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Too Cute for Words:
Cuteness Evokes the Heartwarming Emotion of Kama Muta

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15 Word count: 10 474 (if "accept all changes")

16 1   Abstract (3 3108 of 350 max)

17 A configuration of infantile attributes including a large head, large eyes,
18 with a small nose and mouth low on the head comprise the visual baby
19 schema or Kindchenschema that English speakers call "cute." In contrast
20 to the stimulus gestalt that evokes it, the evoked emotional response to
21 cuteness has been little studied, perhaps because the emotion has no
22 specific name in English, Norwegian, or German. We hypothesize that
23 cuteness typically evokes kama muta, a social-relational emotion that in
24 other contexts is often labeled in English as being moved or touched,
25 heartwarming, nostalgia, patriotic feeling, being touched by the Spirit, the
26 feels, etcetera. What evokes kama muta is sudden intensification of a
27 communal sharing (CS) relationship, either communal sharing CS between
28 the person and another, or communal sharing CS between observed
29 others. In accord with kama muta theory, we hypothesize that the a kama
30 muta response to cuteness results from a sudden feeling of communal
31 sharing CS with the cute target. In colloquial terms, the perceiver adores
32 the cute kittens and their heart goes out to them. When a person
33 perceives cute targets interacting affectionately - that is, intensifying
34 communal sharing CS between them - this should strengthen the a kama
35 muta response. We experimentally investigated these predictions in two
36 studies ($N = 356$). Study 1 revealed that videos of cute targets evoked

37significantly more kama muta than videos of targets that were not
38particularly cute. Study 2, pre-registered, found that, as hypothesized,
39when cute targets interacted affectionately they evoked more kama muta
40and were humanized more than when they were not interacting. We
41measured the level of kama muta by self-reports of ~~bodily~~ sensations and
42signs and of feelings labelled *heartwarming, being moved,* and *being*
43*touched*. Participants' ratings of kama muta were positively correlated with
44reported cuteness. In addition, as in our previous research on kama muta
45elicited by other types of stimuli, trait empathic concern predicted kama
46muta responses and perceived cuteness. The studies thus provide first
47evidence that cute stimuli evoke the heartwarming emotion of kama muta.

48 **2   Introduction**

49   *Cuteness overload: An overload of cuteness; when*
50   *something or someone is so super cute that there is no*
51   *word for it.* (Urban Dictionary, 2008)

52   *Cute attack: A sensational response incited by the*
53   *witnessing of something cute, precious, fuzzy or otherwise*
54   *snuggly. Symptoms include chills traveling up the spine and*
55   *through the fingertips, impulsive smiling and jerking of the*
56   *limbs. Severe cases of cute attacks can cause high-pitched*
57   *squeals and temporary spasms of the entire nervous*
58   *system, forcing its victim to crumble helplessly to the*
59   *ground.* (Urban Dictionary, 2009)

60 Seeing something cute tends to evoke an emotion – an emotion with no
61 name in English, German, or Norwegian, although others, such as the
62 Uralic languages, do name it~~this emotion~~: *elérzékenyült* in Hungarian,
63 *heldinud* in Estonian, *heltyä* in Finnish[1].~~it has a definite name in Hungarian,~~
64 ~~Finnish, Estonian, and Telugu~~ ~~The~~ An emotional response to cuteness is
65 widely recognized (if not named) by marketing professionals and utilized
66 in commercial and charity advertising (Buckley, 2016; Duffy and Burton,
67 2000; Nittono, 2016; Nittono et al., 2012), environmental campaigns
68 (Huddy and Gunnthorsdottir, 2000; Ruanguttamanun, 2014), and product
69 design (Nenkov and Scott, 2014b). Additionally, the Internet is filled with
70 user-generated content of cute babies and animals that are evidently
71 posted, viewed, shared, and liked because they evoke this emotion.[2] There
72 are people whose job it is to identify cute web content (Baron, 2014;
73 Labato and Meese, 2014). Moreover, ~~the~~ a positive affective response to
74 cuteness is apparent in responses to the International Affective Picture
75 System (IAPS), widely used in emotion research (Lang et al., 1997); the
76 seven images rated highest in positive valence are all images of cute
77 animals or human babies.

78 Cuteness is said to be one of the most fundamental influences on human
79 behavior (Kringelbach et al., 2016; see also Dale 2016). Although labels for
80 it have been offered, such as ~~the~~ "cuteness response" (Sherman and
81 Haidt, 2011), "cute-affect", "aww", or "cute-emotion"(Buckley, 2016), the
82 emotion that cuteness evokes has yet to be well conceptualized or
83 experimentally characterized. The current research aims to ~~identify~~ test
84 the hypothesis that kama muta (Sanskrit for "moved by love"; Fiske et al.,
85 2017a, 2017c) is ~~an~~~~one~~ a particular emotion that people commonly

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1 [1] Information gathered from linguistic data ~~studies~~~~fieldwork~~compiled by ~~Professor Alan~~
2 ~~Page~~ Fiske (2019).

3 [2] See for example: https://www.youtube.com/watch?v=D6r9cst8OMU;
4 https://www.youtube.com/watch?v=PjmlmyI56-k. A keyword search among the 1.509
5 comments to the first video (as of Sept. 3, 2018) shows 365 mentions of either "cute",
6 "sweet" or "adorable" and only 1 of either "moved" or "touched" used as an emotional
7 term, indicating that English speakers tend to spontaneously label the object of their
8 cuteness response but not the response itself.

experience in response to cute animals. ~~what emotion people typically~~
~~experience in response to cute animals, hypothesizing that the answer is~~
~~kama muta~~ ~~(Sanskrit for "moved by love"; Fiske et al., 2017a, 2017c).~~

2.1 What cuteness is, and what emotion it evokes

Konrad Lorenz (1943) described a configuration of infantile physical characteristics that he termed *Kindchenschema,* 'baby schema'(see also Glocker et al., 2009).[3] A long line of psychological studies shows that when English speakers perceive beings that display such characteristics they label them *cute* (for example Gross, 1997; Pittenger, 1990; Volk et al., 2007). Stimuli such as human and animal infants draw attention, and people look at them longer than at less cute beings (Bellfield et al., 2011; Borgi et al., 2014; Golle et al., 2013; Hildebrandt and Fitzgerald, 1978, 1981; Little, 2012). Even 3 year-old children look longer at pictures of children with infantile features (Borgi et al., 2014).

Attentiveness to this configuration presumably is adaptive because it motivates ~~tender caretaking, empathy for, and protection~~ responsiveness to the needs of one's own ~~vulnerable, needy~~ offspring, and, in a few species, other infant close kin (Bradshaw and Paul, 2010; Leitão and Castelo-Branco, 2010; Lorenz, 1943; Sherman and Haidt, 2011)~~)~~. The needs of human infants are many and they depend on adults to fulfill these needs for an extraordinary long time. Thus, caretaking behavior can take many forms: for example hugging, feeding, playing, teaching, protecting, speaking, singing, looking, or smiling. T~~his explains why t~~he Kindchenschema configuration thus motivates caretaking in a broad sense, which has been repeatedly found (Glocker et al., 2009; Nittono et al., 2012; Sherman et al., 2013; Volk et al., 2007). **For example, Volk et al.** (2007) found that cuteness predicts willingness to adopt infants, while both Sherman et al. (2013) and Nittono et al. (2012) demonstrated that cuteness can increase carefulness (a proxy for caregiving behavior).

Historical changes in the design of children's toys and cartoon characters reflect the attractiveness of the *Kindchenschema*. Over a period of 80 years, the design of Disney's Mickey Mouse and the traditional stuffed teddy bear have each developed to fit Kindchenschema (Gould, 1980; Morris et al., 1995). Children between 6 and 8 years prefer teddy bears with such traits and display more caregiving behavior towards stuffed animals designed accordingly (Morris et al., 1995). Adults also prefer the Kindchenschema in human babies (Sanefuji, Ohgami ~~et al.~~, & Hashiya, 200~~6~~7). Nittono (2016) introduced a conceptualization of cuteness and ~~the~~ a response to it with reference to the Japanese word 'kawaii.' In Japan, *kawaii* is culturally salient, highly elaborated, and highly motivating; women, in particular, generally aim to appear and act *kawaii,* and display many *kawaii* accoutrements and household items. Nittono argues that the

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[3] Recent research suggests that infantile sounds and smells are also components of the *Kindchenschema* (see Kringelbach et al., 2016). The current paper, however, uses the term "cuteness" only in reference to the visual characteristics of the Lorenzian Kindchenschema, simply because our experimental stimuli were purely visual.

128emotion evoked by kawaii is distinguished by moderate arousal, strong
129approach motivation, and "social orientation".

130However, to our knowledge, the only previous experimental research on
131the specifically emotional responses to cuteness is a set of studies by
132Aragón, Clark, Dyer, and Bargh (2015) and Aragón and Bargh (2018), who
133found that people display "dimorphous" emotional expressions to cute
134stimuli. That is, they found that cute stimuli evoked both care tendencies
135and behaviors that look like aggression, such as wishing to pinch, squeeze
136or bite the target, and clenching of hands and teeth.

137~~Facial cuteness (Keating et al., 2003) and facial~~ *vulnerability* ~~(van de Ven~~
138~~et al., 2016) evoke similar helping-related behaviors. The Stereotype~~
139~~Content Model (SCM; Cuddy et al., 2007; Fiske, 2015) makes a conceptual~~
140~~connection between perceived vulnerability and care, proposing that~~
141~~perceived target warmth and low competence result in pity and sympathy~~
142~~that in turn elicits helping and protective behavior (Fiske, 2012). Signs of~~
143~~vulnerability—being easily harmed by external forces—include young age,~~
144~~small size, small weight, signs of fragility, and weakness, whose effects~~
145~~are enhanced by environmental cues of imminent danger (Dijker, 2014).~~
146~~Concomitantly, people tend to associate the Kindchenschema with~~
147~~fragility, physical weakness, naiveté, warmth, and kindness (Berry and~~
148~~McArthur, 1985).~~

149The effect of cuteness on caretaking may be mediated by a certain kind of
150empathy, as this trait is thought to dispose one to altruistic behaviors such
151as caretaking (Batson et al., 2005). Batson et al. (2005) asked
152undergraduate participants to either read about a vulnerable protagonist
153(child, dog, or puppy) recovering from a broken leg, or read about a less
154vulnerable and less cute recovering adult. Cute vulnerable targets evoked
155stronger self-ratings of being *sympathetic, compassionate, tender,*
156*softhearted, warm*, and *moved*. These adjectives are thought to reflect the
157*empathic concern* state that is typically evoked by *responses to others in*
158*need* (Batson et al., 1987). This state has been hypothesized to reflect ~~the~~
159a parental caretaking response to vulnerable human babies (Niezink et al.,
1602012). Concordant with this hypothesis, Lishner, Oceja, Stocks, and Zaspel
161(2008) found that participants felt more empathic concern for human
162Kindchenschema faces and voices compared to adult counterparts.
163Similarly, Levin, Arluke, and Irvine (2017) demonstrated that reports of
164abuse of a child, puppy, or adult dog evoked more empathic concern and
165distress than reports of the same suffering of an adult human. Zickfeld,
166Kunst, & Hohle (2017a) found the same Kindchenschema effect on
167empathic concern for animal faces.

168In sum, cute animals have facial features of the *Kindchenschema*, an
169evolved elicitor of attention, liking, approach, compassion, motivation to
170care for and protect one's own infants and those of close kin. Humans thus
171seem to respond to cute animals in a similar way as to human infants,
172presumably triggered by the Kindchenschema. In addition, cute animals
173are perceived as vulnerable and needy, and people high in trait empathic

174concern seem to respond more strongly to cuteness than people low in
175empathic concern. Less consensus has been reached, however, about the
176emotional state evoked by perceiving cuteness. According to one theory,
177cuteness may evoke a specific positive emotion, kawaii, which motivates
178approaching others, while another approach suggests that cuteness tends
179to evoke a dimorphous response, which motivates both care and behaviors
180that look like aggression. We propose that cuteness evokes a ~~very~~ specific
181positive emotion, kama muta, which motivates devotion to communal
182relations.

