Too Cute for Words

Cuteness Evokes the Kama Muta Emotion and Motivates Communal Sharing

Kamilla Knutsen Steinnes

Submitted as a Master Thesis in Social Psychology

Department of Psychology

University of Oslo

May 2017

Year: 2017

Title: Too Cute for Words: Cuteness Evokes the Kama Muta Emotion and Motivates Communal Sharing

Author: Kamilla Knutsen Steinnes

http://www.duo.uio.no/

Print: Reprosentralen, University of Oslo

Abstract

Infantile attributes, such as large eyes, chubby cheeks, and a small nose and mouth, comprise the visual *Kindchenschema* and are perceived as cute. People are highly sensitive to such features as they stimulate approach and care, which is triggered by an emotional response. This emotional response to cuteness has generally been ignored as a research topic and has consequently remained unidentified. Attempting to address this research gap, the current thesis postulates that cuteness typically evokes *kama muta*; a social-relational emotion that often is labeled in English as *moved*, *touched*, and *heartwarming*. What evokes kama muta is sudden intensification of a communal sharing relationship. Hence, it is further hypothesized that this theorized kama muta response to cuteness is mediated by observing an affectionate interaction (i.e., intensification of communal sharing). These predictions were experimentally investigated in two respective studies. Study 1 revealed that cute videos evoked significantly more kama muta than non-cute videos ($p < .001$), while Study 2 found that the combination of cuteness and communal sharing interaction evoked significantly more kama muta than cuteness alone, as measured by bodily sensations ($p = .005$) and subjective feelings of being moved ($p < .001$). In sum, Kindchenschema and signs of communal sharing evoke kama muta, which people label in this context as perception of cuteness.

Keywords: Kindchenschema; cuteness; kama muta; being moved; communal sharing

Summary

Name of Author: Kamilla Knutsen Steinnes **Name of Main Supervisor**: Beate Seibt

Name of Co-supervisor: Johanna Katarina Blomster **Name of External Supervisor**: Alan Page Fiske

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Kindchenschema refers to a set of physical infantile features such as large eyes, a round face, and a small nose and mouth, which people perceive as cute. These visual characteristics draw attention and evoke an emotional response. Despite its prevalence, the emotion evoked by cuteness has not yet been identified or experimentally characterized. Attempting to address this gap in research, the current thesis posits that cuteness typically evokes *kama muta*; a social-relational emotion that often is labeled in English as *moved*, *touched*, and *heartwarming.* What evokes kama muta is sudden intensification of communal sharing, characterized by trust, sharing and unity. Thus, it is further predicted that this theorized kama muta response to cuteness is mediated by observing an affectionate interaction (i.e., intensification of communal sharing). Two preliminary studies and two experiments were conducted in order to test these hypotheses.

The first preliminary study used semi-structured interviews to explore potential relationships between cuteness and kama muta. The second preliminary study used an available dataset to examine if there was a correlation between cuteness ratings of one sample and self-reports of being moved or touched by a different sample. Results from both exploratory studies suggested a co-occurrence of cuteness and kama muta, which subsequently encouraged the implementation of two experimental studies.

Study 1 investigated whether or not kama muta could be evoked by cuteness. Americans recruited through Amazon Mechanical Turk and Norwegians recruited through online snowball sampling participated in a within-subjects design and were presented with a cute video and a non-cute video. After each video, they were asked to indicate their cuteness perception of the video and how moved, touched, and heartwarmed they felt (as a measure for kama muta). The results revealed that cute videos evoked significantly more kama muta than non-cute videos ($p < .001$).

Study 2 tested whether cuteness and kama muta ratings were higher in response to observation of an affectionate social interaction. Norwegian participants were recruited at the University of Oslo and through an online snowball sample. They were asked to watch two videos featuring cute animals, either indicating high or low communal sharing. Responses to both videos regarding cuteness perception and kama muta feelings were collected. The study

found that the videos with high communal sharing evoked significantly more kama muta compared to low communal sharing videos, as measured by physiological sensations typically accompanying kama muta ($p = .005$) and subjective feelings of being moved ($p < .001$).

Thus, taken together these studies provide evidence that the kama muta emotion is reported as perception of cuteness and that observing communal sharing relations contribute to both the kama muta emotions and ratings of cuteness.

The current thesis was part of the kama muta project and the data was collected independently by the author.

