurk, requesting only workers from the US, and paying between $1 and $2 depending on the length of the task. From all samples, we removed participants who did not respond to the final questionnaire, who did not watch the full video according to the time auditing, who did not follow instructions, who indicated that they had participated in a recent study on a similar topic, and those who reported technical difficulties. Exclusion was decided before importing the rating data of the participant in question. In total, data were collected from 953 participants; data from $N = 909$ participants were retained for analysis. The sample included 453 female participants (1 unknown gender); age ranged from 18 to 74 years ($M = 34.05$, $SD = 10.88$).

Materials and Procedure

We used six different videos in total, labelled here “Thai medicine”, “Elephant rescue”, “Christian the lion”, “Marina Abramovic”, “Two orphans”, and “Thai altruism” (see Supplementary Materials for short synopses and links). All materials were in

English. Three of the videos had soundtracks in other languages, but were subtitled in English.

We asked participants to indicate any change in the feeling or judgment as soon as they noticed it. For feeling *moved or touched*, *happy*, and *sad*, we used 5-point scales with each point labelled (e.g., for feeling *moved or touched*: "1 = not moved at all, 2 = somewhat moved, 3 = moved, 4 = very moved, 5 = extremely moved"; and the instruction "While you watch the video, please indicate how touched or moved you feel right now"). For *goosebumps*, we used a dichotomous scale (1 = no goosebumps, 2 = goosebumps), while for both *crying* and *experienced warmth in the chest or some other part of your body* we used a 3-point scale (e.g., for crying: 1 = no moist eyes/tears, 2 = moist eyes, 3 = tears). For measuring *closeness* we employed the IOS scale introduced by Aron et al. (1992), which uses a graphical representation of metaphorical "overlap", with the instruction "While you watch the video, please indicate how close you think the people in the video are" (scale from 1 to 7). Seibt, Zickfeld, Schubert, and Fiske (2016) have shown that ratings on this one-item graphical scale correlate substantially with a multi-item measure designed to assess communal sharing (Haslam & Fiske, 1999), confirming that this is a valid operationalization of communal sharing.

Instructions on the continuous measure were given together with an example of the scale where participants could practice indicating changes. After instructions, correct comprehension was probed with a test question, offering three possible answers. If a wrong answer was chosen, participants were presented with the instructions again. If a wrong answer was chosen again, participation in the study ended.

The studies were programmed in Qualtrics, videos were embedded and the timestamps accessed using the Google YouTube API. The interaction through keyboard and the recording of keystrokes and timestamps were programmed in JavaScript within

Qualtrics. The scale was always visible underneath the video. Changes could be indicated with the mouse or keyboard. Each change of rating was protocolled with a timestamp of the video being played acquired through the API.[5]

All procedures were in line with local regulations regarding participants' privacy and approved by the Ethics Committee of the Department of Psychology, University of Oslo. Raw and aggregated data are available at Open Science Framework (https://osf.io/2qces/); stimuli and measures are documented in the supplemental material. We present our complete data from this study; we did not collect additional measures or present other stimuli. In sum, we report how we determined our sample size, all data exclusions, all manipulations, and all measures in the study.

Results

Data Preparation and Manipulation Check

Figure S1 illustrates the process of data preparation, and Table S1 reports additional statistical details (Supplementary Materials). Out of the timestamps of participants' rating changes, we created time series of ratings consisting of a value for each second over the duration of the particular video. In order to compare the time series for different ratings to each other, we averaged across all participants for each second of the time series of a given rating and video, creating one time series per rating and video (Figure S1-B). We checked the consistency of time series among participants by computing intraclass correlations (ICCs; Landers, 2015; Shrout & Fleiss, 1979) for all interval-scaled variables; they were all above .80 and are listed in Table S1. For goosebumps, we computed Fleiss' *kappa;* the respective values were considerably lower, presumably due to the dichotomous item (between .14 and .26).

[5] For exploratory purposes not relevant to the present hypotheses, at the end participants also answered questions on mood, arousal, trait empathy, and a 10-item personality survey. We will not report these data here.

Most of the resulting curves of the variables showed increases over time that slowed towards the end. In other words, they had both positive linear and negative quadratic trends. The trends are informative because they indicate that the measured phenomena actually increased during the video. For the time series of feeling *moved or touched*, linear terms were significant for all videos, confirming that the videos successfully induced the feeling at some point during the video. We report the parameters in Table S1 and the correlations among the raw time series in Table 1 (after smoothing, see below).

In concurrent measurement of a variable changing over time, a linear trend is likely to occur simply as a result of setting the measurement to start at a value and limiting ratings to values above that value. A quadratic trend could then result because the scale has an upper limit that some participants might reach before the end of the video. When the variables all have linear or quadratic trends, the raw values will cross-correlate simply because they have these measurement-constraint-based trends in common. Therefore, we removed the linear and quadratic trends for the main analysis to increase the likelihood that the cross correlations reflect changes in the variables that occur at approximately the same time (or with a fixed offset). We de-trended each time series for each video separately by estimating the linear and quadratic effects in a multiple regression (using an index of *t* in seconds starting at 0, and its square, as predictors) and saving the unstandardized residuals (Figure S1-C; Shumway & Stoffer, 2011).

Finally, we reduced the resolution of the time scale. The time series analysis determines simultaneousness within specific time windows. One cannot expect participants to indicate a change in emotion or judgment in the one-second clock interval they experience it, or with a constant temporal offset. Before analyzing the data

we decided upon a window of three seconds because in most cases that should be sufficient for participants to indicate changes, and because chunks of about three seconds seem to be the building blocks of human perceptual and motor existence (Nagy, 2011). We thus aggregated the time courses by averaging judgments within units of three consecutive seconds, which smooths the curves somewhat (Figure S1-D).

Cross-Correlations

To compare the changes in the various indicators over time, we computed the cross-correlation function between the time series and, in line with that literature, their 95% CIs. Table 1 shows the cross-correlation function at lag 0 (CCF_0) among *moved or touched* and the seven other variables (before and after linear and quadratic de-trending of all); Table S2 lists CCF_0s between feeling *moved or touched* and the other variables for each video separately.[6] Figure 2 shows the correlations after linear and quadratic detrending. A high correlation at lag 0 means that the two self-reports tend to change concurrently along the video. CCFs at lag 0 were almost always the highest ones; there was no systematic pattern regarding other lags. We therefore report only lag 0 CCFs in the following (see Supplementary Materials text for more information).

Feeling moved and closeness. As predicted, for all the videos, curves of feeling *moved or touched* cross-correlated strongly and significantly with closeness, between CCF_0 = .54 [.29, .72], and CCF_0 = .84 [.74, .90] (see the first column of values in Figure 2). The mean cross-correlation across the videos is .75. The respective cross-correlations among the time series before de-trending are even higher, but note that these also reflect the shared presence of linear and quadratic trends (Table 1). The

[6] We used the CCF command in SPSS 22. Computationally, CCF is identical to Pearson's correlation coefficient. We use the abbreviation CCF instead of *r* to emphasize that we report correlations among aggregated time series, where the units of analysis are the units of time in the series.

former associations reflect changes that occur nearly simultaneously, while the latter in addition reflect correspondence among trends across the complete clips.