183

184**2.2 Kama muta**

185Kama muta theory postulates that a specific emotion, kama muta – which
186English speakers may label *feeling moved* or *touched* – occurs when a
187communal sharing ~~(CS)~~ relationship suddenly intensifies (Fiske et al.,
1882017a; Fiske et al., 2017c; see Zickfeld et al., 2018b for a review of
189research based on the vernacular lexeme, *moved*). Kama muta is a
190positive emotion that people actively seek out, like to evoke in other
191people, and want to experience together with others. <u>Like other emotions,</u>
192<u>it varies in intensity.</u> ~~Kama muta motivates compassion, care, and~~
193~~solidarity, including, we suggest, the motivation to care for and protect~~
194~~cute babies and animals. Indeed, precisely because of this, we speculate~~
195~~that the phylogenetic source of kama muta is maternal bonding. Mothers~~
196~~must instantly form intense CS bonds to offspring at the moment of birth.~~
197~~In the small percent of species that form pair bonds and the smaller~~
198~~percentage in which siblings and other kin contribute to care of the infant,~~
199~~the father and those kin, too, must instantaneously form CS bonds with~~
200~~the infant. Thus we concur with McDougall who described the *tender*~~
201~~*emotion*, (one of the seven basic emotions) – something very much like~~
202~~kama muta – as an outgrowth of the of the human maternal instinct to~~
203~~care for their own babies, extended to an emotion experienced in a vast~~
204~~array of eliciting situations:~~

205~~In the human being, just as is the case in some degree with all the~~
206~~instinctive responses . . . there takes place a vast extension of the field of~~
207~~application of the maternal instinct. The similarity of various objects to the~~
208~~primary or natively given object, similarities which in many cases can only~~
209~~be operative for a highly developed mind, enables them to evoke tender~~
210~~emotion and its protective impulse directly. *(McDougall, 1919, pp. 57-58,*~~
211~~*see also 1923)*~~

212The kama muta construct is based on relational models theory (RMT;
213Fiske, 1991, 1992, 2004). RMT postulates that people use four
214fundamental, biologically innate models to understand, motivate,
215evaluate, and coordinate nearly all social relationships and social
216structures. These four models are communal sharing ~~(CS)~~, authority
217ranking, equality matching, and market pricing. <u>Communal sharing</u> ~~CS~~
218refers to a group or dyadic social relationship in which participants have a

219sense of equivalence; their interaction is characterized by trust, unity,
220closeness, and kindness. Examples of communal sharing CS include, but
221are not limited to, relationships between romantic partners and among
222family members. One can also form a communal relationship with
223nonhuman beings and with fictional characters (Fiske, 1991; Haslam,
2242017), such as a cute animal, a teddy bear, or Mickey Mouse.

225Kama muta theory (Fiske et al., 2017b, 2017c) posits that the emotion
226which English speakers may label *being moved, touched, heartwarming,*
227*tenderness, nostalgia, team pride, patriotism, rapture, being touched by*
228*the Spirit, the feels, feeling stirred,* and other terms occurs when a
229communal sharing relationship suddenly intensifies. This conceptualization
230has been confirmed by robust cross-correlational findings using the
231appraisal of increased social *closeness* as a measure of communal sharing
232(Schubert et al., 2016). In addition, a study with 3542 paricipants in 19
233nations responding in 15 languages using the KAMMUS scale to measure
234the appraisal of *suddenly increased communal sharing* along with other
235indicators of kama muta confirmed the substantial cross-correlation
236between these various indicators (Zickfeld et al., 2018a). For example, the
237correlation of the *appraisal* scale with the *label* scale (self-report of being
238*moved*, *touched*, and *heartwarming*) was *r* = .54 [95% CI: .49, .59].
239Additionally, the same study by Zickfeld et al. (2018a) also provided
240discriminant validity of the KAMMUS scale as a measure of kama muta,
241distinct froorm amusement, sadness, and awe of the KAMMUS scale.

242An increase in communal sharing CS can be recognized subjectively as an
243increase in trust and feelings of unity with an interaction partner or a
244relationship partner, or it can be observed. Cues indicating increased
245communal sharing CS include commensalism (eating together, feeding the
246other), touch, bodily proximity, synchrony and need-based giving (Fiske,
2472004; Schubert et al., 2008). The suddenness of the appraisal can occur
248either as a sharp temporal transition from no relational model or another
249relational model to communal sharingCS, or it can be against a backdrop
250of lack or loss of communal sharingCS.

251Kama muta theory further posits, and several studies show, that the
252emotion is characterized by certain physical sensations and signs. Such
253experiences typically involve a warm or other feeling in the center of the
254chest, goosebumps or chills, moist eyes or tears, a lump in the throat,
255feeling buoyant, being exhilarated, and sometimes also putting a hand to
256the chest, and saying something like "awww" or corresponding
257vocalizations in other languages (Zickfeld et al., 2018a). Being in a state of
258kama muta is theorized to motivate caring and compassion and to be a
259highly positive occurrence that people actively seek out and are eager to
260share with others with whom they have a communal sharing relationship
261(Fiske et al., 2017a, 2017c). Accordingly, it is characterized by research
262participants as a predominantly positive experience whose motivational
263outcomes include wanting to hug someone, to share the experience again
264and do so together with others (Zickfeld et al., 2018a). The kama muta
265construct has been conceptually and empirically distinguished from other,

266broader emotional valences such as happiness and sadness (Fiske et al.,
2672017a, 2017b, 2017c; Schubert et al., 2016; Seibt et al., 2017a, 2017b,
2682018; Zickfeld et al., 2017b).

269Cuteness can evoke feelings closely related to kama muta. When Batson,
270Lishner, Cook, and Sawyer (2005) asked participants to read about a cute,
271vulnerable protagonist (child, dog, or puppy), compared to narratives
272about less vulnerable and less cute targets, these targets evoked stronger
273ratings of *empathic concern* measured by self-reports of being
274sympathetic, compassionate, tender, softhearted, warm, and moved.
275Given the similar conceptualizations and operationalizations of empathic
276concern and kama muta, Zickfeld et al. (2017b) recently proposed that
277empathic concern is a trait that predicts how often and how intensely a
278person experiences kama muta, not only with regard to those who are in
279need, but across the whole spectrum of communal sharing~~CS~~-intensifying
280events. Accordingly, their meta-analysis of 16 studies with US and
281Norwegian participants found that the intensity of kama muta responses
282to video stimuli, as measured by ratings of *being moved or touched,*
283correlated .35 [95% CI: .29, .41] with trait empathic concern. In a
284subsequent 19-national study the overall correlation was .32 [95% CI: .
28528, .37] (Zickfeld et al., 2018a). Both studies show that trait empathic
286concern is consistently related to three sensations and signs that are,
287together, a reliable indication of kama muta: feelings of warmth in the
288chest, positive tears, and goosebumps or chills.

289What is the intensification of communal sharing when a person reads or
290hears about, sees or interacts with a cute, vulnerable animal? We propose
291that perceiving cute animals activates the communal sharing~~CS~~-model: a
292person feels affection, unity, closeness, and kindness towards that animal.
293Given that humans mainly relate in a communal sharing ~~CS~~ way with other
294humans, we hypothesize that experiencing increased communal sharing
295~~CS~~ and kama muta in response to cute animals goes along with
296humanizing them. Kama muta thus is evoked by increased communal
297sharing and reinforces devotion to that same communal sharing
298relationship, for instance through caring for and protecting the animal,
299feeding and touching it, and being attentive to its expression of needs. We
300characterized this constellation of feeling kama muta about one's own
301communal sharing ~~CS~~ intensification as first person kama muta (Seibt et
302al., 2017a), i.e., ~~by as~~ ~~having~~ one's 'heart going out' to the cute animal~~:~~.

303Conversely, third person kama muta is evoked by observing, reading or
304hearing about the communal sharing ~~CS~~ intensification of others – such as
305videos of people showing exceptional love, kindness or care for each
306other. We found that the more a person feels kama muta from watching
307third person communal sharing ~~CS~~ intensifications, the more she tends to
308humanize the protagonists (Blomster et al., 2018), and be motivated to
309engage in a communal sharing ~~CS~~ relation with these protagonists
310(Blomster et al., 2018; Zickfeld, 2015). Some of the videos that have been
311used to test kama muta theory involve animals showing care for each
312other (elephants) or for humans (a lion and a dog), and a human showing

313care for an animal (cat rescue) (Schubert et al., 2016; Seibt et al., 2017a,
3142017b).

315Accordingly, we expect stimuli depicting individual cute animals to evoke
316first person kama muta (Study 1), and stimuli depicting animals
317interacting in a loving way to also evoke third person kama muta (Study
3182). In this case, the interacting animals should also be perceived as cuter
319than non-interacting animals specifically because they evoke more kama
320muta. Our theory also predicts that the change in communal sharing
321should be experienced as sudden in order to evoke kama muta. Therefore,
322our appraisal items (Zickfeld et al., 2018a) tap into *sudden* change.

323**2.3 To summarize, kama muta theory posits that kama muta is an**
324 **emotional response to an event in which a communal sharing**
325 **relationship suddenly intensifies. This emotion likely**
326 **developed from parental and kin responses to small infants,**
327 **facilitating care, compassion and protection, including**
328 **hugging, feeding, defending the child and being responsive to**
329 **its signals. Parental responses to small infants are triggered**
330 **by the Kinchenschema, which humans perceive as cute. We**
331 **therefore posit that animals high in cuteness should evoke**
332 **the emotion of kama muta. Specifically, the central appraisal**
333 **theme of kama muta, *suddenly increased CS*, is evoked either**
334 **by the person's 'heart going out to the cute animal' (first**
335 **person) or by appraising the loving care that cute animals and**
336 **their interaction partners display for each other (third**
337 **person). The cues to increased CS relevant for the third**
338 **person case that we manipulated in Study 2 are bodily**
339 **proximity (cuddling, snuggling up, licking, touching) and**
340 **feeding. These cues are universal signs of CS (Fiske, 2004).**

341

342**2.4 Overview of the current studies**

343We conducted two experiments to test whether cute features in animals
344(Study 1) and communal sharing ~~CS~~ interactions among animals (Study 2)
345evoke the characteristic components of kama muta, including the typical
346labels, ~~bodily sensations~~ sensations and signs, motivations, and positive
347valence. To measure these components, we used a scale highly similar to
348the validated KAMMUS scale (Zickfeld et al., 2018a). In a within-subject
349design in Study 1, participants were presented with videos of cute animals
350and animals that were not cute. We expected the cute animals to evoke
351more kama muta than the non-cute animals.

352Kama muta is evoked by sudden intensification of communal sharing~~CS~~,
353and ~~CS~~ is indexed by affectionate touching and feeding (Fiske, 2004).
354~~Hence~~Hence, viewing cute targets' affectionate touching and feeding
355should evoke stronger kama muta than the Kindchenschema alone. To test
356this proposition, Study 2 employed video stimuli of cute animals either
357interacting with each other in these communal sharing ~~CS~~ ways or not

358interacting (but otherwise doing similar things) to manipulate increased 359communal sharing CS between the target animals. We used the appraisal 360subscale of the KAMMUS to test whether the videos of the interacting 361animals are indeed appraised as a suddenly increased communal 362sharingCS, and whether these appraisals correlate with the other 363components of kama muta. We expected that affectionate touching and 364feeding interaction between the targets would evoke both stronger ratings 365of cuteness and stronger kama muta emotion. We expected kama muta 366emotion to mediate the effect of communal sharing CS content on 367cuteness perceptions. In Study 2, we also tested whether communally 368interacting cute animals are humanized more than non-interacting 369animals.

370In both studies we tested whether trait empathic concern predicts kama 371muta responses to cuteness, just as it predicts kama muta responses to 372the other sudden intensifications of communal sharing CS we have 373employed as stimuli.

374The studies were approved by the internal review board of the Department 375of Psychology, University of Oslo. As recommended by Simmons et al. 376(2011), we report how we determined our sample size, all data exclusions, 377all manipulations, and all measures. All data sets, stimulus material and 378procedures are available at our OSF project page (https://osf.io/bjuva/).