Acknowledgements

First of all, I would like to thank my supervisor Beate Seibt, co-supervisor Johanna Katarina Blomster, and external supervisor Alan Page Fiske, for their continual guidance and crucial feedback throughout this project; helping me far beyond what was expected of them. I also want to recognize Janis Zickfeld and Thomas Schubert for their invaluable help with the design and choice of statistical analyses for both Study 1 and 2.

My sincerest gratitude is extended to Sigrun Marie Moss for her immensely detailed and helpful comments to the exploratory interview study. I also want to thank Tim Wildschut and Ad Vingerhoets for sharing the data set used in the pilot test with me and the rest of the kama muta research lab. Furthermore, I would like to extend my gratitude to the Junior Researcher Programme (JRP) and the attendees at the JRP Poster Session 2016 for having me present the results of Study 1, and consequently for the helpful comments I received regarding Study 2.

I also want to thank everyone who assisted in the stimuli production of Study 2. I wish to acknowledge my two sisters for their assistance in video editing and for providing filming equipment. I am especially grateful towards Katrine Lie, Magnor Rasmussen, Asbjørn Andersen, Kathrine Karlsen Kramer, and their respective families, for welcoming me into their homes to videotape their pets. Without this help, I would have been unable to carry out the second study of this project.

Finally, special appreciation goes out to my wonderful family for their constant support, love, and encouragement throughout the time I've spent working on this project. To my sisters; I deeply appreciate your intelligence, beauty, and eternal friendship. To my parents; I greatly admire your strength, morality, and how you have taught me the value of hard work and an education. Thank you all for always inspiring me to pursue my aspirations.

The current project was financially supported by the Department of Psychology at the University of Oslo, through a summer scholarship awarded to the author and through subsidiaries granted to Beate Seibt.

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Kama Muta: An Emotional Response to Cuteness

> *Cuteness overload*: An overload of cuteness; when something or someone is so super cute that there is no word for it.
>
> - Urban Dictionary, May 13, 2008[1]

> *Cute attack*: A sensational response incited by the witnessing of something cute, precious, fuzzy or otherwise snuggly. Symptoms include chills traveling up the spine and through the fingertips, impulsive smiling and jerking of the limbs. Severe cases of cute attacks can cause high-pitched squeals and temporary spasms of the entire nervous system, forcing its victim to crumble helplessly to the ground.
>
> - Urban Dictionary, December 14, 2009[2]

The emotion people typically experience when they perceive something or someone as cute is widely acknowledged by marketing professionals and exploited in commercial advertisement (Buckley, 2016; Duffy & Burton, 2000; Nittono, 2016; Nittono, Fukushima, Yano, & Moriya, 2012), environmental campaigns (Huddy & Gunnthorsdottir, 2000; Ruanguttamanun, 2013), and product design (Nenkov & Scott, 2014b). Practitioners in these fields target this particular emotion because it strongly motivates approach. All of the aforementioned areas effectively and intentionally utilize cues of cuteness in an attempt to evoke this response, usually with great success. Indeed, this emotion is so powerful that it sometimes results in damaging behavior. As an example, some Internet users enjoy viewing cute animal videos even if the videos display illegal activities relating to harmful effects on an endangered animal species (Nekaris, Campbell, Coggins, Rode, & Nijman, 2013). Additionally, the Internet is full of videos and images of cute babies and animals that supposedly evoke this emotion. There are also countless web pages and forums exclusively dedicated to the viewing, sharing and discussion of cute content. The influence of this emotion is even expanding into the professional job market by creating jobs that are solely based on cuteness. Large Internet companies like Buzzfeed employ people under titles like "Associate Animals Editor" and "Beastmaster" (Baron, 2014). Their job description entails ranking and selecting cute videos and images for publication that are most likely to be shared by Internet users in various social media platforms. Similar to modeling agencies, there are a growing number of animal agencies, giving rise to cute celebrity pets (Lobato & Meese, 2014). Furthermore, the video-sharing website YouTube is full of videos showing people, usually children, reacting with tears of joy when they meet and touch cute animals.[3] Moreover, the positive affective response to

[1] Retrieved from: http://www.urbandictionary.com/define.php?term=cuteness%20overload
[2] Retrieved from: http://www.urbandictionary.com/define.php?term=Cute%20Attack
[3] See for example: https://www.youtube.com/watch?v=D6r9cst8OMU; https://www.youtube.com/watch?v=PjmlmyI56-k

cuteness is evident in the International Affective Picture System (IAPS), widely used in emotion research (Lang, Bradley, & Cuthbert, 1999): the seven images rated highest in positive valence are all images of cute animals and human babies.