Feeling moved and physical sensations. Reports of all three physical sensations also substantially cross-correlated over time with feeling *moved or touched*. Feeling *warmth in the chest* (second column in Figure 2) cross-correlated significantly and strongly with feeling *moved or touched* in all six videos, between CCF_0 = .68 [.49, .81] and CCF_0 = .97 [.94, .98]. The same was true for *crying*: CCF_0 = .49 [.26, .66], to CCF_0 = .93 [.87, .96] (third column in Figure 2). *Goosebumps* had moderate to strong cross-correlations with feeling *moved or touched* for all of 6 videos, from CCF_0 = .47 [.15, .71], to CCF_0 = .87 [.76, .93] (fourth column in Figure 2). Averaged across the videos, the cross-correlation of feeling *moved or touched* with *warmth* was .93, with *crying* .73, and *goosebumps* .65, and the three physical sensations cross-correlated with each other between .63 and .75 (Table 1).

Feeling moved and other feelings. *Happiness* cross-correlated with feeling *moved or touched* substantially in 5 out of the 6 videos, between CCF_0 = .47 [.21, .67], and CCF_0 = .97 [.94, .98] (sixth column of Figure 2) – but not for the "Two orphans" video. The average cross-correlation across all six videos was .79. The picture for *sadness* is more varied. Its curve cross-correlated with the feeling *moved or touched* curve negatively for two videos, positively for another, and not significantly for three others. The final column in Figure 2 shows the wide spread of these cross-correlations. Across the six videos the mean cross-correlation of *sadness* with feeling *moved or touched* is -.15.

Exploratory analyses. Finally, we inspected cross-correlations between *sadness* and *crying*. *Sadness* and *crying* were positively cross-correlated in only one video, CCF_0 = .82 [.71, .89], negatively in two others, and not significantly associated in three

others. The mean cross-correlation is small and negative: -.18. In contrast, *happiness* cross-correlated positively with *crying* for 4 out of the 6 videos, between CCF_0 = .33 [.08, .55] and CCF_0 = .92 [.86, .96]. In contrast, in the "Two orphans" video the cross-correlation between happiness and crying was negative, CCF_0 = -.31 [-.53, -.06], while the cross-correlation for "Marina Abramović" was not significant. The mean cross-correlation was .44. (for an overview see Table S3).

Expert Ratings

Using the same methodology as above, we asked experts in Relational Models Theory to continuously rate the presence of the communal sharing relational model in the video clips. All expert raters have conducted research and published on the theory. Five experts responded, but one affirmed during debriefing that she or he was already familiar with our kama muta construct, so we used only the data from the four others. The video *Christian the lion* was rated by only three raters, while all raters rated the other five videos.

The expert raters first always watched each clip without rating it, and then watched it again, rating continuously "Right now, how intense is the Communal Sharing relationship, if any, between the characters?" on a scale from 1 (No CS at all) to 5 (Very Intense CS; see Supplementary Materials for complete instructions). To assess inter-rater consistency, we computed intraclass correlations as above. Consistencies were satisfactory; for videos 1-6, respectively, they were ICC(2,4)=.79, ICC(2,4)=.76, ICC(2,3)=.79, ICC(2,4)=.92, ICC(2,4)=.64, and ICC(2,4)=.71. We aggregated and transformed these ratings as we did all of the other ratings.

The expert rating of communal sharing cross-correlated with participants' mean feeling *moved or touched* on average CCF_0 = .56. For one of the six videos (Elephant rescue), the CCF_0 was small and not significant (.10), while it was between .43 and .81

and significant for the remaining five video clips. Table 1 shows that the average cross-correlation of the expert-rated communal sharing and the other variables are all sizable. The largest cross-correlations were obtained with participants' judgments of *closeness* and feelings of *warmth in the chest* (.65 and .66). Only *sadness* was not on average cross-correlated with expert-rated communal sharing.

Discussion

The current study measured feeling *moved or touched* while watching "moving" video clips. We predicted that participants' feeling *moved or touched* would co-occur in time with physical sensations of tears, goosebumps, felt warmth in the chest, and also with appraised increases in communal sharing relations – ratings of *closeness* – because we assume all of these to be components of the hypothesized emotion, kama muta. This was confirmed by our findings:

First, over the course of every video there was a strong increase in feeling *moved or touched*. In line with many Internet comments on these videos, the clips consistently evoked this feeling in our participants.

Second, we found strong cross-correlations between the curves of feeling *moved or touched* and other participants' reports of *goosebumps,* a *warm feeling in the chest,* and *crying*. The cross-correlations with *goosebumps* were lowest, possibly due to the dichotomous answering format, lower consistency among participants' reports for this variable, less specificity of goosebumps for kama muta, or all of these. These data corroborate earlier work which showed such associations when people provide a summary report after experiencing the emotion (Benedek & Kaernbach, 2011; Seibt, Schubert, Zickfeld, & Fiske, 2016; Strick et al., 2015). What is unique about the current data is the evidence that the feeling and the physical sensations develop concurrently (at the level of 3-second intervals). The cross-correlations confirm that these components of

a coherent emotion change together over time. However, there are enough differences between the curves to suggest that at least in some people at some moments, feeling *moved or touched* can occur without *tears,* or without *goosebumps,* or without a *warm feeling in the chest.*

Third, we found that one set of participants' feeling *moved or touched* matches changes in another sample's judgments of social *closeness* at the same moments in the videos. Inspection of the curves in Figure 1 shows that most large swings of *closeness* judgments correspond to swings in feeling *moved or touched;* this observation is confirmed by high and significant cross-correlations between the two curves for all video clips, even after removing linear and quadratic trends in each variable from each respective video. We interpret participants' judged *closeness* as indexing intensification of communal sharing. This is backed up by its cross-correlations with expert-rated presence of communal sharing, which also predict participants' feelings *moved,* with the exception of one video clip. These results go beyond previous work that characterized feelings labeled "being moved" or "touched" as caused by the "fulfillment" of attachment "concerns" (e.g. Frijda, 1988); we present and support a more precise emotion construct a more precise mechanism for its activation. We also go beyond work theorizing that such feelings are caused by other social judgments—work that never directly measured those hypothesized judgments (Algoe & Haidt, 2009; Cova & Deonna, 2014; Frijda, 1988; Schnall et al., 2010).

The current results are backed up by our findings from not yet published studies, which show that the same and similar video clips evoke appraisals of increased closeness, feeling moved and touched, and the same physiological sensations—not just in the U.S., but also in several non-English speaking cultures (Seibt, Schubert, Zickfeld, Zhu, et al., 2016).

Each of the time series averages the judgments of a different group of participants. We believe that given this, the similarity of the curves is remarkable. Aggregating across many participants reduces error variance, analogous to aggregating across many items of a scale. The resultant increase in reliability makes these high cross-correlations possible—but of course far from inevitable, as we can see from the low, varying, and sometimes negative correlations with sadness. Before de-trending, some cross-correlations are close to one. This is informative because it indicates the presence of parallel linear and quadratic trends in most of the variables across the whole length of the roughly two-minute videos, in addition to the moment-to-moment synchronization of the changes.

Our data did not reveal any consistent time lag between the curves of feeling *moved or touched* and judged *closeness*. Given that we argued that judged closeness is the appraisal leading to kama muta, one might wonder whether it should not precede the feeling. There may be several reasons for why it did not: The temporal resolution is not precise to the second, and therefore we actually smoothed the data into three-second segments. Also, given the nature of fast emotions as opposed to deliberate conscious judgments, it is questionable whether we should expect the judgment curve to precede the curve of feeling *moved or touched*.

Our data are correlative. One potential third variable is the music present in all six of our video clips. Sloboda (1991) identified structural features of musical passages that are reported to frequently cause tears and a lump in the throat. We do not think that the scores can explain what we found—just telling the same stories orally or presenting moving videos without sound can move people considerably, while our impression is that hearing these particular musical pieces alone would not cause the same feelings.

However, the scores likely amplified what was happening in the story (Strick et al., 2015).