3793 Study 1

380The main objective of the first study was to experimentally investigate 381whether cute animals evoke the kama muta emotion more than animals 382that are minimally cute. The study tested the following two main 383hypotheses:[4]

384**H1**: Viewing videos of cute animals, compared to videos of minimally cute 385animals, will evoke stronger kama muta ratings across four components of 386the emotion: vernacular labels, motivation to form or strengthen 387communal sharingCS-relationships, emotional valence, and bodily 388sensations and signs.

389**H2**: Participants higher on trait empathic concern will rate the animals as 390cuter and will have higher ratings of kama muta in the four components.

3913.1 Method

392**Participants.** We recruited $N = 121$ participants through Amazon 393Mechanical Turk, requesting workers from the US, and $N = 176$ Norwegian 394participants through convenience sampling on Facebook.[5] Participants

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13[4] We also had three additional hypotheses regarding effects of gender, pet ownership, 14and number of children that are not focal to the present investigation; for those analyses, 15see the Supplementary Materials.

16[5] The survey was translated to Norwegian, then back-translated and reconciled (Brislin, 171970). Both versions were available for both samples, and participants chose whether

395were excluded from the primary analyses based on the following *a priori*
396criteria; having more than 20% missing responses, not watching the
397videos, and being under the age of 18. Of the remaining $N = 217^6$, $N =$
398121 indicated that they were female ($N = 3$ indicated "other" or skipped
399that question), $N = 105$ were US American, $N = 101$ Norwegian, $N = 11$
400from other countries or missing. Age varied from 19 to 63, $M = 31.80$, SD
401$= 10.73$; two participants did not provide demographic information.

402**Procedure and materials.** A within- and between-participants design
403was employed. Condition was a within-participants factor; participants saw
404both a video of a cute animal and a video of a non-cute animal. The order
405in which these videos were presented was randomized between
406participants. After each video, the participants were asked to rate the
407cuteness of the video and asked about their kama muta labels, valence,
408communal sharing CS motivation, and sensations sensations and signs.
409Lastly, participants responded to the trait empathic concern measure, and
410provided demographic information.

411The video stimuli comprised of eight pretested 20- to 40-second video
412clips depicting either very cute (e.g., bunny, kitten) or minimally cute
413animals (e.g., anglerfish, octopus, proboscis monkey). In each condition,
414participants saw one video randomly selected from a pool of four videos
415(see Supplemental Materials for video links and pre-test results).

416**Measures.** The first (Steinnes) and last author wrote a cuteness scale of
417nine items (e.g., "It is adorable") to measure perceived cuteness of the
418animals in the videos. The scale was constructed based on a review of the
419literature, while attempting to identify the most distinctive and prevalent
420vernacular lexemes colloquially used to denote visual Kindchenschema
421cuteness. The cuteness scale included distractor items (not included in the
422number of items), and responses were assessed on a 7-point Likert scale
423from 0 (*not at all*) to 6 (*a lot*).

424The experience of kama muta was assessed through four subscales,
425specifically: vernacular labels (6 items: e.g., "I was moved"); physical
426sensations and signs (12 items: e.g., "A warm feeling in the center of the
427chest"); motivation to form or strengthen communal sharingCS-
428relationships (7 items: e.g., "I felt more strongly committed to a
429relationship"); and emotional valence (2 items: "I had positive feelings",
430and "I had negative feelings"). The kama muta scale included distractor
431items (not included in the number of items), and offered response
432alternatives on a 7-point Likert scale from 0 (*not at all*) to 6 (*a lot*). This
433measure was an earlier version of the kama muta scale (*KAMMUS*) later
434validated in Zickfeld et al. (2018a).

18they wanted to respond in English or Norwegian.

19[6] Note that the sample was included in previously published research to test a different
20research question (Zickfeld et al., 2017b). Results and sample characteristics might differ
21minimally due to different exclusion criteria.

435 Empathic concern was measured with a subscale of the interpersonal
436 reactivity index (IRI, Davis, 1980, 1983). Participants were asked to rate
437 seven items such as "I am often quite touched by things that I see
438 happen" on a 5-point Likert scale, ranging from 1 (*does not describe me*
439 *well*) to 5 (*describes me very well*). Item-level descriptive statistics and
440 Norwegian translations for all measures can be found in the Supplemental
441 Materials.

442 Lastly, participants were asked to indicate whether they listened to the
443 sound of the video (which they had been instructed to turn off; see
444 Supplement Section 2.1 for further information) and provide demographic
445 information, outlined in the participants section above.

446 3.2 Results

447 We created five average scores from (1) six cuteness scale items (control
448 condition: $\alpha = .91$; cute condition: $\alpha = .94$),[7] (2) three kama muta
449 vernacular labels items (control: $\alpha = .90$; cute: $\alpha = .90$), (3) 12 items of
450 ~~bodily~~ sensations and signs (control: $\alpha = .84$; cute: $\alpha = .87$), (4) four items
451 of motivation (control: $\alpha = .95$; cute: $\alpha = .94$), and (5) the seven items of
452 empathic concern ($\alpha = .88$). The kama muta scores were constructed
453 based on a subset of items validated in Zickfeld et al. (2018a)[8]. ~~Notably,~~
454 ~~Zickfeld and colleagues (2018a) suggested to calculat~~ing ~~e separate scores~~
455 ~~for different sensational aspects such as tears or chills. As we did not have~~
456 ~~a particular prediction regarding the outcome of these separate sensation~~
457 ~~factors w~~We combined all sensation and sign items into one score.
458 Analyses employing the separate sensation and sign factors are presented
459 in the Supplementary Material.

460 **Intercorrelations**. We first assessed the co-occurrence among the four
461 kama muta components, and the association of these aspects of kama
462 muta with cuteness and empathic concern. In order to do so, we
463 calculated intercorrelations of the cuteness scale, empathic concern, and
464 the four kama muta components (vernacular labels, ~~bodily~~ sensations and
465 signs, motivations, and positivity) for the cute and non-cute conditions
466 separately (see Table 1). Intercorrelations among the kama muta
467 components were similar in the cute condition (rs between .48 and .79)
468 and in the non-cute condition (rs between .45 and .77). The consistently
469 strong correlations among the kama muta components support the
470 validity of the kama muta construct, suggesting that these four
471 components tap into the same construct.

472 In addition, all four kama muta components correlated strongly with
473 perceived cuteness (rs between .34 and .68) in the cute condition. This

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22 [7] We decided to discard three reverse scored items based on a factor analysis revealing
23 that these items loaded on a separate factor (see Supplemental Materials for the factor
24 analysis).

25 [8] Only 3 items of the Labels scale and 4 items of the Motivation scale were utilized in the
26 analyses, as a later validation of the KAMMUS scale found that only these particular items
27 are necessary to measure kama muta labels and ~~–~~motivation (Zickfeld et al, 2018a).

474correlational test of Hypothesis 1 supports the hypothesis that the emotion
475evoked by seeing cute animals is, in fact, kama muta. The four kama muta
476scores also correlated with empathic concern in the cute condition,
477supporting H2.

478**Main analyses.** We tested the hypotheses that cute animals would evoke
479more of all four components of kama muta than non-cute animals (H1),
480and that empathic concern would moderate the effect of condition (cute vs
481non-cute) on kama muta ratings and cuteness ratings (H2). We did this by
482fitting mixed models using the *lme4* package in *R*. [9] Both hypotheses were
483tested in five combined models, one for cuteness ratings and one for each
484of the four kama muta components. We regressed these dependent
485variables on the same set of predictors: condition, order of video, trait
486empathic concern, and all two-way interactions.[10] For all models intercepts
487were allowed to vary randomly across participants and video. All factors
488were contrast coded and empathic concern was mean-centered. We report
489unstandardized effect size estimates *B* and their 95% confidence intervals.
490In addition, we report standardized effect sizes (Cohen's *d* or Pearson's *r*)
491for all main effects. Table 2 provides an overview of all models.

492First, we observed a main effect of condition for all five models, as seen in
493Table 2. Validating our experimental manipulation, we observed that in
494Model 1 the high cuteness videos induced higher cuteness ratings than
495low cuteness videos (see Table 3 for descriptive statistics). In addition,
496supporting our first hypothesis, we found that in Model 2, ratings of kama
497muta labels were higher for the high cuteness videos compared to the low
498cuteness videos. Similarly, participants reported more kama muta
499sensations and signs in Model 3 for the high cuteness videos than for the
500low cuteness videos. In Model 4, ratings for the communal sharing CS
501motivation component of the kama muta emotion were also higher in the
502high cuteness videos in contrast to the non-cute videos. Finally, in Model
5035, participants rated the high cuteness videos as more positive than the
504low cuteness videos.

505Supporting our second hypothesis, trait empathic concern positively
506predicted ratings of cuteness, and ratings of all four components of kama
507muta. For all models we observed an interaction effect of empathic
508concern with condition: the effects of trait empathic concern were stronger
509for the high cuteness videos (see Table 1 for intercorrelations of empathic
510concern and cuteness). Finally, we found a main effect of order of video for
511all models except the sensations and signs model. For these three models,
512ratings were stronger for the first video. We also observed an interaction

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28[9] Most of our variables of interest showed skewed distributions. So we repeated the main
29analyses for each of the five DVs using a Wilcoxon signed rank test with condition as
30predictor. The results did not differ from the findings using multilevel models and can be
31found in the Supplementary Material.

32[10] For each model, we ran an initial test including nationality, video type, and video sound
33as additional predictors. We only observed a significant nationality*order interaction for
34the cuteness and positivity models. In both cases the order effect was more pronounced
35for the US participants.

513effect between order and condition in the cuteness, motivation, and
514positive valence model: the effect of video order on the low cuteness
515videos was strongest.[11] We did not detect a significant interaction effect
516between empathic concern and order for any of the models.

517 3.3 Discussion

518Hypothesis 1 was supported. Participants' ratings of all four kama muta
519components were higher when watching the cute videos, compared to the
520non-cute videos: Cuteness evoked significantly stronger motivation to
521engage in communal sharing~~CS~~-relationships; more intense ~~bodily~~
522sensations and signs; more subjective feelings of being *moved, touched*
523and *heart-warmed;* and more positive feelings. These data support the
524theory that cuteness evokes kama muta in the perceiver.

525Participants higher on trait empathic concern also had higher ratings on all
526of the kama muta components and on cuteness, supporting H2. In
527addition, we found an interaction effect of empathic concern and condition
528in all models, meaning that participants higher on EC were more sensitive
529to the cute videos, rating these as cuter and more kama muta evoking.

530 4   Study 2

531Study 1 established that images of cute animals evoke kama muta. Study
5322 tested whether adding well established signs of communal sharing to
533these stimuli, namely affiliative contact between the cute animals or
534feeding them results in greater cuteness perception and stronger kama
535muta reactions, compared to videos of cute animals not interacting and
536not being fed. A second objective of this study was to investigate whether
537kama muta responses mediated the effect of the touching and feeding
538communal sharing ~~CS~~manipulations on cuteness perception. Hence, we
539preregistered the following four hypotheses (https://osf.io/bjuva/):[12]

540**H1:** High communal sharing (CS) ~~CS~~videos will be judged as cuter than
541low ~~communal sharing~~CS ~~CS~~videos.

542**H2:** Compared to low ~~communal sharing~~CS ~~CS~~videos, high ~~communal~~
543~~sharing~~CS ~~CS~~videos will evoke more kama muta, as measured by (a) the
544kama muta sensations and signs, and (b) labels.

545**H3**: The effect of ~~communal sharing~~CS ~~CS~~on cuteness ratings will be
546mediated by kama muta, as measured by (a) the kama muta labels and
547(b) sensations and signs.

548**H4:** Trait empathic concern positively predicts cuteness ratings.

36[11] While we observed a significant interaction effect between order and condition, testing
37our main models separately for first and second order effects revealed that all effects
38were in the predicted direction and their 95% CIs did not include zero.

39[12] We also pre-registered two additional hypotheses not focal to the present research
40question. All hypotheses and planned statistical analyses were preregistered at
41AsPredicted.com, 20th September 2016.

549**H5:** High ~~communal sharing~~CS ~~CS~~ videos will lead to more perceived
550humanness of the animal protagonists than the low ~~communal sharing~~CS
551~~CS~~ videos.