Consequently, cuteness as a characteristic has recently been termed one of the most fundamental influences determining people's behavior (Kringelbach, Stark, Alexander, Bornstein, & Stein, 2016). Despite labeling it as the "cuteness response" (Sherman & Haidt, 2011), "cute-affect", "aww", or "cute-emotion" (Buckley, 2016), the emotion that cuteness evokes has not yet been identified or experimentally characterized. Indeed, psychological research on this particular emotion has recently been requested (Buckley, 2016). So which emotion is it that people feel exactly when they observe something or someone cute?

A recent emotional construct called *kama muta* (Sanskrit for "moved by love") postulates that the emotion which people may label *feeling moved* or *touched,* and similar terms in English and other languages, occurs when a communal sharing relationship suddenly intensifies (Seibt, Schubert, Zickfeld, & Fiske, 2017). Kama muta is characterized as a positive emotion that people seek out, like to evoke in others, and like to experience together with others. Cute animals and babies similarly stimulate approach behavior, draw attention, and evoke caretaking in the perceiver. Likewise, kama muta motivates care. Mammals must care for their young, and Konrad Lorenz (1943) suggested that certain physical cues of cuteness, which he termed *Kindchenschema* or baby schema, evoke caretaking.

Hence, in two exploratory and two experimental studies the current project will attempt to identify which emotion people typically experience in response to cuteness, hypothesizing that the answer is kama muta.

Cuteness

Cuteness was introduced as an academic concept in 1943 by the Austrian ethologist Konrad Lorenz. He suggested that a set of infantile physical characteristics termed *Kindchenschema* evokes a positive emotional reaction in humans which results in caretaking (Lorenz, 1943). Such features include a relatively large head compared to body size, a high and protruding forehead, large eyes, chubby cheeks, a small nose and mouth, short and thick extremities and a plump body shape (Glocker et al., 2009), although recent research suggests that infantile sounds and smells are also components of the Kindchenschema[4] (see Kringelbach et al., 2016 for a review). Presumably attentiveness to cute signals is adaptive because it motivates caretaking, tenderness and empathy, ordinarily for one's own offspring (Bradshaw & Paul, 2010; Leitao & Castelo-Branco, 2010). A long line of psychological studies has corroborated this claim

[4] Despite recent research indicating that the Kindchenschema might include auditory and olfactory aspects (Kringelbach et al 2016), the current thesis uses the term cuteness only in reference to the visual characteristics of the Lorenzian Kindchenschema.

that infantile attributes are perceived as cute (for example Gross, 1997; Pittenger, 1990; Volk, Lukjanczuk, & Quinsey, 2007).

The essential aspect of the Lorenzian hypothesis (i.e., the proposition that cuteness evoke caretaking) has received a substantial amount of support (see for example Nittono et al., 2012; Sherman, Haidt, Iyer, & Coan, 2012). Several experimental studies have shown that caretaking is evoked by a young appearance. Volk et al. (2007) found that pictures of faces signaling a young age (6 months-6 years) was the most effective at evoking care-related responses (e.g., willingness to adopt children) in adults, as compared to pictures of more mature faces. Furthermore, Glocker et al. (2009) manipulated images of infants and found that the more pronounced the baby schema, the more the images were ranked as cute and evoked motivation for caretaking. Hence, features of Kindchenschema cuteness represent especially salient visuals.