The predicted cross-correlations are strong and significant across six videos depicting diverse social interactions. Any alternative interpretation of our findings would have to account for that consistency across narratives whose only evident commonality is that they all consist of rapid and pronounced intensifications of CS relationships. Nevertheless, future work should strive to develop a method for sampling stimuli clips from the population of clips that are deemed "moving", "touching", "heartwarming", etc., in various cultures – as well as other kinds of stimuli and experiences in which CS intensifies.

In the present data, increases in social closeness are associated with increases in feeling moved and physical sensations. However, we would argue that especially sudden and significant increases cause the full-blown emotion, while slow increases should not reach that quality (Fiske et al., 2016; Frijda, 1988). Testing this precise prediction remains a task for future studies with more variations in the stimulus materials and improved statistical methods.

Exploring Related Emotions

Comparing the curves of feeling *moved or touched* with those of *happiness* and *sadness* suggests two conclusions: First, kama muta is distinct from both happiness and sadness. Kama muta can coincide with happiness, but does not always. Kama muta can also coincide with sadness, but often does not. This is what one would expect for distinct emotions: They may occur at the same time, or not. Second kama muta's observable association with happiness is stronger than its association with sadness. To the extent that this can be generalized beyond the stimuli in this study, our results support findings in the literature that kama muta is consistently associated with

positivity, but not with negativity (Seibt, Schubert, Zickfeld, & Fiske, 2016). It is a mostly positive, satisfying, desirable emotion; people often actively seek it. Importantly, our data show that kama muta can arise independently of being sad. This is in line with the kama muta model, where sadness as such is not assumed to play a causal role, even though obstacles or relational problems can induce momentary sadness that provides the background condition for an intensification of communal sharing.

Our data are also informative about crying, which is a topic of study on its own (Vingerhoets & Bylsma, 2015). The field recognizes that crying can result from both negatively and positively evaluated situations. Our situations are clearly of the latter type: *Crying* cross-correlated positively with *happiness*, and overall slightly negatively with *sadness*. When people experience kama muta, their tears are happy ones.

Kinds of Sharing

We base our theoretical model of kama muta on *communal sharing*, a theoretical concept introduced in Relational Models Theory (Fiske, 1992), and argue that this model underlies the appraisal. *Communal sharing* should not be confused with other kinds of sharing, such as the sharing of emotional experiences that tends to make the emotions stronger (e.g., Boothby, Smith, Clark, & Bargh, 2016), or the sharing of emotional episodes after they have occurred, which has been identified as an important characteristic of how humans experience and regulate emotions (Rimé, 2009).

However, both of these are also important for kama muta: Joint experiences of kama muta should be stronger, especially if the relation to the other person is one of communal sharing. Experiences of kama muta will also be ‘shared’ in the other sense: actively transmitted to others. This can be observed in social media, where we found our stimuli because they were shared (with the intention to evoke kama muta in others, presumably) and commented upon as *moving* and *touching*. Together, these various

notions of sharing show that emotional appraisal, experience, expression, regulation, and regulatory function are largely socio-relational (cf. Fiske, 2002; Fischer & Manstead, 2016).

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Author Note

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Tables

Table 1

Mean of Six Videos' Cross-Correlation Functions at lag 0 (CCF_0) between time-series of all eight measured variables, before/after de-trending and smoothing.

	Feeling moved	Closeness	Warmth	Crying	Goose-bumps	Expert CS	Happiness
Closeness	.97 / .75						
Warmth	.99 / .93	.98 / .77					
Crying	.94 / .73	.89 / .36	.92 / .64				
Goosebumps	.86 / .65	.84 / .43	.89 / .75	.85 / .63			
Expert CS	.64 / .56	.68 / .65	.70 / .66	.63 / .39	.75 / .55		
Happiness	.96 / .79	.91 / .61	.94 / .73	.86 / .44	.78 / .35	.65 / .46	
Sadness	.33 /-.15	.36 / .03	.35 /-.10	.14 /-.18	.24 /-.09	.19 / .02	.03 /-.64

Note. First and second numbers in each cell respectively show cross-correlations at lag 0 before and after removing linear and quadratic trends and smoothing. Cross-correlations were computed for each video separately, then Fisher's *z*-transformed, and then averaged and re-transformed. Expert CS scores are averages of four experts' ratings of communal sharing.

Figure Captions

Figure 1. Mean ratings of feeling *moved or touched* (solid lines), and judged *closeness* (dashed lines) over time for each video, each rated by a different set of participants, *before* de-trending and smoothing. Horizontal axes show time of original clip in seconds. Original scales were 1 to 5 for feeling touched and moved and 1 to 7 for closeness, but for this figure, the latter was transformed to a scale from 1 to 5.

Figure 2. For each of the six video clips, cross-correlation function (equivalent to *r*) at lag 0 between de-trended and smoothed time series of mean of one set of participants' ratings of feeling *moved or touched* and seven other variables, each respectively rated by a different set of participants: Participants' judgments of video characters' social *closeness*; participants' own felt *warmth in the chest, crying,* and *goosebumps;* expert-rated *communal sharing* between characters; participants' ratings of their own *happiness* and *sadness*.