552**H6:** Humanness ratings of the animals and kama muta evoked will
553correlate.

554**4.1 Method**

555**Participants.** We conducted an *a priori* power analysis based on an effect
556size of $f = .15$ ($\alpha = .05$, $1-\beta = .95$), which suggested a total sample size of
557148 participants[13]. We recruited $N = 201$ participants in Norway through
558convenience sampling on Facebook and a student research participation
559pool at the University of Oslo where students were invited to participate in
560a study investigating emotional responses to video stimuli. As pre-
561registered, participants were excluded from the primary analyses if they
562indicated participating for their personal educational purposes only (i.e.,
563choosing not to contribute their data to the study), having more than 20%
564missing values, and not watching the whole video. Of the remaining $N = $
565139,[14] $N = 107$ indicated that they were female ($N = 1$ indicated "other"),
566$N = 130$ were Norwegian, $N = 9$ from other countries. Age varied from 16
567to 63, $M = 24.28$, $SD = 7.58$.

568**Materials and procedure.** A mixed design was employed. Condition was
569a within-subjects factor where participants saw a video of two subjects
570(either two animals or one animal and one human[15]) engaging in an
571affectionate interaction like cuddling, liking, and feeding one another (high
572~~communal sharing~~CS~~CS~~), and a video of two subjects interacting minimally
573or not at all (low ~~communal sharing~~CS~~CS~~). Another within-subjects factor
574was type of animal: participants saw one video featuring dogs and one
575video featuring cats. The between-subjects factors were the video version
576(Video A or B of a particular stimulus set), and the order in which the
577videos were presented (high ~~communal sharing~~CS ~~CS~~ first or high
578~~communal sharing~~CS ~~CS~~ second).

579We created four stimulus sets (high or low ~~communal sharing~~CS ~~CS~~ video
580with cats or dogs) with two videos each (see Supplemental Materials for
581links to the eight videos). The videos were pairwise matched between
582~~communal sharing~~CS ~~CS~~ conditions, meaning that apart from the
583~~communal sharing~~CS ~~CS~~ manipulation, everything else was held constant
584(i.e., the targets, the movement of the targets, background, setting, and
585lighting). Two videos were sampled per participant. The first video was
586sampled from one of the four stimulus sets and the second video was then

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42[13] Based on repeated ANOVAs rather than the mixed models used here.

43[14] Note that the sample was included in previously published research to test a different
44research question (Zickfeld et al., 2017b). Results and sample characteristics might differ
45minimally due to different exclusion criteria.

46[15] In videos showing a human, only the hands of the person were visible, in order to limit
47participants' cuteness appraisals to the animal.

587sampled from the stimulus set of the other ~~communal sharing~~CS ~~CS~~
588condition and other animal.

589After each video, participants were asked to rate the cuteness of the
590video, the perceived humanness of the animal subject(s), and five aspects
591of their own kama muta emotion. Finally, participants responded to the
592trait empathic concern items, and provided demographic information.

593**Measures.** A revised 6-item scale from Study 1 measured perception of
594cuteness; 3 negatively worded items (e.g., "The video was not cute") and
5953 positively worded items (e.g., "The video was adorable"). The
596experience of kama muta was assessed through five subscales using an
597earlier version of the KAMMUS that has since been further validated in
598Zickfeld et al. (2018a), specifically: vernacular labels (7 items, same as in
599Study 1 with the addition of "I felt in love"); ~~physical~~ sensations and signs
600(14 items, with "choked up" and "difficulty speaking" added as additional
601items from the subscale in Study 1); ~~communal sharing~~CS intensification
602appraisals (10 items: e.g., "I observed a special sense of belonging");
603motivation to form or strengthen ~~communal sharing~~CS~~CS~~-relationships (7
604items, same as in Study 1 but one item rephrased to "I felt especially
605friendly" from "I felt especially friendly to nearly everyone); and emotional
606valence (2 items: "I had positive feelings", and "I had negative feelings").
607The cuteness and kama muta scales included distractor items (not
608included in the number of items), which were, as planned, excluded from
609all analyses. A single item written by the third author was added to the
610cuteness scale to assess humanization of the animal protagonist(s) in the
611videos: "The animal(s) in the video seemed human to me". Answers were
612given on a 7-point Likert scale from 0 (*not at all*) to 6 (*a lot*). The same
613empathic concern measure and demographic questions used in Study 1
614were again presented in Study 2.

615**4.2 Results**

616We created six average scores (1) from the six cuteness scale items (low
617~~communal sharing~~CS ~~CS~~ condition: $\alpha = .75$; high ~~communal sharing~~CS ~~CS~~
618condition: $\alpha = .59$); (2) from the three kama muta vernacular labels (low
619~~communal sharing~~CS~~CS~~: $\alpha = .85$; high ~~communal sharing~~CS~~CS~~: $\alpha = .85$);
620(3) the 12 items of ~~bodily sensations~~ sensations and signs (low ~~communal~~
621~~sharing~~CS~~CS~~: $\alpha = .79$; high ~~communal sharing~~CS~~CS~~: $\alpha = .89$); (4) the four
622items of ~~communal sharing~~CS intensification appraisals (low ~~communal~~
623~~sharing~~CS ~~CS~~ $\alpha = .95$; high ~~communal sharing~~CS ~~CS~~ $\alpha = .94$); (5) four
624items of motivation (low ~~communal sharing~~CS~~CS~~: $\alpha = .92$; high ~~communal~~
625~~sharing~~CS~~CS~~: $\alpha = .91$), and (6) the seven items of empathic concern ($\alpha = .$
62676). As in Study 1, the KAMMUS subscales were constructed based on
627Zickfeld et al. (2018a) but with only one score for all ~~bodily sensations~~
628sensations and signs combined; analyses employing the separate
629sensation and sign factors are presented in the Supplementary Material.

630**Intercorrelations.** Correlations among the main variables are presented
631in Table 4. Ratings of perceived humanness in the animals correlated

632positively with all kama muta components (rs between .28 and .52),
633supporting H6. As in Study 1, all of the kama muta factors correlated with
634all of the others in both the low and high CS
635condition (rs between .42 and .79). We also observed positive correlations
636between the cuteness scale and all five kama muta indicators. Finally, as
637in Study 1, empathic concern correlated more with all other variables in
638the experimental (i.e., high CS) condition, compared
639to the low CS condition.

640**Main effect analyses.** We used a series of mixed models to test the
641hypotheses.[16] The final dataset consisted of a total of 278 video reactions.
642For all models, intercepts were allowed to vary randomly across
643participants. We regressed each dependent variable (CS-intensification appraisals, cuteness, humanness, kama muta
645labels, sensations and signs, motivation, and positivity) in a separate
646model on the same set of predictors: cuteness condition, type of animal
647presented, order of video, and video version, as well as interactions
648between condition and order, and between animal type and version. For
649the cuteness model, we added trait empathic concern as a covariate. All
650factors were contrast coded (see Table 5) and empathic concern was
651mean-centered. We report unstandardized effect size estimates B and
652their 95% confidence intervals. In addition, we report standardized effect
653sizes (Cohen's d or Pearson's r) for all main effects. Table 5 gives an
654overview of all models.

655Seen in Model 1 of Table 5, the main effect of condition on CS-intensification ratings was significant; high-CS videos were rated higher on CS
658intensification appraisals than low CS videos. The
659manipulation was therefore successful (for descriptive statistics see Table
6606). In addition, we observed an interaction effect between type of animal
661and video version on the CS appraisals. The second
662version of the cat video evoked less CS appraisals
663than all other videos.

664Seen in Model 2, cuteness ratings were higher in the high-CS videos in contrast to the low-CS videos,
666supporting H1. Supporting H4, we also observed a positive effect of trait
667empathic concern on the cuteness ratings.[17] There was also a significant
668main effect of animal type (cats were rated as cuter than dogs).

48[16] Most of our variables of interest showed skewed distributions. So we repeated the main
49analyses using a Wilcoxon signed rank test with condition as predictor for each of the
50seven DVs. The results did not differ from the findings using multilevel models; they can
51be found in the Supplementary Material.

52[17] Table 4 suggests an interaction effect between empathic concern and condition. We
53therefore repeated the main model including the interaction between these variables in
54an exploratory fashion. We did not find a statistically significant interaction effect in the
55full model, but did so when including only condition and empathic concern as predictors.

Seen in Model 3, participants' ratings on the kama muta labels were higher in the high CS condition than in the low CS condition (see Table 6). The same was true for the kama muta sensations and signs, as seen in Model 4. Both models support H2.

Seen in Model 5, participants rated the animals in the high CS condition as more human than animals in the low CS condition, therefore supporting H5.

Finally, we also explored whether condition influenced CS motivation and positive valence ratings. We observed that motivation ratings in Model 6 were higher in the high CS condition compared to the low CS condition. We also observed in Model 7 that ratings of positive valence were higher in the high CS condition than in the low CS condition.

In Models 2, 3, 6 and 7 we also found an order effect where the first video had higher ratings than the second video on each of the kama muta components and on cuteness. Order did not interact with condition in any of the models, thus, the order effects do not invalidate the conclusions from the hypothesis tests.

Mediation analyses. Mediation analyses were conducted to test H3, that the effect of high or low CS (video condition) on cuteness ratings (as revealed by H1) was mediated by kama muta, as measured by the sensations and signs (Model 1) and labels (Model 2, see Figure 1).

The possible mediation by kama muta was tested using three mixed models (Bauer et al., 2006). To obtain path a, a mixed regression of the mediator on the independent variable was performed. Paths b and c' were determined by regressing the dependent variable on the mediator and the independent variable. To obtain path c, we regressed the dependent variable on the independent variable. Coefficients for the different paths and the indirect effect were manually calculated and standardized according to Bowman (2012), while a confidence interval for the indirect effect was estimated using a Monte Carlo simulation method (Falk and Biesanz, 2016).[18]

As seen in Model 1 of Figure 1, kama muta sensations and signs mediated the relationship between low and high CS condition and cuteness ratings. Model 2 of Figure 1 showed that kama muta labels also mediated the relationship between CS condition and cuteness ratings. Both the sensations and signs and the labels partially mediated the main effect of condition on cuteness ratings; the direct effect of condition on the cuteness ratings remained strong. Thus, high CS videos (showing two animals affectionately interacting with each other or feeding) received higher kama muta ratings,

[18] By use of the following website: https://msu.edu/~falkcarl/mediation.html.

712which then increased participants' perceptions of the cuteness of the
713animals. However, kama muta does not account for the whole effect of
714condition on cuteness.

715**4.3 Discussion**

716Study 2 showed that when seeing two cute animals interacting
717affectionately, participants rated them as cuter and more human. They
718also evoked more kama muta, as indexed by the use of vernacular labels
719for kama muta, by reporting more sensations and signs typical of kama
720muta episodes, by indicating the experience as being more positive and by
721feeling motivated to connect in a communal sharing CS way. As in Study 1,
722participants higher on trait empathic concern were more inclined to rate
723the animals in the videos as cute. Lastly, we found that the difference in
724cuteness ratings between the high and the low communal sharing CS
725conditions was partly explained by increased kama muta in the high
726communal sharing CS condition. Therefore, all hypotheses were supported
727in Study 2. However, we found order effects where the first video was
728consistently rated as cuter or evoking more kama muta than the second
729video. Given that this effect did not interact with condition, it does not
730compromise our conclusions.

731**5   General discussion**

732Two studies with a total of 356 participants supported the hypothesis that
733cuteness typically evokes *kama muta,* a social-relational emotion that, in
734other contexts, is often labeled in English *moved*, *touched*, *heartwarming,*
735*nostalgia, patriotism, team spirit, feeling God's love,* etcetera. In both
736studies, we presented videos of animals differing in cuteness and
737observed stronger ratings of four aspects of kama muta in response to the
738cuter category. The four indicators or components we assessed were the
739use of kama muta labels to describe one's emotional response, the judged
740positivity of that response, the motivation to connect to others in a
741communal way, and the report of typical sensations and signs of kama
742muta, such as warm feelings in the chest, tears, or goosebumps.
743Moreover, within each stimulus category, we observed significant
744correlations between the judged cuteness of each stimulus and the four
745components of the kama muta response. Furthermore, across both
746studies, we observed that the empathic concern trait predicted ratings of
747cuteness and kama muta responses to them, corroborating research from
748Lehmann, Huis in't Veld, and Vingterhoets (2013) and Zickfeld et al 2017b;
7492018a8. This confirmed our hypothesis that empathic concern, as a
750general predisposition for feeling kama muta, would also predict kama
751muta responses to cuteness.