Sensitivity to Cuteness. Cute stimuli such as human and animal infants draw attention. A live puppy or a cute picture of an infant attracted significantly more participants to a personally-administrated survey than the same survey in the absence of cute stimuli (Bellfield et al., 2011). Studies consistently show that adults look longer at cute stimuli than less cute stimuli (e.g., Hildebrandt & Fitzgerald, 1978; Hildebrandt & Fitzgerald, 1981). Even children as young as 3 years look longer at pictures of children with infantile features (Borgi, Cogliati-Dezza, Brelsford, Meints, & Cirulli, 2014). Moreover, humans look longer at dogs and cats with infantile features (Borgi et al., 2014; Golle, Lisibach, Mast, & Lobmaier, 2013; Little, 2012). Historical changes in the design of children's toys and cartoon characters are responsive to these factors. Over a period of 80 years, the design of Walt Disney's Mickey Mouse has progressed to fit Kindchenschema by gradually giving him softer features. It is argued that the outcome of his evolution is that he is now more able to elicit a tenderness response from children, similar to the adult parental instinct (Gould, 1979). Much in the same way, the traditional stuffed teddy bear has gradually acquired neotenous traits (Morris, Reddy, & Bunting, 1995). Children between 6 and 8 years prefer teddy bears with such traits and display care-giving behavior as a result (Morris et al., 1995). Moreover, the cute features that children prefer are essentially the same as those that adults prefer (Sanefuji, Ohgami, & Hashiya, 2006). Thus, it appears that the salient pull of cuteness is present at a very early stage in human development.

Gender Differences. Western women are generally more sensitive to cute features than men (for a review, see Luo et al., 2015). For example, women have been found to be more motivated to look at cute infants, as measured by viewing time (Hahn, Xiao, Sprengelmeyer, & Perrett, 2013). Women also tend to perform better than men in cuteness discrimination. That is, they are better able to correctly identify the cutest babies (according to Kindchenschema) from pictures (Lobmaier, Sprengelmeyer, Wiffen, & Perrett, 2010). Furthermore, cute facial features in

children are more strongly valued by women than men in a hypothetical adoption setting (Volk & Quinsey, 2002). When it comes to cute affect, compared to women, men report less trait tenderness, and rate themselves as feeling less compassionate, tender, caring, and affectionate in response to a cute infant photo (Beall & Schaller, 2014). However, these gender differences might be a result of cultural gender norms and related self-concepts and self-presentation concerns. Parsons, Young, Kumari, Stein, and Kringelbach (2011) found that women were more likely to report sensitivity (being able to differentiate between higher and lower levels of cuteness as defined by Kindchenschema) to infant facial features, but no significant difference was found between men's and women's time looking at cute stimuli.

Vulnerability and Caretaking. Vulnerability of living beings may be defined as the characteristic of being easily harmed or attacked by external forces, either situational or other-initiated. Signs of vulnerability include young age, small size, small weight, signs of fragility, weakness, and environmental cues signaling imminent danger (Dijker, 2014). This description closely corresponds to the physical description of a typical cute subject such as a kitten.

Cute features affect perception in the sense that they signal certain traits. People tend to associate cuteness with a range of traits, including helplessness, physical weakness (Lorenz, 1943), naiveté, warmth, and kindness (Berry & McArthur, 1985). Some of these traits indicate a needy state of the cute subject signaling incapacity for self-care.

The vulnerability of cute subjects often elicits helping behavior. This relationship has been theorized in the Stereotype Content Model (SCM) (Cuddy, S. T. Fiske, & Glick, 2007). The SCM proposes a meditational model in which perceived target warmth and low competence results in pity and sympathy that in turn elicits helping and protective behavior (S. T. Fiske, 2012). Indeed, facial cuteness does evoke help-related behavior, such as returning lost resumes (Keating, Randall, Kendrick, & Gutshall, 2003). Similarly, van de Ven, Meijs, and Vingerhoets (2016) manipulated perceived vulnerability in faces by altering the presence of tears. They found that people wanted to take care of the pictured individuals when tears were present. This finding corresponds to Dijker's (2014) proposed conceptualization of a reactive, psychological mechanism that has evolved to respond to vulnerability cues to help prevent the harmful treatment of needy kin. This is referred to as a care mechanism, which is activated when aggressive tendencies or threats are directed at a vulnerable protagonist. This ultimately results in prosocial behaviors to help the vulnerable target. The motivational force behind the behavioral helping outcome is thought to be "sympathy". Dijker (2014) further makes an important distinction between perceived degree of responsibility. If a vulnerable subject is perceived to be more or less responsible for its own state of need, then the care mechanism is not activated. However if the target is perceived to be devoid of responsibility due to its innocent and immature nature, then the system is activated and prosocial behavior is

evoked as a result. Dijker lastly suggests that the emotion of being moved is closely related to the tender feelings prompted by cute targets. Strick, de Bruin, de Ruiter, and Jonkers (2015) explored the possibility that this emotion evokes help-related behaviors. After watching audio-visual advertisements, albeit not depicting cuteness, self-reports of being moved lead to an increase in helping intention.