Figure 1

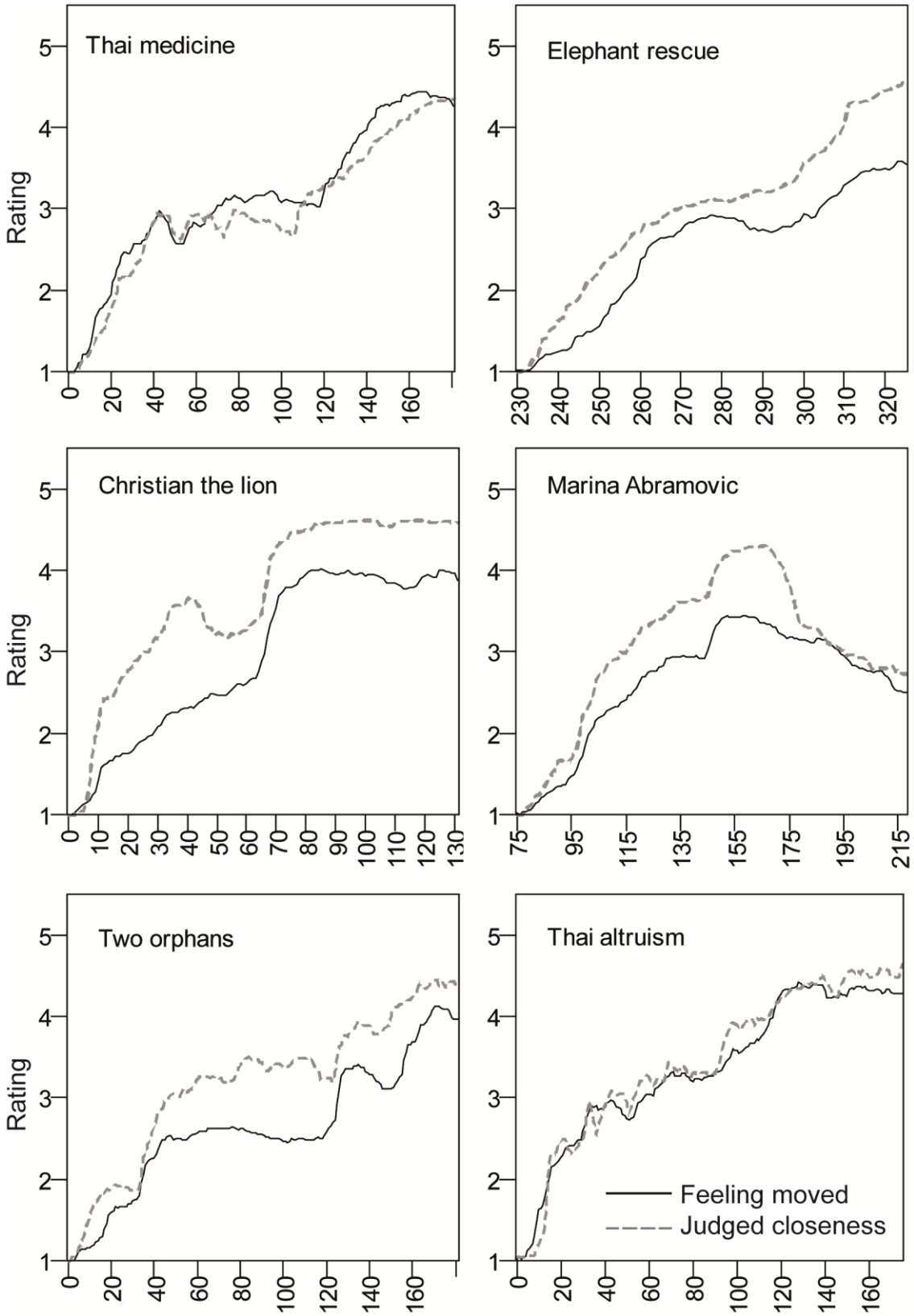
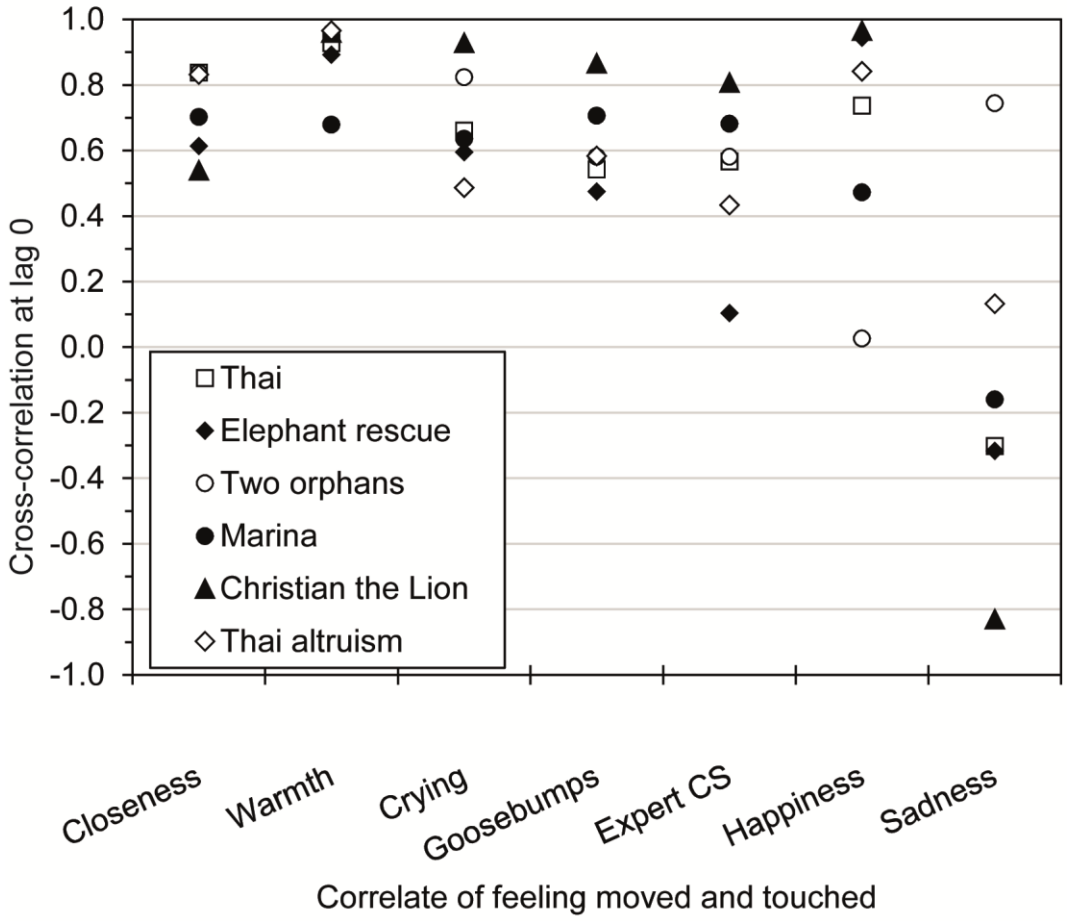

Thai medicine
Elephant rescue
Christian the lion
Marina Abramovic
Two orphans
Thai altruism
Rating
Feeling moved
Judged closeness

Figure 2


1.0
0.8
0.6
0.4
0.2
0.0
-0.2
-0.4
-0.6
-0.8
-1.0
Cross-correlation at lag 0
Thai
Elephant rescue
Two orphans
Marina
Christian the Lion
Thai altruism
Closeness
Warmth
Crying
Goosebumps
Expert CS
Happiness
Sadness
Correlate of feeling moved and touched

Supplementary Materials

Supplementary Information Text: Notes on Methodology

Detrending. Let us illustrate the effect of de-trending with a linear trend only. Assume two time series of one-minute duration with values for each second. The first series shows a linear increase in the first thirty seconds and remains constant for the remaining time. The second series is low and constant for the first thirty seconds, and then linearly increases for the remaining time. Without removing the linear trend, the two series would cross-correlate positively. However, after regressing both time series on an index *t* counting the seconds and saving the residuals, those residuals cross-correlate negatively. The same principle operates when removing either the linear or the quadratic trend. In sum, after de-trending, two curves that both increase overall, but never at the same time, actually have a negative cross-correlation. Without de-trending, a cross correlation would be found if both curves simply increase overall, but at different points in time.

Cubic trends. Several of our time-series also showed significant cubic trends, but we chose not to remove them. Linear and quadratic trends can potentially be outcomes of measuring a successfully induced phenomenon by starting at the lowest value and having a scale with an upper limit, but cubic trends necessarily imply some change that is due to the time course of the phenomenon itself. We nevertheless explored whether removing the cubic trends would have resulted in different results, and found that it changed the results very little.

Confidence intervals of CCFs. The reported 95% CIs were obtained by transforming CCFs to Fisher's *z*s, adding and subtracting the *SE*s multiplied by 1.96 to obtain upper and lower CI boundary, and retransforming those. *N*s used to compute *SE*s were the length of the videos in seconds divided by 3 – that is, the number of temporal units across which the CCFs were computed.

Lagged cross-correlations. A high correlation at a non-zero lag means that one variable tends to change prior to the other. A detailed listing of CCF_0s between being moved or touched and the other variables, for each video, is provided in Table S2. In that table, we also report the highest cross-correlation from -4 to +4 lags (-/+12 seconds). We observed a few cross-correlations of being moved and touched at other

lags that were higher than those at lag 0, but there was no clear pattern, with the possible exception of goosebumps at lags of -1 or -2 (see Table S2). If one variable caused another one with a lag of 3 seconds or more, we would expect consistently stronger cross-correlations across a lag different from 0, but that is not what we found. The varying values at lags greater than 0 suggest instead that those specific higher cross-correlations are caused by idiosyncrasies of the individual movie clips.

Order. In the current analyses we do not control for how many videos a participant has seen before because our previous work has shown only small effects of having watched other moving videos right before (Seibt et al., 2016).