752Since many studies have shown that kama muta is evoked by the
753observation of a sudden intensification of communal sharing in others, we
754further hypothesized that kama muta responses to cuteness would be
755strongest when observing affectionate contact between the target animals
756or the target animal and a human hand. Study 2 confirmed this with
757respect to four aspects of kama muta. Given that persons perceive

758 communal sharing ~~CS~~ relations as an important part of human nature
759 (Haslam, 2006), we also expected that participants would humanize the
760 affectionately interacting animals more than the non-interacting animals,
761 and that a stronger kama muta response would go along with more
762 humanization of the animals. We also expected that the interacting
763 animals would be judged as cuter than their non-interacting counterparts,
764 and kama muta responses would mediate this effect of affectionate
765 interaction on cuteness ratings. Results of Study 2 supported these
766 hypotheses.

767 **5.1 Kama muta ~~a~~is ~~the~~ ~~a~~ typical response to cuteness ~~response~~**

768 The first study demonstrated that compared to videos of less cute animals,
769 videos of cute animals evoked significantly more intense ~~physical~~
770 sensations and signs of kama muta, a stronger motivation for communal
771 interactions, more positive feelings, and higher ratings on labels relevant
772 to kama muta (*moved, touched* and *heart-warming*)*.* This finding
773 complements that of Batson et al. (2005), who showed that cuteness (of a
774 dog, puppy or child) evoked subjective feelings labeled being *moved*.
775 Going beyond Batson et al.'s findings, the present findings indicate that
776 ~~the~~ one cuteness ~~evokes~~ response is kama muta, by providing evidence
777 for ~~an emotion with~~ the various components typical of an emotional
778 episode – not only a label but also ~~bodily~~ sensations and signs, an
779 appraisal, and a motivational tendency (Moors et al., 2013). Americans
780 and Norwegians evidently feel kama muta in response to cuteness, despite
781 the fact that in this context, they can't readily name their emotion (Fiske
782 et al., 2017c). Other languages do have a distinct, accessible, consensual
783 name for kama muta in response to cuteness, or else use the same
784 lexeme they use for kama muta in other contexts. Even though the
785 cuteness scores were generelly high, the mean ratings for the sensations
786 and signs ~~and sensations~~, motivations, and labels in response to cuteness
787 were all found to be relatively low ~~lower than mean scores for other kama~~
788 ~~muta experience~~sat the lower end of the scale. Nevertheless, we did find a
789 significant difference in all kama muta components between the
790 experimental and control conditions. ~~(for example Seibt et al., 2018). The~~
791 ~~variance of these scores was rather low in both conditions (see~~
792 ~~Supplementary Material). However, both parametric and non-parametric~~
793 ~~tests shows a significant difference between the conditions.~~ This indicates
794 that kama muta is a typical response to cuteness ~~as a cuteness reponse~~
795 ~~does occur, albeit in the current study it is a mild occurrence of kama~~
796 ~~muta, rather than a powerful one~~. ~~However~~Of course, it is likely to be
797 stronger in direct interactions with living cute targets.

798 ~~might be more powerful in other, more immersive contexts, or for people~~
799 ~~who are more empathic.~~Consistent with all our previous research showing
800 that trait empathic concern correlates with kama muta response states, ~~As~~
801 Study 1 showed that, empathic concern moderated the relationship
802 between condition and rating of the different kama muta components,
803 meaning that people high on trait EC reported feeling more kama muta in
804 the cute condition than people lower on trait EC.

805 Kama muta motivates compassion, care, and solidarity, including, we
806 suggest, the motivation to ~~care for and protect~~respond to the needs of
807 cute ~~babies and animals~~human and non-human infants.

808 Indeed, precisely because of this, we speculate that the phylogenetic
809 source of kama muta is maternal bonding. Mothers must instantly form
810 intense CS bonds to offspring at the moment of birth. In the small percent
811 of species that form pair bonds and the smaller percentage in which
812 siblings and other kin contribute to care of the infant, the father and those
813 kin, too, must instantaneously form CS bonds with the infant. Thus we
814 concur with McDougall who described the *tender emotion*, (one of the
815 seven basic emotions) – something very much like kama muta – as an
816 outgrowth of the ~~of the~~ human maternal instinct to care for their own
817 babies, extended to an emotion experienced in a vast array of eliciting
818 situations:

819 *In the human being, just as is the case in some degree with all the*
820 *instinctive responses . . . there takes place a vast extension of the*
821 *field of application of the maternal instinct. The similarity of various*
822 *objects to the primary or natively given object, similarities which in*
823 *many cases can only be operative for a highly developed mind,*
824 *enables them to evoke tender emotion and its protective impulse*
825 *directly. (McDougall, 1919, pp. 57-58, see also 1923)*

826

827 **Communal sharing mediates ~~the~~ a kama muta response to**
828 **cuteness.** While Study 1 showed that cuteness evokes kama muta,
829 apparently through first-person communal sharing ~~CS~~ with the cute
830 targets, the second study revealed that the kama muta response, along
831 with cuteness ratings, were significantly larger when the participants
832 observed communal sharing ~~CS~~ intensification. That is, observing an
833 affectionate interaction between two cute animals, or between a cute
834 animal and a human hand, evoked third-person kama muta in addition to
835 the first-person kama muta evoked by observing the same two
836 protagonists when they were not interacting. This may explain why online
837 video content of cute animals typically includes a caring interaction, often
838 cuddling or caressing. Witnessing a caring and tender relationship
839 between others is typically *moving* and *heart-warming* in itself, even when
840 the protagonists are not cute (Schubert et al., 2016; Seibt et al., 2017a,
841 2017b). Nittono and Ihara (2017) have shown that cute images typically
842 elicit facial muscles associated with smiling. Smiling ~~may signal~~ often
843 occurs in communal feelings, especially when they intensify, and is ~~often~~ a
844 common (though not unique/distinctive) reaction to kama muta
845 experiences (Zickfeld, 2015, 2018). Earlier studies on the kama muta
846 emotion have found that appraisals of sudden communal sharing ~~CS~~
847 intensification are strong predictors of a kama muta experience (Zickfeld
848 et al., 2018a). In conjunction with the results presented here, this further
849 validates kama muta as ~~the typical~~a cuteness emotion: When we
850 increased the kama muta response to cute animals by showing them

851 interacting communally, we combined two sources of kama muta
852 responses (first and third person), which resulted in even stronger kama
853 muta responses and ratings of the animals as cute. However, the partial
854 mediation effect found in Study 2 suggests that other factors than
855 communal sharing may have additional influences on cuteness responses,
856 such as preferences and attractions for different animals, and various
857 personality traits.

858 **Cuteness, kama muta and empathic concern.** Results from the
859 present studies provide evidence that individuals scoring high on empathic
860 concern, the tendency to express sympathy for others in need (Davis,
861 1983), report stronger experiences of kama muta and cuteness. While
862 previous studies have consistently shown that cute features in animals or
863 infants evoke strong experiences of *empathic concern* (Batson et al.,
864 2005; Zickfeld et al., 2017a), there are reasons to believe that the feeling
865 of empathic concern is a motivational facet of kama muta (Zickfeld et al.,
866 2017b, 2018a). This is not surprising as state empathic concern has been
867 assessed using labels such as *moving* or *warmth*, which are the most
868 common English labels for kama muta. Niezink and colleagues (2012)
869 have provided evidence that empathic concern consists of aspects of
870 *sympathy* and *tenderness*. While we have argued that the sympathy
871 component might evoke kama muta through identification with the target
872 in need (Zickfeld et al., 2017b), the present Study 2 suggests that
873 intensifications in communal sharing increase experiences of cuteness –
874 the tenderness component of empathic concern. The present research
875 provides further evidence that kama muta and empathic concern are
876 highly intertwined and play a central role in cuteness experiences.

877 **Kama muta and humanization.** The results of Study 2 showed that cute
878 animals interacting communally were seen as more human than cute
879 animals not interacting, albeit with a small effect size (d = .18). In
880 addition, the inter-correlations in Table 4 show that all kama muta
881 components correlated moderately with humanness ratings within both
882 conditions, and that these correlations were highest between appraisals of
883 communal sharing intensification and humanness. This gives further
884 support to the notion that perceiving interactions as communal makes the
885 agents seem more human. We believe that this occurs because acting
886 communally shows that the agents are able to care for each other, which
887 people construe as a core aspect of humanness (Opotow, 1990). Similarly,
888 Blomster et al. (2018) found that out-group members interacting
889 communally and therefore eliciting kama muta in participants (as
890 compared to acting in a manner that elicits amusement) were perceived
891 as more human. Moreover, the same study also found that humanness
892 ratings of out-group members before the kama muta manipulation
893 predicted how much kama muta participants felt, suggesting a
894 bidirectional relationship between kama muta and humanization.
895 Therefore, future studies should investigate whether people who perceive
896 animals as less different from humans (see Hodson et al., 2015) are more
897 susceptible to feeling kama muta towards cute animals. In other words, is

898there a bidirectional relationship between kama muta and humanness for 899cute animals?

9005.2 Limitations

901The results of the current studies should be considered in light of their 902limitations. As reported the results section, order effects were detected in 903both studies. This might be due to anchoring effects. This fits the actual 904pattern of the means of cuteness, showing that when a low cuteness video 905was presented first it was judged as more cute than when it was shown 906second. Another possible explanation for the observed order effects of 907Study 1 is demand effects. The experimental videos combined with the 908subsequent cuteness scale might have tended to make participants feel 909that it would be socially undesirable to rate an animal as "not at all" cute. 910Given that in Study 1, the effect of the experimental manipulation was 911significant in both order conditions, and in Study 2 there was no 912interaction between order and condition, the order effects do not 913invalidate our conclusions.

914Correlations between the trait empathic concern scale and the kama muta 915components could possibly be due to an artifact: common method 916variance resulting from individual differences in willingness to report 917tender, caring emotions. We found gender differences in levels of kama 918muta component ratings and cuteness ratings (see Supplementa~~ry~~ry 919Material~~s~~) , which may partially or completely result from correlated gender 920differences in disposition to report the emotion, and to report judgments 921that the stimuli are cute. So there is a possibility that responses to the IRI 922empathic concern trait subscale, the KAMMUS, and the cuteness items 923share variance due to individual differences in social desirability or 924impression management with regard to revealing, or even acknowledging 925to oneself, feelings and judgments judged to be feminine, juvenile, or 926embarrassing. If so, such shared method variance may contribute to the 927observed correlations among the measures.

928Another limitation of the current studies concerns the data collection and 929data quality. The use of convenience sampling and relatively high drop-out 930and exclusion rates do not threaten the internal validity (as the 931experimental conditions were manipulated within participants and fully 932randomized), but they do suggest that the sample may not have been 933representative on relevant dimensions of the Norwegian population 934especially. For example, people sensitive to cuteness may have been more 935likely to actually complete the whole study. This was less of a problem for 936the US sample in Study 1, in which participants were paid for their time. In 937this light, the convergence of the findings for Norway and the US bolsters 938the central conclusions.

939A statistical issue in the current studies was the high skew of some of the 940measures. For example, the ~~sensations~~ sensations and signs of tears and 941goosebumps were rarely reported, skewing the distributions. To check the 942robustness of the findings for such measures, these analyses were

943therefore repeated using non-parametric models. The main results did not
944differ substantially from the multilevel models (see Supplementary Tables
94515 and 17). Thus, this problem does not appear to invalidate the obtained
946findings.