ARIMA. An alternative way to analyze these data would have been to use ARIMA (Autoregressive Integrated Moving Average) models, and in particular to pre-whiten the series by fitting ARIMA models and saving the residuals. Rather than saving residuals from a multiple regression with linear and quadratic terms (which is what we did), ARIMA models would use differencing (compute differences between consecutive intervals). Also, rather than averaging across three seconds (as we did), ARIMA models would have computed moving averages. We decided against using ARIMA models because the selection of the correct ARIMA model should depend on the observation of many repeated changes in cyclical data, with many cycles being observed. Instead, our data describe single emotional episodes of becoming moved for a given video, and each video is different. (For a similar argument, see Ruef & Levenson, 2007.)

Further analyses. Our method aimed for a strong foundation by using not just one single stimulus but six different ones (Judd, Westfall, & Kenny, 2012) and by collecting large cell sizes for each video and variable, across which we aggregated. We believe the results obtained from this strategy are persuasive, but it is quite possible that other analytical methods could shed even more light on the data. We refrained from using other methods because we are not convinced that the assumptions of these more sophisticated techniques are valid for our data, given the inherently dependent nature of time series data and our design. For instance, multi-level growth curve analyses build on multiple observations of variables on the same participants, and hence were not

appropriate for our data (for a good illustration, see Kret, Fischer, & De Dreu, 2015). However, we encourage re-analyses of the full data set, which we make available in accord with open data guidelines. The nature of our design allows the collection of other variables simply by adding new sets of participants, which can then be used directly to compute CCFs with our data. We are eager to have other labs replicate and extend our studies with the same and new stimuli, measures, samples, expert judgments, or codings.

Supplemental Materials References

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Table S1

Details of Linear and Quadratic Detrending of Each Variable on Each Video

					Removed terms		
Video	Length	Variable	*N*	ICC/ κ	Intercept (*SE*)	Linear *B* (*SE*)	Quadratic *B* (*SE*)
Thai medicine	181	Feeling moved	81	.99	1.55 (.06)	.021 (.002)	-2.69E-05 (9.00E-06)
		Closeness	66	.99	1.69 (.10)	.029 (.002)	-3.39E-05 (1.30E-05)
		Sadness	59	.97	1.29 (.10)	.046 (.002)	-2.37E-04 (1.30E-05)
		Happiness	52	.99	2.30 (.17)	-.024 (.004)	-2.09E-04 (2.30E-05)
		Goosebumps	50	.21	1.08 (.03)	.002 (.001)	-9.80E-06 (4.00E-06)
		Crying	62	.98	1.02 (.02)	.002 (4.74E-04)	-2.69E-05 (3.00E-06)
		Warm Chest	88	.99	1.29 (.04)	.007 (.001)	-5.56E-06 (5.00E-06)
		CS Expert	4	.79	2.14 (.20)	-.009 (.005)	1.31E-04 (2.80E-05)
Elephant	95	Feeling moved	76	.99	.88 (.06)	.05 (.003)	-2.47E-04 (2.90E-05)
rescue		Closeness	58	.99	1.39 (.09)	.066 (.004)	-1.72E-04 (4.60E-05)
		Sadness	46	.93	1.69 (.10)	-.005 (.005)	-7.00E-06 (4.70E-05)
		Happiness	72	.99	.91 (.07)	.084 (.003)	-.001 (3.60E-05)
		Goosebumps	53	.21	1.00 (.03)	.01 (.002)	-2.77E-05 (1.60E-05)
		Crying	51	.97	.93 (.02)	.006 (.001)	-4.88E-05 (1.10E-05)
		Warm Chest	86	.99	1.01 (.03)	.03 (.002)	-1.39E-04 (1.70E-05)
		CS Expert	4	.79	2.80 (.23)	-.02 (.01)	4.43E-04 (1.13E-04)

(continued)

Table S1 (continued)

Video	Length	Variable	*N*	ICC/ κ	Removed terms: Intercept (*SE*)	Linear *B* (*SE*)	Quadratic *B* (*SE*)
Christian the lion	131	Feeling moved	75	.99	.85 (.06)	.05 (.002)	-1.74E-04 (1.60E-05)
		Closeness	57	.99	1.64 (.12)	.084 (.004)	-3.69E-04 (3.10E-05)
		Sadness	43	.89	1.15 (.05)	.022 (.002)	-1.75E-04 (1.40E-05)
		Happiness	39	.99	.92 (.05)	.06 (.002)	-1.99E-04 (1.40E-05)
		Goosebumps	58	.26	.86 (.04)	.02 (.001)	-9.60E-05 (9.00E-06)
		Crying	57	.98	.77 (.05)	.02 (.002)	-3.94E-05 (1.20E-05)
		Warm Chest	89	.99	.99 (.03)	.03 (.001)	-1.15E-04 (8.00E-06)
		CS Expert	3	.81	1.43 (.24)	.04 (.008)	-1.81E-04 (6.20E-05)
Marina Abramović	143	Feeling moved	74	.98	.69 (.03)	.057 (.001)	-3.15E-04 (6.00E-06)
		Closeness	59	.98	.47 (.09)	.118 (.003)	-.001 (1.80E-05)
		Sadness	35	.96	1.01 (.10)	.041 (.003)	-2.45E-04 (2.10E-05)
		Happiness	40	.96	1.23 (.06)	.047 (.002)	-2.60E-04 (1.30E-05)
		Goosebumps	55	.14	.94 (.02)	.015 (.001)	-9.98E-05 (5.00E-06)
		Crying	47	.94	.83 (.02)	.019 (.001)	-1.01E-04 (3.00E-06)
		Warm Chest	85	.98	.93 (.03)	.036 (.001)	-2.15E-04 (6.00E-06)
		CS Expert	4	.93	.31 (.14)	.099 (.005)	-.001 (3.10E-05)

(continued)

Table S1 (continued)

Video	Length	Variable	*N*	ICC/ κ	Removed terms: Intercept (*SE*)	Linear *B* (*SE*)	Quadratic *B* (*SE*)
Two orphans	181	Feeling moved	79	.99	1.33 (.06)	.015 (.002)	-6.51E-06 (9.00E-06)
		Closeness	61	.99	1.51 (.08)	.045 (.002)	-1.16E-04 (1.10E-05)
		Sadness	54	.97	1.52 (.10)	.024 (.003)	-9.51E-05 (1.30E-05)
		Happiness	40	.95	1.51 (.06)	-.002 (.002)	-6.36E-05 (9.00E-06)
		Goosebumps	48	.18	1.09 (.02)	-.001 (.001)	2.13E-05 (3.00E-06)
		Crying	53	.95	1.12 (.02)	-.002 (4.87E-04)	-3.43E-05 (3.00E-06)
		Warm Chest	86	.98	1.20 (.03)	.009 (.001)	-8.58E-06 (5.00E-06)
		CS Expert	4	.72	2.53 (.15)	-.01 (.004)	1.17E-04 (2.10E-05)
Thai altruism	176	Feeling moved	104	.99	1.43 (.05)	.032 (.001)	-8.82E-05 (7.00E-06)
		Closeness	67	.99	1.53 (.08)	.053 (.002)	-1.48E-04 (1.10E-05)
		Sadness	55	.85	1.14 (.04)	.014 (.001)	-7.21E-05 (5.00E-06)
		Happiness	61	.98	2.13 (.07)	.026 (.002)	-7.82E-05 (1.00E-05)
		Goosebumps	57	.15	.99 (.03)	.005 (.001)	-1.24E-05 (4.00E-06)
		Crying	58	.98	1.02 (.03)	-.002 (.001)	-5.39E-05 (5.00E-06)
		Warm Chest	87	.98	1.25 (.03)	.015 (.001)	-4.05E-05 (4.00E-05)
		CS Expert	4	.71	2.06 (.16)	.018 (.004)	-7.42E-05 (2.30E-05)

Note. Length is duration of video clip in seconds. *N* reports number of aggregated participants reporting this variable for this video. Intraclass correlation (ICCs) are reported for all variables except the dichotomously measured goosebumps, for which Fleiss' kappa (κ) was computed. Variables use the following scales: *Feeling moved or touched*: 1 = not moved at all, 2 = somewhat moved, 3 = moved, 4 = very moved, 5 = extremely moved; *goosebumps*: 1 = no goosebumps, 2 = goosebumps; *crying:* 1 = no moist eyes/tears, 2 = moist eyes, 3 = tears; *experienced warmth in the chest or another part of the body*: 1 = no warmth, 2 = some warmth, 3 = a lot of warmth; *closeness:* IOS scale 1 – 7 (Aron, Aron, & Smollan, 1992).