947**5.3 Implications and directions for future research**

948**Implications for emotion research.** The current studies have
949implications for theories of emotions in general and for emotional
950constructs similar to kama muta in particular. The evidence that hundreds
951of participants report being *moved* by cute videos seems difficult to
952reconcile with Cova & Deonna's (Cova and Deonna, 2014; Deonna, 2018)
953claim that *being moved* consists of the experience of a positive,
954transcendentally significant core value. They write that *being moved* (or
955*être ému*) "is the experience of a positive core value . . . perceived by the
956moved subject as standing out" (Cova and Deonna, 2014, p. 447). They
957continue, "'Core values' may be said to be those that a moral community
958treats as possessing 'transcendental significance' which preclude
959comparisons, trade-offs, or indeed any mingling with more mundane
960values" (see also Deonna, 2018). This conceptualization appears to
961preclude participants reporting that they are *moved* by cute kittens and
962puppies.

963Likewise, Haidt (2000; Algoe and Haidt, 2009) theorizes that the emotion
964of *elevation* occurs as a result of observing or hearing about "moral
965beauty" or acts that reveal "humanity's higher or better nature." Haidt
966(2003, p. 281) points out that "the popular press and Oprah Winfrey talk
967about it (as being touched, moved, or inspired)". He characterizes
968elevation as involving a feeling of opening up and merging with others,
969and being motivated to help others. Haidt (2003, p. 282) indicates that
970elevation is recognizable by the "warm or glowing feeling in the chest,"
971along with "tingling". There are many measures of elevation, but most of
972them include ratings of *being moved,* while many include sensations and
973signs such as warmth in the chest, a lump in the throat, and goosebumps
974or chills (Pohling and Diessner, 2016; Thomson and Siegel, 2017; see
975Zickfeld et al. 2018b). These sensations and signs and labels are among
976the sensations and signs and labels that many previous studies have
977shown to characterize kama muta (e.g., Schubert et al., 2016; Seibt et al.,
9782018; Zickfeld et al., 2018a). Thus, the elevation construct seems to
979overlap considerably with kama muta. To the extent that the emotion
980states posited by the elevation and kama muta theories are
981phenomenologically similar, it appears inconsistent with elevation theory
982to find that people report that they are *moved, touched,* or have warm
983sensations in the chest when they look at images or videos of cute kittens
984or puppies. Cute kittens and puppies, wonderful as they are, probably do
985not instantiate either moral beauty or humanity's higher nature.

986Finally, the evidence for a clear and definite *but unnamed* emotional
987response to cuteness appears inconsistent with definitions and theories
988that emotions consist of the labelling of sensations and signs (Barrett,

989 2017; Cannon, 1927; Lang, 1994). It is crucial to those theories that all 990 emotional experiences have readily accessible lexical names; for these 991 theories, a person must give a name to their sensations and signs, or else 992 the person is not experiencing an emotion. Yet neither Americans nor 993 Norwegians can readily name what it is they feel when they see something 994 cute; they simply characterize the evocative target with an adjective such 995 as *cute, adorable,* or *sweet*. Hence, our findings that Americans and 996 Norwegians nevertheless do have a definite emotion in response to 997 cuteness poses a challenge to the labelling-of-sensations and signs 998 theories. In contrast to Norwegian or English, an emotional response to 999 cuteness has a definite name in Hungarian, Finnish, Estonian, and 1000 Telugu Uralic languages name this emotion: *elérzékenyült* in Hungarian, 1001 *heldinud* in Estonian, *heltyä* in Finnish. So it would be interesting to see 1002 whether kama muta responses to cuteness are stronger for speakers of 1003 these languages – perhaps labeling, while not essential, amplifies 1004 awareness, memory, and reporting of an emotion.

1005 The finding that the *Kindchenschema* evokes kama muta supports 1006 McDougall's (1991; 1923) and our speculation that the maternal bonding 1007 mechanism is the root of kama muta, which, in *Homo sapiens,* evolution 1008 has freed from the limitations of that dyad and made generatively 1009 available to afford all kinds of CS bonding.

1010 **Future directions: Investigating the mechanism behind kama** 1011 **muta as a cuteness response.** Why does cute animals evoke kama 1012 muta? In one line of research, Kindchenschema facial features are thought 1013 to be adaptive because it they motivates tender caretaking, empathy for, 1014 and protection of one's own vulnerable, needy offspring, and, in a few 1015 species, other infant close kin (Bradshaw and Paul, 2010; Leitão and 1016 Castelo-Branco, 2010; Lorenz, 1943; Sherman and Haidt, 2011). This 1017 explains why the Kindchenschema configuration motivates caretaking, 1018 which has been repeatedly found (Glocker et al., 2009; Nittono et al., 1019 2012; Sherman et al., 2013; Volk et al., 2007). For example, Volk et al. 1020 (2007) found that cuteness predicts willingness to adopt infants, while 1021 both Sherman et al. (2013) and Nittono et al. (2012) demonstrated that 1022 cuteness can increase carefulness (a proxy for caregiving behavior). 1023 Furthermore Consistent with this, facial cuteness (Keating et al., 2003) and 1024 facial *vulnerability* (van de Ven et al., 2016) evoke similar helping-related 1025 behaviors. The Stereotype Content Model (SCM; Cuddy et al., 2007; Fiske, 1026 2015) makes a conceptual connection between perceived vulnerability and 1027 care, proposing that perceived target warmth and low competence result 1028 in pity and sympathy that in turn elicits helping and protective behavior 1029 (Fiske, 2012). Signs of vulnerability—being easily harmed by external 1030 forces—include young age, small size, small weight, signs of fragility, and 1031 weakness, whose effects are enhanced by environmental cues of 1032 imminent danger (Dijker, 2014). Concomitantly, people tend to associate 1033 the Kindchenschema with fragility, physical weakness, naiveté, warmth, 1034 and kindness (Berry and McArthur, 1985).

1035 However, in another line of research, Sherman and Haidt (2011) argue
1036 that cuteness is a social engagement response; Rather than cuteness only
1037 evoking parental caretaking motives, cuteness evokes
1038 engagement/affiliative motives (such as to talk to, or play with, care for,
1039 the cute entity). They argue for this by citing literature showing thatIn line
1040 with this proposal, infants at the peak of their vulnerability were rated as
1041 less cute than six to ten-month-old babies (Hildebrandt & Fitzgerald, 1979;
1042 Sanefuji et al., 2007). Additionally, babies displaying negative emotions
1043 (such as crying) were rated as less cute than children displaying positive
1044 emotions (such as smiling; Hildebrandt, 1983). From this they conclude
1045 that, as six to ten-month-old babies are more social, and smiling babies
1046 express more sociality, it is human sociality that is motivated by the
1047 cuteness response, and not caretaking. Furthermore, Sherman and Haidt
1048 (2011) predict that cute agents are anthropomorphized as social
1049 connection is an important motivator for anthropomorphism (Epley, Akalis,
1050 Waytz, & Cacioppo, 2008).

1051 The studies in the current paper were not designed to compare the
1052 vulnerability and the social engagement accounts, as the main focus was
1053 to show that kama muta in fact is evoked by cute agents. Kama muta
1054 theory claims that the emotion motivates persons to devote themselves to
1055 a communal sharing relationship. Such a relationship is characterized by
1056 responding to the needs of the relationship partner and it is also
1057 intrinsically rewarding. Given that the needs of human infants include not
1058 only being fed and protected, but also playing and talking, all of these
1059 motivations are likely to be higher for cuter agents. Furthermore, as
1060 communal sharing is an intrinsically motivating and enjoyable relation,
1061 persons should also experience joy when interacting with cute agents.
1062 Therefore, fFuture studies should investigate the mechanism behind kama
1063 muta responses to cuteness and compare by distinguishing more clearly
1064 between these two different theoretical accountsmotivations evoked by
1065 cuteness.

1066 **Other future directions.** Future studies should also seek evidence that
1067 the a kama muta response evoked by cuteness motivates people to
1068 extend care, help, and compassion to the targets or others. Cuteness is
1069 frequently linked to perceived vulnerability and distress (e.g. Gross, 1997;
1070 Nenkov and Scott, 2014), which is hypothesized to evoke pity and
1071 sympathy (Cuddy et al., 2007). Children for instance, as cute stimuli, are
1072 inherently vulnerable although they might not be at their cutest when
1073 most vulnerable as Sherman & Haidt (2011) point out in a review of
1074 cuteness literature.

1075 While the goal of these studies was to test whether kama muta is the
1076 emotion evoked by seeing cuteness, this was only tested with videos of
1077 animals. It remains to be shown whether the obtained results hold for
1078 other cute agents, notably human babies, children, some adults, and
1079 artistic creations such as cartoon characters.

1080A final direction for subsequent research goes into a clinical domain.
1081Animal Assisted Therapy improves emotional wellbeing (Nimer and
1082Lundahl, 2007). It would be interesting to see whether kama muta
1083mediates this therapeutic effect. There are also programs that bring
1084animals to visit hospital patients, and ones that bring animals to sooth
1085students stressed by exams. It might be that the benefits of interaction
1086with affectionate animals is due to people's kama muta responses to
1087them.

1088**5.4 Conclusion**

1089Features such as large eyes, a small nose, facial features low on the head
1090(leaving a high forehead), a round face, and a large head comprise the
1091*Kindchenschema* or baby schema; people perceive this schema as cute. —
1092Such cute features are neotenous, meaning they are characteristic of
1093infants and gradually diminish with maturation. Mammalian survival
1094depends on parents' Kindchenschema-induced motivation to nurture and
1095protect their offspring. Yet this emotion has been little studied in humans.
1096We postulated that ~~the~~ a typical ~~n~~ ~~predominant~~ emotional response to
1097cuteness is kama muta. Kama muta is evoked by a sudden intensification
1098of a communal sharing ~~CS~~ relationship, and often denoted in English as
1099*being touched*, *moved*, or having a *heartwarming* experience. The present
1100project further hypothesized that communal sharing interactions would
1101increase cuteness perceptions of cute animals, and that kama muta would
1102mediate this effect. Two experimental studies provided strong
1103experimental support for both hypotheses.

1104In sum, the evidence of kama muta responses to cute kittens and puppies
1105poses intriguing challenges to existing understandings of emotions. If
1106these experiments are not persuasive, one only needs to open a browser
1107and search for "cute images and videos". The enormous amount of cute
1108content on the Internet, the number of views and likes, and the responses
1109that people post in response to them provide overwhelming evidence for
1110the ubiquity and impact of kama muta responses to cuteness.

6   Tables

Table 1

Study 1: Intercorrelations of the Kama Muta Components, Cuteness Ratings, and Trait Empathic Concern in Cute (left) and Non-Cute (right) Conditions.

	Labels	Sensations and Signs	Motivation	Positive Valence	Cuteness
Sensations and Signs	.73***/.77***				
Motivation	.73***/.71***	.79***/.74***			
Positive Valence	.48***/.47***	.57***/.45***	.48***/.48***		
Cuteness	.34***/.29***	.42***/.21**	.36***/.31***	.68***/.45***	
Empathic concern	.27***/-.01	.28***/.04	.31***/.08	.43***/.04	.43***/-.10

Note. *** $p < .001$, ** $p < .01$ (2-tailed).