Table S2

Cross-Correlations (*CCF*), *SE*s, and CIs between Feeling Moved and seven other variables, all linearly and quadratically detrended: Closeness, Sadness, Happiness, Goosebumps, Crying, and Warm Chest, and expert-rated communal sharing (CS).

		Cross-correlations at lag 0		Highest cross-correlations		
Video	Correlate of feeling moved	*CCF*	95% CI	Lag	*CCF*	*SE*
Thai medicine (SE_0 = .128)	Closeness	.837*	[.74, .90]			
	Sadness	-.303*	[-.52, -.06]	-4	-.436*	.132
	Happiness	.736*	[.59, .83]			
	Goosebumps	.541*	[.33, .70]	-1	.609*	.129
	Crying	.660*	[.49, .78]			
	Warm Chest	.927*	[.88, .96]			
	CS Expert	.566*	[.37, .71]	1	.596*	.129
Elephant rescue (SE_0 = .174)	Closeness	.613*	[.34, .79]	2	.787*	.180
	Sadness	-.317	[-.60, .04]	2	-.447*	.180
	Happiness	.943*	[.89, .97]			
	Goosebumps	.474*	[.15, .71]	-2	.747*	.180
	Crying	.594*	[.31, .78]	1	.617*	.177
	Warm Chest	.892*	[.79, .95]	-1	.934*	.177
	CS Expert	.103	[-.23, .42]	4	.572*	.186

(continued)

Table S2 (continued)

Video	Correlate of feeling moved	Cross-correlations at lag 0		Highest cross-correlations		
		CCF	95% CI	Lag	*CCF*	*SE*
Christian the Lion (SE_0 = .151)	Closeness	.538*	[.29, .72]			
	Sadness	-.831*	[-.91, -.71]			
	Happiness	.965*	[.94, .98]			
	Goosebumps	.865*	[.76, .93]	-1	.906*	.152
	Crying	.928*	[.87, .96]			
	Warm Chest	.956*	[.92, .98]			
	CS Expert	.806*	[.67, .89]	1	.815*	.152
Marina Abramović (SE_0 = .144)	Closeness	.702*	[.52, .82]			
	Sadness	-.160	[-.43, .13]	4	-.438*	.151
	Happiness	.472*	[.21, .67]			
	Goosebumps	.706*	[.53, .83]			
	Crying	.635*	[.43, .78]			
	Warm Chest	.678*	[.49, .81]			
	CS Expert	.681*	[.50, .81]			
Two orphans (SE_0 = .128)	Closeness	.837*	[.74, .90]			
	Sadness	.744*	[.60, .84]			
	Happiness	.026	[-.23, .28]	-3	-.092	.131
	Goosebumps	.581*	[.38, .73]	-2	.686*	.130
	Crying	.823*	[.72, .89]			
	Warm Chest	.959*	[.93, .98]			
	CS Expert	.581*	[.39, .72]	1	618*	.129

(continued)

Table S2 (continued)

Video	Correlate of feeling moved	Cross-correlations at lag 0		Highest cross-correlations		
		CCF	95% CI	Lag	*CCF*	*SE*
Thai altruism	Closeness	.831*	[.73, .90]			
(SE_0 = .130)	Sadness	.132	[-.13, .38]	-2	.188	.132
	Happiness	.841*	[.74, .90]			
	Goosebumps	.582*	[.38, .73]			
	Crying	.486*	[.26, .66]	2	.575*	.132
	Warm Chest	.965*	[.94, .98]			
	CS Expert	.433*	[.21, .62]			

Note. Left columns shows CCF and their CIs at lag 0 for each correlating variable of each video; if CCF at lag 0 was not the highest, the right columns show largest CCF within +/- 4 lags (and the corresponding lag).

* Cross-correlations with 95% CIs not including 0 are considered as significant.

Table S3

Cross-correlations (CCF), *SE*s, and CIs of crying with closeness, sadness and happiness, all linearly and quadratically detrended.

		Cross-correlations at lag 0		Highest cross-correlations		
Video	Correlate of Crying	*CCF*	95% CI	lag	*CCF*	*SE*
Thai	Closeness	.371*	[.13, .57]	1	.378*	.129
medicine	Sadness	-.256	[-.48, .00]	-4	-.329*	.132
(SE_0 = .128)	Happiness	.474*	[.25, .65]	-1	.482*	.129
Elephant	Closeness	.126	[-.23, .45]	-4	-.304	.186
rescue	Sadness	-.463*	[-.70, -.14]			
(SE_0 = .174)	Happiness	.529*	[.22, .74]	-1	.595*	.177
Christian the	Closeness	.318*	[.02, .56]	-3	.411	.156
Lion	Sadness	-.846*	[-.91, -.73]			
(SE_0 = .151)	Happiness	.923*	[.86, .96]			
Marina	Closeness	.414*	[.14, .63]			
Abramović	Sadness	-.130	[-.40, .16]	4	-.754*	.151
(SE_0 = .144)	Happiness	.104	[-.19, .38]	4	.452*	.151
Two orphans	Closeness	.623*	[.44, .76]			
(SE_0 = .128)	Sadness	.819*	[.71, .89]	-1	.832*	.129
	Happiness	-.313*	[-.53, -.06]	-3	-.405*	.131
Thai altruism	Closeness	.259	[.00, .48]	1	.286*	.131
(SE_0 = .130)	Sadness	-.133	[-.38, .13]	-3	-.140	.134
	Happiness	.334*	[.08, .55]			

Note. Left columns shows CCF and their CIs at lag 0 for each correlating variable of each video; if CCF at lag 0 was not the highest, the right columns show largest CCF within +/- 4 lags (and the corresponding lag). SE_0 = Standard Error at lag 0.

* Cross-correlations with 95% CIs not including 0 are considered as significant.