Table 2

Study 1: Prediction of Cuteness, Moved, Sensations and Signs, Motivation, and Positive Valence by Condition, Order, Empathic Concern (EC), and their Two-Way Interactions using Mixed Models

Predictor	F	df1,df2	*p*	B [95% CI]	*d* (*r*†)
		Cuteness (Model 1)			
Condition	122.43	1,6	< .001	3.85 [3.18, 4.51]	3.04
Order	25.09	1,209	< .001	-.50 [-.69, -.30]	-.22
EC	33.21	1,211	< .001	.37 [.25, .50]	.15†
Condition*Order	5.94	1,211	.02	.58 [.11, 1.04]	-
Condition*EC	36.37	1,210	< .001	.66 [.44, .87]	-
Order*EC	.53	1,209	.468	.08 [-.13, .30]	-
		Labels (Model 2)			
Condition	104.84	1,4	< .001	1.61 [1.31, 1.92]	1.15
Order	4.77	1,207	.03	-.23 [-.43, -.02]	-.14
EC	12.89	1,212	< .001	.30 [.14, .46]	.17†
Condition*Order	2.62	1,213	.107	.49 [-.10, 1.09]	-
Condition*EC	27.06	1,208	< .001	.60 [.37, .82]	-
Order*EC	.01	1,207	.922	-.01 [-.23, .22]	-
		Sensations and Signs (Model 3)			
Condition	53.83	1,4	.001	.57 [.42, .72]	.74
Order	4.12	1,206	.04	-.10 [-.20, -.005]	-.13
EC	9.65	1,212	.002	.15 [.06, .25]	.17†
Condition*Order	3.59	1,212	.06	.34 [-.01, .69]	-
Condition*EC	20.98	1,207	< .001	.25 [.14, .36]	-
Order*EC	.66	1,206	.419	.04 [-.06, .15]	-
		Motivation (Model 4)			
Condition	28.00	1,4	.005	.79 [.49, 1.09]	.65
Order	.01	1,207	.929	-.01 [-.17, .15]	-.01
EC	10.68	1,213	.001	.25 [.10, .40]	.18†
Condition*Order	4.65	1,213	.03	.60 [.06, 1.14]	
Condition*EC	18.62	1,208	< .001	.39 [.21, .56]	
Order*EC	.40	1,207	.527	.06 [-.12, .24]	
		Positive Valence (Model 5)			
Condition	61.06	1,5	< .001	2.17 [1.63, 2.71]	1.18
Order	4.16	1,208	.04	-.27 [-.53, -.01]	-.13
EC	22.62	1,213	< .001	.51 [.30, .72]	.22†
Condition*Order	11.45	1,213	< .001	1.32 [.56, 2.08]	-

Condition*EC	32.01	1,209	< .001	.83 [.54, 1.11]	-
Order*EC	.12	1,208	.729	.05 [-.23, .34]	-

Note. All outcome variables were measured on scales from 0 to 6. All factors were contrast coded (condition: -.5 = control; .5 = cute, order: -.5 = first; .5 = second). The covariate (EC) was measured on a scale from 1 to 5 and mean centered. For all models intercepts were allowed to vary randomly across participants and video. Values denoted with † represent correlation coefficients.

Table 3

Descriptive Statistics for the Kama Muta Components, Cuteness Ratings, and Trait Empathic Concern in Study 1

Scale	Cute		Non-cute	
	M (SE)	95 % CI	M (SE)	95% CI
Labels	2.07 (.11)	[1.81, 2.34]	.49 (.11)	[.23, .76]
Sensations and Signs	.93 (.06)	[.79, 1.08]	.38 (.06)	[.24, .53]
Motivation	1.15 (.12)	[.88, 1.43]	.37 (.12)	[.10, .65]
Positive Valence	4.07 (.19)	[3.61, 4.52]	1.95 (.19)	[1.49, 2.40]
Cuteness	4.72 (.25)	[4.12, 5.32]	.94 (.25)	[.34, 1.55]
Empathic concern	3.80 (.04)	[3.72, 3.89]	3.80 (.04)	[3.72, 3.89]

Note. Participants were asked to indicate their agreement on scales ranging from 0 to 6, with the exception of empathic concern which was rated from 1 to 5. Empathic concern was measured once, hence the same values in both conditions.

1111Table 4

Study 2: Intercorrelations of the Kama Muta Components, Cuteness Ratings, Trait Empathic Concern, and Humanness in the High CS (left) and Low CS (right) Conditions.

	Communal Sharing	Labels	Sensations and Signs	Motivation	Positive Valence	Cuteness	Empathic Concern
Labels	.63***/.79***						
Sensations and Signs	.53***/.59***	.72***/.73***					
Motivation	.56***/.61***	.59***/.66***	.58***/.58***				
Positive Valence	.57***/.49***	.57***/.68***	.42***/.51***	.46***/.45***			
Cuteness	.47***/.35***	.53***/.46***	.41***/.39***	.36***/.38***	.56***/.56***		
Empathic Concern	.15*/.00	.24**/-.01	.24**/.06	.18*/.04	.22**/.02	.42***/.11	
Humanness	.52***/.50***	.44***/.44***	.47***/.33***	.32***/.33***	.28***/.31***	.17**/.20*	.15*/.14

1112*Note.* * *p* < .05, ** *p* < .01, *** *p* < .001 (two-tailed). Also note that sample sizes for the correlations differ slightly 1113because of missing values.

1114Table 5

1115*Study 2: Prediction of the Individual Kama Muta Components, Cuteness, and*
1116*Humanness by Animal Type, Order, Video Version, Empathic Concern (EC) and*
1117*the Interactions Condition x Order, and Animal Type x Version using Mixed*
1118*Models*

Predictor	F	df1,df2	*p*	B [95% CI]	*d* (*r*†)
		Communal Sharing (Model 1)			
Condition	107.54	1,134	< .001	1.58 [1.28, 1.88]	1.02
Animal Type	.46	1,133	.499	.10 [-.19, .40]	.06
Order	3.17	1,133	.08	-.27 [-.57, .02]	-.16
Video Version	.13	1,254	.715	.06 [-.28, .41]	.04
Condition*Order	.69	1,137	.406	-.35 [-1.17, .47]	-
Animal Type*Version	9.69	1,232	.002	1.07 [.40, 1.74]	-
		Cuteness (Model 2)			
Condition	50.50	1,133	< .001	.79 [.57, 1.00]	.73
Animal Type	4.43	1,133	.037	-.23 [-.45, -.02]	-.20
Order	8.51	1,133	.004	-.32 [-.54, -.11]	-.29
Video Version	.75	1,260	.388	.11 [-.13, .34]	.09
EC	13.19	1,133	< .001	.39 [.18, .59]	.22†
Condition*Order	.007	1,135	.931	.02 [-.51, .56]	-
Animal Type*Version	.30	1,244	.584	-.13 [-.60, .34]	-
		Labels (Model 3)			
Condition	26.95	1,133	< .001	.70 [.44, .96]	.44
Animal Type	.43	1,133	.515	-.09 [-.35, .17]	-.05
Order	6.71	1,133	.01	-.35 [-.61, -.09]	-.22
Video Version	1.03	1,227	.310	-.17 [-.50, .16]	-.11
Condition*Order	.52	1,136	.472	-.33 [-1.23, .57]	-
Animal Type*Version	1.33	1,206	.249	.37 [-.26, 1.01]	-

Predictor	F	df1,df2	*p*	B [95% CI]	*d* (*r*†)
			Sensations and Signs (Model 4)		
Condition	9.88	1,124	.002	.26 [.10, .42]	.30
Animal Type	.04	1,124	.842	-.02 [-.18, .14]	-.02
Order	3.67	1,124	.06	-.16 [-.32, .002]	-.18
Video Version	.35	1,231	.552	-.06 [-.25, .14]	-.07
Condition*Order	.27	1,129	.602	-.13 [-.62, .36]	-
Animal Type*Version	.46	1,208	.497	.13 [-.24, .51]	-
			Humanness (Model 5)		
Condition	4.62	1,134	.03	.32 [.03, .62]	.18
Animal Type	2.50	1,134	.12	.24 [-.05, .53]	.13
Order	3.81	1,134	.053	-.29 [-.59, -.002]	-.16
Video Version	0.20	1,223	.66	.08 [-.28, .45]	.05
Condition*Order	1.70	1,137	.20	-.68 [-1.71, .35]	-
Animal Type*Version	1.01	1,204	.32	.36 [-.34, 1.07]	-
			Motivation (Model 6)		
Condition	15.87	1,133	< .001	.52 [.27, .77]	.32
Animal Type	5.06	1,133	.03	-.29 [-.55, -.04]	-.18
Order	9.76	1,133	.002	-.41 [-.66, -.16]	-.25
Video Version	.05	1,217	.818	-.04 [-.36, .29]	-.02
Condition*Order	.14	1,136	.713	-.18 [-1.11, .76]	-
Animal Type*Version	2.59	1,197	.109	.51 [-.11, 1.13]	-
			Positive Valence (Model 7)		
Condition	36.98	1,131	< .001	1.02 [.70, 1.35]	.60
Animal Type	6.01	1,131	.02	-.41 [-.74, -.09]	-.23
Order	4.51	1,131	.04	-.36 [-.69, -.03]	-.20
Video Version	1.25	1,255	.265	-.22 [-.60, .16]	-.12
Condition*Order	.26	1,134	.611	-.24 [-1.15, .67]	-
Animal Type*Version	.00	1,232	.990	-.005 [-.77, .76]	-

1119 *Note.* All outcome variables were measured on scales from 0 to 6. All factors
1120 were contrast coded (condition: -.5 = low CS, .5 = high CS; animal type: -.5 =
1121 cat, .5 = dog; order: -.5 = first, .5 second; video version: -.5 = version 1, .5 =
1122 version 2). The covariate (EC) was measured on a scale from 1 to 5 and mean
1123 centered. For all models intercepts were allowed to vary randomly across
1124 participants. Values denoted with † are correlation coefficients.

1125Table 6

1126*Descriptive Statistics for the Kama Muta Components, Cuteness Ratings,*
1127*Humanness, and Trait Empathic Concern in Study 2*

Scale	high CS		low CS	
	M (SE)	95 % CI	M (SE)	95% CI
Communal Sharing	2.90 (.13)	[2.65, 3.16]	1.30 (.13)	[1.04, 1.56]
Labels	2.31 (.13)	[2.05, 2.57]	1.60 (.13)	[1.33, 1.86]
Sensations and Signs	2.31 (.13)	[2.05, 2.57]	1.60 (.13)	[1.33, 1.86]
Motivation	1.92 (.14)	[1.64, 2.19]	1.36 (.14)	[1.09, 1.63]
Positive Valence	4.40 (.14)	[4.12, 4.69]	3.36 (.14)	[3.08, 3.64]
Cuteness	4.90 (.09)	[4.72, 5.08]	4.08 (.09)	[3.90, 4.26]
Humanness	2.55 (.15)	[2.25, 2.85]	2.21 (.15)	[1.91, 2.51]
Empathic concern	3.96 (.05)	[3.85, 4.07]	3.96 (.05)	[3.85, 4.07]

1128*Note.* Participants were asked to indicate their agreement on scales ranging
1129from 0 to 6, with the exception of empathic concern, which was from 1 to 5.
1130Empathic concern was measured once, hence the same values in both
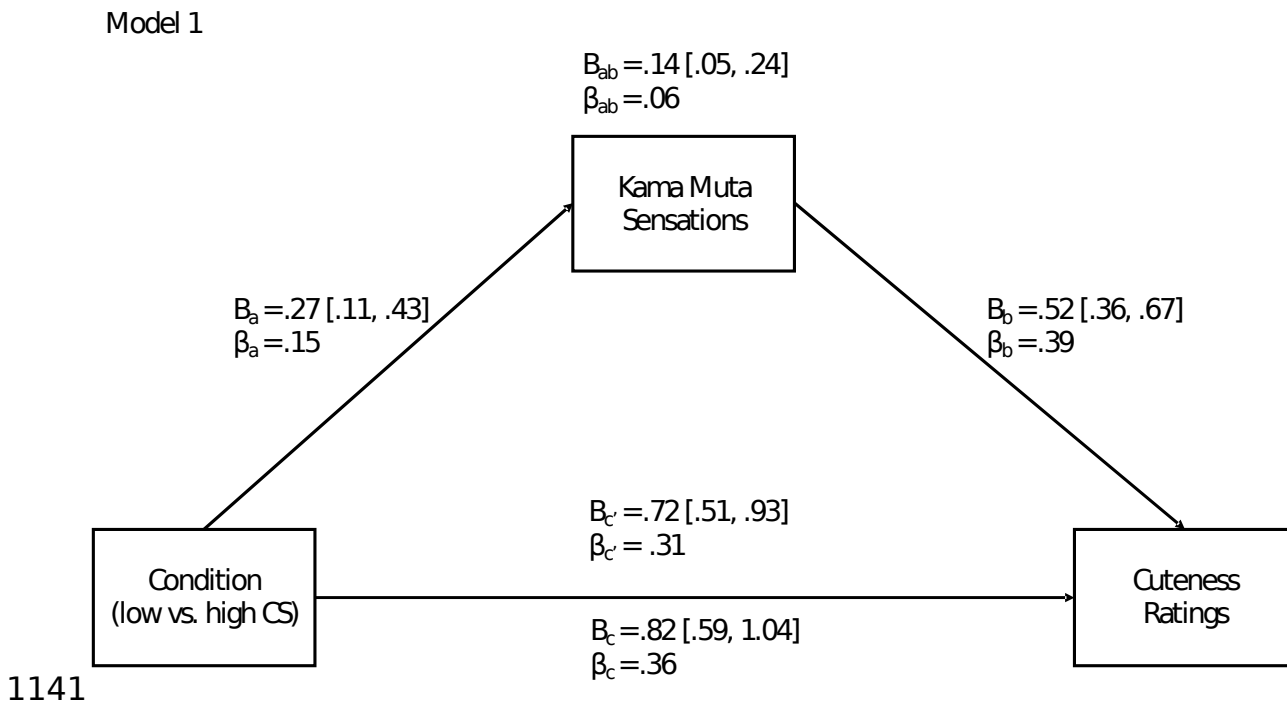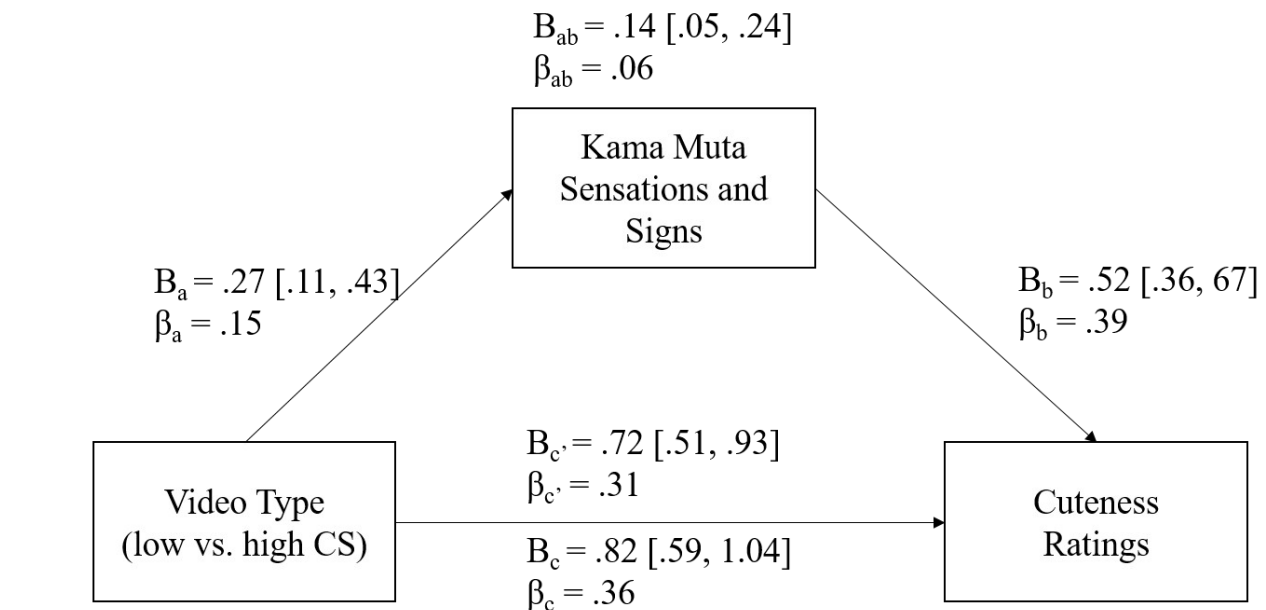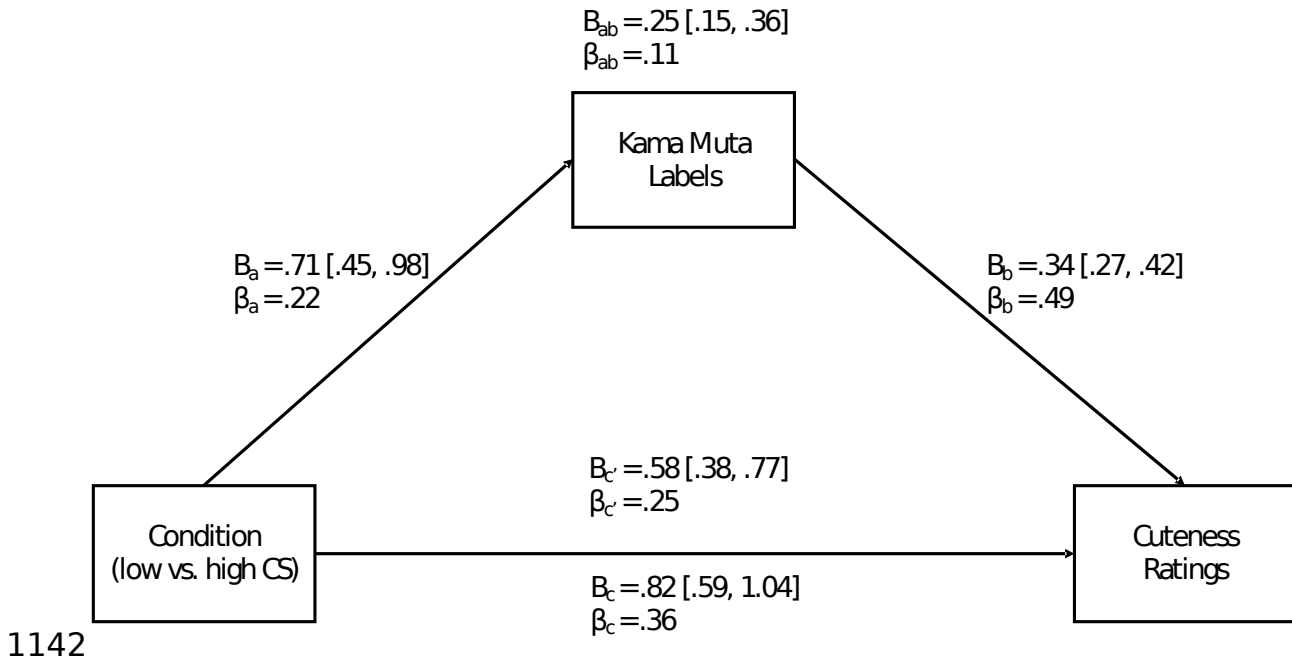1131conditions.
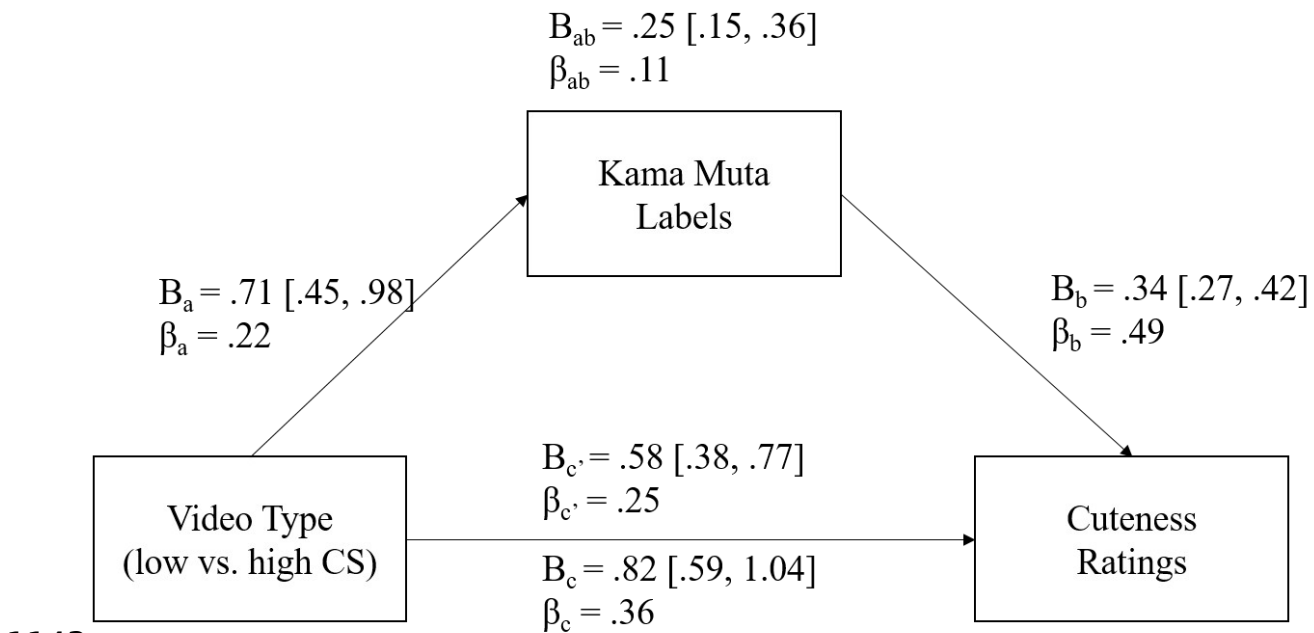
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1139**7** **Figure**

Model 1

$B_{ab} = .14 [.05, .24]$
$\beta_{ab} = .06$

Kama Muta
Sensations and
Signs

$B_a = .27 [.11, .43]$
$\beta_a = .15$

$B_b = .52 [.36, 67]$
$\beta_b = .39$

Video Type
(low vs. high CS)

$B_{c'} = .72 [.51, .93]$
$\beta_{c'} = .31$

Cuteness
Ratings

$B_c = .82 [.59, 1.04]$
$\beta_c = .36$

1140

Model 1

$B_{ab} = .14 [.05, .24]$
$\beta_{ab} = .06$

Kama Muta
Sensations

$B_a = .27 [.11, .43]$
$\beta_a = .15$

$B_b = .52 [.36, .67]$
$\beta_b = .39$

Condition
(low vs. high CS)

$B_{c'} = .72 [.51, .93]$
$\beta_{c'} = .31$

Cuteness
Ratings

$B_c = .82 [.59, 1.04]$
$\beta_c = .36$

1141

Model 2

$B_{ab} = .25 [.15, .36]$
$\beta_{ab} = .11$

Kama Muta
Labels

$B_a = .71 [.45, .98]$
$\beta_a = .22$

$B_b = .34 [.27, .42]$
$\beta_b = .49$

$B_{c'} = .58 [.38, .77]$
$\beta_{c'} = .25$

Condition
(low vs. high CS)

$B_c = .82 [.59, 1.04]$
$\beta_c = .36$

Cuteness
Ratings

1142

Model 2

$B_{ab} = .25 [.15, .36]$
$\beta_{ab} = .11$

Kama Muta
Labels

$B_a = .71 [.45, .98]$
$\beta_a = .22$

$B_b = .34 [.27, .42]$
$\beta_b = .49$

$B_{c'} = .58 [.38, .77]$
$\beta_{c'} = .25$

Video Type
(low vs. high CS)

$B_c = .82 [.59, 1.04]$
$\beta_c = .36$

Cuteness
Ratings

1143

1144 *Figure 1.* Mediation analyses of H3. Path diagram showing the direct (c'), indirect
1145 (a*b), and total unstandardized (B) and standardized (β) effect (c) of video
1146 content on cuteness ratings and its partial mediation of the kama muta
1147 ~~sensations~~ sensations and signs (model 1), and the kama muta labels (model 2).

1148

8   Conflict of Interest

The authors declare that the research was conducted in the absence of any commercial or financial relationships that could be construed as a potential conflict of interest.

9   Author Contributions

KKS, BS and APF designed the studies. KKS produced the stimulus material, programmed and conducted the studies. KKS and BS wrote the introduction. JKB and JHZ analysed the data, wrote up the methods and results, and created the tables, figures and supplemental material. All authors contributed to the general discussion and edited the paper.

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1450

13   Supplementary Material

1452 The Supplementary Material for this article can be found online at:
1453 https://www.dropbox.com/s/z3ngeuoqn8o9d6k/Too%20cute%20for%20words
1454 %20Supplementary_Material%200.2.docx?dl=0

1   Data Availability Statement

1456   All datasets, stimulus material
1457   and procedures are available at
1458   our OSF project page:
1459 https://osf.io/bjuva/.