Figure S1

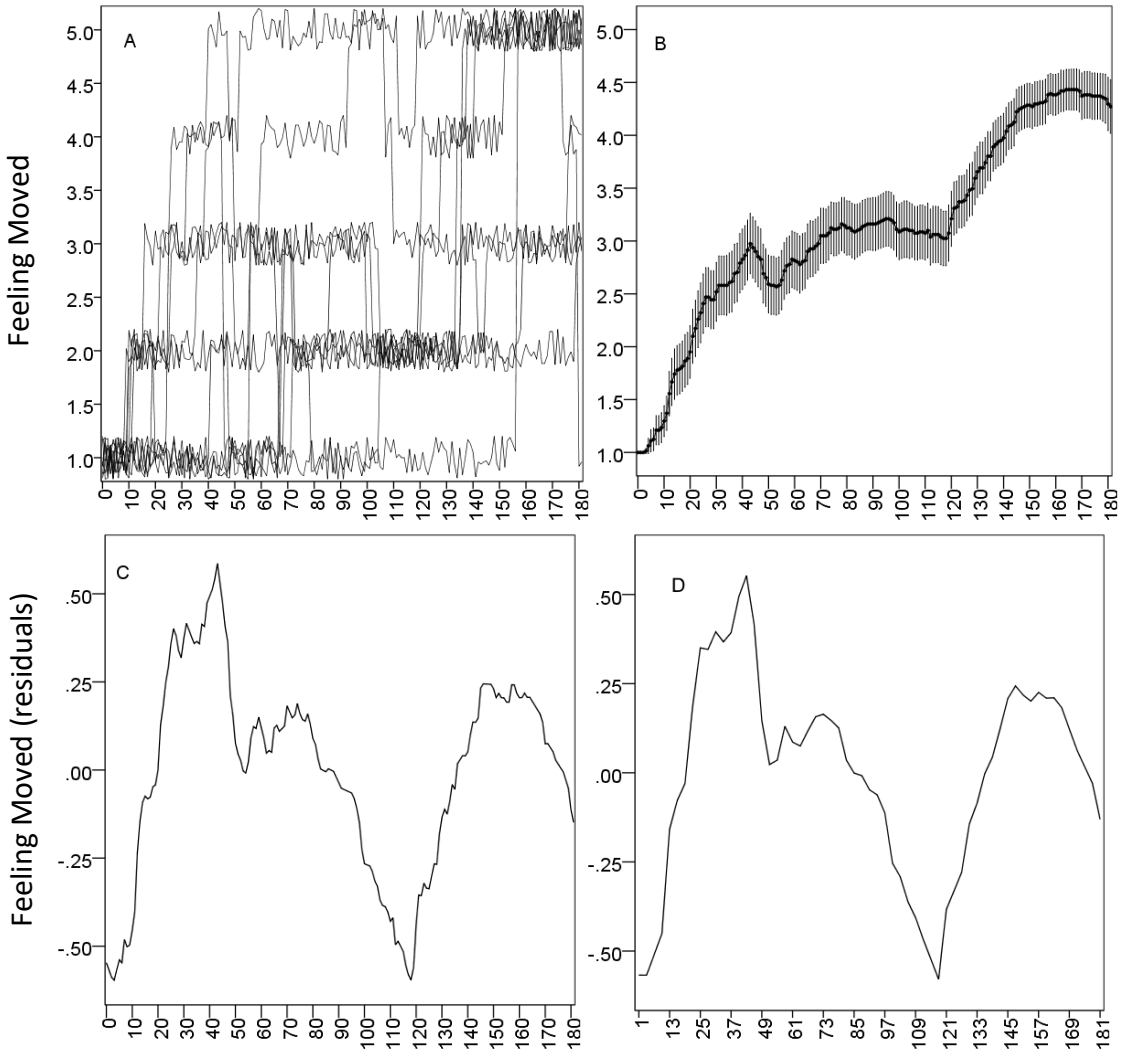


Figure S1. Example for data preparation process for the clip "Thai medicine" and ratings of "feeling moved or touched" (on Y) depending on time (on X, in seconds). A: Individual time series from ten of the participants. B: Average ratings of being "feeling or touched" from all participants (solid line) and 95% CIs for each second. C: De-trended values: unstandardized residuals after removal of linear and quadratic effects. D: Curve smoothed by aggregating into averages of 3 second segments (here, the horizontal axis shows midpoint of each segment). Original scale ranged from 1 to 5. *Note:* To make inset A legible, it shows only ten randomly chosen participants, and each value was jittered with an offset varying randomly between -0.2 and +0.2.

Expert ratings task

While you watch the videos, we want you to judge the intensity of any communal relationship(s) between the characters in each video at each moment. You can draw on whatever aspects of the interaction are informative, including, for example, a resource distribution, the conformation system of consubstantial assimilation, or what the characters say.

Please rate only communal sharing. Thus if you assign a low score, it can be either because the characters are relating according to a different model, or that they are not relating at all (null or asocial interaction)

The intensity of any communal sharing relationship may change as the story progresses, and we are asking you to rate the intensity at each moment, based on what you see and infer at that point.

WHEN THE DEGREE OF COMMUNAL SHARING CHANGES, PLEASE IMMEDIATELY CHANGE THE RATING.

Right now, how intense is the Communal Sharing relationship, if any between the characters?

1 (No CS at all) … 5 (Very Intense CS)

Informed Consent:

Background and purpose

This is a request for you to participate in a research study that intends to measure emotions and feelings that arise while we consume media. We investigate video clips on Youtube or Facebook, audio clips in podcasts, stories in blogs and books, and other media. The goal is to better understand what makes us feel emotions, which emotions exists, and how they differ between cultures.

This research is conducted by a team at the University of Oslo. You can contact Thomas Schubert, thomas.schubert@psykologi.uio.no, for questions and comments.

What does the study entail?

During the study, you will be shown brief videoclips, brief audioclips, images such as comic strips, or read texts. Each of these will take about two minutes. All of them will be taken from common websites such as Youtube, Facebook, Buzzfeed, etc., and thus be similar to what you experience while using the Web. We will then ask you about your thoughts and feelings about what you saw, heard or read. In addition, we will ask you a couple of questions about yourself. If you get paid for participation in this study by Amazon MTurk, we ask you to watch at least 6 clips, and to finish the questionnaires. You will not be paid if you do not proceed until the end of the questionnaire. You can however leave

out questions that you do not wish to answer.

If you participate as part of a mandatory research experience, you can exit the study at any point, and still get the participation credits.

Potential advantages and disadvantages

The clips and texts that you are going to see are selected because they cause emotional reactions. We believe that you will enjoy watching most of this material, and that the questions will be interesting for you to reflect on the experience. Some of them might cause some sadness, among other emotions. If you recently suffered a traumatic experience, you may feel that you do not want to finish the study. However, none of the stimuli features any graphic violence, disturbing scenes, or material of sexual nature.

What will happen to the information about you?

The data that are registered about you will only be used in accordance with the purpose of the study as described above. All the data will be processed without name, ID number or other directly recognisable type of information. It will not be possible to identify you in the results of the study when these are published.

Voluntary participation

Participation in the study is voluntary. You can withdraw your consent to participate in the study at any time and without stating any particular reason.

This will not have any consequences for you. If you wish to participate, indicate your consent below before proceeding. If you agree to participate at this time, you may later on withdraw your consent without your treatment being affected in any way. If you later on wish to withdraw your consent or have questions concerning the study, you may contact thomas.schubert@psykologi.uio.no.

Please note that you need to be 18 years or older in order to participate!

Privacy

Information that is retained about you are only the answer you give in the questionnaire. No identifiable information, such as IP, is saved.

If you participate via MTurk, a temporary random code number links your participation here to the MTurk HIT. That number is deleted three days after your participation.

If you participate as part of a research experience of a university course, a temporary random code number links your participation here to the management software of your university. That number is deleted immediately after you finish the questionnaire and were linked back to the management software.

Releasing material and data to other parties

Your answers are merged with the answers of the other participants in a large database; your answers can not be traced back to you. This database might be shared with other researchers, which is recommended best practice in any psychological research.

Right to access and right to delete your data

If you agree to participate in the study, you are entitled to have access to what information is registered about you. You are further entitled to correct any mistakes in the information we have registered. If you withdraw from the study, you are entitled to demand that the collected data are deleted, unless the data have already been incorporated in analyses or used in scientific publications.

Funding and the role of University of Oslo

The study is funded by research grants from the Department of Psychology of the University of Oslo, Norway.

Information about the outcome of the study

You are entitled to receive information about the outcome/result of the study. Please contact the research team to do so.

Instructions

(Exemplified by the Warmth Rating, all other instructions were similar):

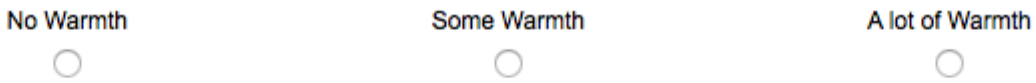
HERE IS WHAT WE WANT YOU TO DO:

While you watch the videos, WE WANT TO KNOW ABOUT YOUR EMOTIONS AND EXPERIENCES.

In particular, we want to know WHETHER YOU FEEL WARMTH IN YOUR CHEST OR SOME OTHER PART OF YOUR BODY at any moment throughout the video.

Of course, this experience will change as the story of the film progresses. While you watch the video, please indicate throughout how strong the feeling of warmth is. WHEN THE FEELING CHANGES, PLEASE IMMEDIATELY CHANGE THE RATING.

If you feel that something in the video makes you feel warmth, please indicate it right away. You will do this on a scale like this:



If you feel warmth in your chest or some other part, or if the feeling goes away, please indicate it immediately by:

clicking with your mouse on one of the choices or pressing the respective **number keys on your keyboard** (1-3) or pressing the **left or right cursor** keys

on your keyboard for moving up and down.

It is up to you which method do you use, just do what is easiest for you.

Please notice that from time to time an advertisement could pop up (this is incorporated by youtube not by us). If you close this pop up window please use the mouse (at least once) afterwards for ratings since pressing a key could interfere with video playback.

So, for instance, if something happens after half of the movie that makes you somewhat feel warmth, you click or press a button to say "some warmth". After that, something else happens, the feelings goes away, and you indicate that by clicking a lower number on the scale. And so on until the movie ends.

NOTE: If the video does not load just reload the page once this should fix the issue.

PLEASE PROCEED WHEN YOU HAVE READ THIS CAREFULLY.

Measures

Moved:

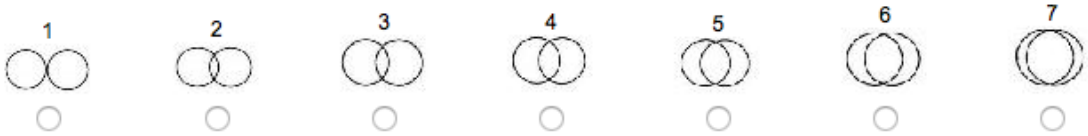
1 = not moved at all | 2 = somewhat moved | 3 = moved | 4 = very moved | 5 = extremely moved

While you watch the video, please indicate how much you **feel moved or touched RIGHT NOW**

- click with your mouse on one of the choices or
- press the respective number keys on your keyboard (1-5) or
- press the left or right cursor keys on your keyboard for moving up and down

Important: If pressing the respective keys does not work, please use the mouse once to select a response!

Closeness:



While you watch the video, please indicate **how close you think the people in the video are**

- click with your mouse on one of the choices or
- press the respective number keys on your keyboard (1-7) or
- press the left or right cursor keys on your keyboard for moving up and down

Important: If pressing the respective keys does not work, please use the mouse once to select a response!

Happiness:

1 = not happy at all | 2 = somewhat happy | 3 = happy | 4 = very happy | 5 = extremely happy

While you watch the video, please indicate how **HAPPY YOU FEEL RIGHT NOW**

- click with your mouse on one of the choices or
- press the respective number keys on your keyboard (1-5) or
- press the left or right cursor keys on your keyboard for moving up and down

Important: If pressing the respective keys does not work, please use the mouse once to select a response!

Sadness:

1 = not sad at all ○ 2 = somewhat sad ○ 3 = sad ○ 4 = very sad ○ 5 = extremely sad ○

While you watch the video, please indicate how **SAD YOU FEEL RIGHT NOW**

- click with your mouse on one of the choices or
- press the respective number keys on your keyboard (1-5) or
- press the left or right cursor keys on your keyboard for moving up and down

Important: If pressing the respective keys does not work, please use the mouse once to select a response!

Crying:

1 = no moist eyes/tears at all ◉ 2 = moist eyes ○ 3 = tears ○

While you watch the video, please indicate whether you **EXPERIENCE MOIST EYES OR TEARS**.

- click with your mouse on one of the choices or
- press the respective number keys on your keyboard (1-3) or
- press the left or right cursor keys on your keyboard for moving up and down

Important: If pressing the respective keys does not work, please use the mouse once to select a response!

Goosebumps:

1 = no goosebumps ◉ 2 = goosebumps ○

While you watch the video, please indicate if you EXPERIENCE GOOSE BUMPS

- click with your mouse on one of the choices or
- press the respective number keys on your keyboard (1-2) or
- press the left or right cursor keys on your keyboard for moving up and down

Important: If pressing the respective keys does not work, please use the mouse once to select a response!

Warmth:

No Warmth	Some Warmth	A lot of Warmth
○	○	○

While you watch the video, please indicate whether you **EXPERIENCE A WARM FEELING IN THE CHEST OR ANOTHER PART OF YOUR BODY**. click with your mouse on one of the choices or press the respective number keys on your keyboard (1-3) or press the left or right cursor keys on your keyboard for moving up and down

Important: If pressing the respective keys does not work, please use the mouse once to select a response!

NOTE: If the video does not load just reload the page once this should fix the issue.

Stimulus Material

"Thai." A young boy gets bailed out by a cook after stealing medicine for his sick mother. Years later the boy, now a doctor, reciprocates by paying a large bill for medical treatment.

https://www.dropbox.com/s/fqrefqmyysij5dr/STUDY%202%20Video%201%2C%20Poor%20boy%20gets%20food%20-%20becomes%20doctor.mp4?dl=0

'Elephant Rescue'. A baby elephant is saved by a group of Rangers from a well it fell into, reunifies with its mother.

https://www.dropbox.com/s/9ed4bf0733rlcnw/STUDY%201%20Touching%20Footage%20Of%20Elephants%20_Saying%20Goodbye_%20To%20Dead%20Young%20-%20YouTube%20WE%20USED%20SEcommunal sharing%203%20-%2060.mp4

'Two Orphans'. Two children from an orphanage embark on a journey to "visit" the mother of one of them. The bond over her grave.

https://www.dropbox.com/s/f5sjlnwhur1epo9/STUDY%202%20Video%205%2C%20Two%20orphans.mp4?dl=0

"Marina". Marina Abramovic is joined by her former partner Ulay during her performance at MOMA. She starts to weep and, breaking her rules, reaches out and touches him.

https://www.dropbox.com/s/cppgue7txqq1mhl/STUDY%203%20PT%20Marina%20Abramovi%C4%87%20e%20Ulay%20-%20MoMA%202010%20-%20YouTube%20SECS%2075%20-%20218.mp4?dl=0

‘Christian the Lion’. Two men buy a lion cub and raise it in their backyard, however when the lion, named Christian, becomes too big they try to integrate him into a herd in Africa. After some years they want to see him again in the wilderness. Although being told that he will not recognize them, they embark on the journey and are heartwarmingly welcomed by Christian.

https://www.dropbox.com/s/48bvs73exopfg56/Study%203PT%20Christian%20the%20lion%20-%20YouTube%20%20WE%20USED%20SECS%200%20-%20131.mp4?dl=0

‘Thai Altruism’. Portrays a day in the life of a man who perform good deeds by helping the people around him.

https://www.dropbox.com/s/zx0kt4s6c6caq8l/Unsung%20Hero_%20%28Official%20HD%29%20_%20TVC%20Thai%20Life%20Insurance%202014.mp4?dl=0