Kama Muta

Occurrences of being moved or touched are commonplace (A. P. Fiske, Schubert, & Seibt, in press) and are believed to evoke a specific emotion, yet there is no general agreement regarding the elicitory causes, the subjective experience or the physical sensations of this emotion (Seibt, Schubert, Zickfeld, & Fiske, in press). However, recent work by Seibt and colleagues (2017) has addressed this issue by proposing the construct of *kama muta* (Sanskrit: "moved by love"). This model has been confirmed through numerous qualitative and quantitative studies, and has also been conceptually and empirically distinguished from other emotions such as happiness and sadness (Seibt et al., in press).

The kama muta conceptualization is founded on relational models theory (RMT) (A. P. Fiske, 1992, 2004). RMT postulates that four fundamental, biologically innate models can be used to understand, motivate and evaluate all forms of social relationships and formations. These four models are communal sharing (CS), authority ranking (AR), equality matching (EM) and market pricing (MP). Communal sharing is especially significant in relation to the kama muta framework. CS refers to a group or dyadic social relationship characterized by trust, sharing and unity. That is, the individuals within a CS-relationship feel blended into a single, shared entity. Examples of such a model include, but are not limited to, relationships between romantic partners and family members. One can also form a communal relationship with nonhuman beings and fictional characters (Haslam, 2017), such as a cute animal, a teddy bear, or Mickey Mouse. Seeing as kama muta is evoked by an immediate intensification of a communal relation, it seems plausible that a sudden increase of CS to a cute protagonist can evoke kama muta.

Kama muta theory (Seibt, Schubert, Zickfeld, & Fiske, 2017) posits that the emotion which people may label *being moved* or *touched,* and similar terms, occurs when a communal sharing relationship suddenly intensifies. This motivates caring and unity. This claim that the emotion occurs due to a sudden increase of CS has been verified by robust cross-correlational findings from studies utilizing time series analyses (Schubert, Zickfeld, Seibt, & Fiske, in press). These studies demonstrated that when communal sharing (measured as ratings of social "closeness") increases while watching a moving video, feelings of being moved or touched increase correspondingly. Besides, kama muta is a highly positive occurrence, one that people actively seek out and are eager to share with individuals with whom they have a communal sharing relationship

(A. P. Fiske et al., in press).

Kama muta theory further argues that moving experiences are characterized by certain physical sensations, appraisals and motivations, as measured by the KAMMUS scale of kama muta. Such experiences typically involve bodily perceptions like goosebumps, moist eyes or tears, having a warm or other feeling in the center of the chest, feeling buoyant, energized, refreshed, putting a hand to the chest or saying something along the lines of "awww". Intuitively, these sensations appear highly applicable to the perception of cuteness as one can easily imagine any or all of them in response to a tiny, furry puppy. Furthermore, appraisals of increased social "closeness" (as a measure of CS) have been found to be a strong predictor of kama muta episodes (Seibt, Schubert, Zickfeld, Zhu, et al., 2017). Motivational outcomes include wanting to hug someone or share the experience again and together with others. The aforementioned sensations, appraisals and motivations of a kama muta episode resemble what one might experience in response to cuteness. This makes sense seeing as kama muta is theorized to motivate devotion to communal sharing relationships, which involve caretaking. Thus, both constructs of kama muta and cuteness are theorized to motivate care. However, it is important to note that the intensity of a kama muta experience depends on the individual, the context and on the cultural setting (A. P. Fiske et al., in press; Seibt, Schubert, Zickfeld, Zhu, et al., 2017). Consequently, some people may feel no bodily sensations while others may feel all of them at once (A. P. Fiske et al., in press). Given the previous theorization, this might be true for the intensity of a cuteness experience as well.

Existing Literature on the Emotion of Cuteness. During the last half-decade there have been major developments in the field of cuteness. In an influential new paradigm, Sherman and Haidt (2011) argue that the perception of cuteness might result in behavior beyond caretaking, namely increased social involvement that motivates interaction with a cute agent. Hence, the primary function of cuteness is the resulting behavioral change of increased motivation towards engaging in social interactions. The current article will argue that this increased social motivation is due to the sudden intensification of communal sharing that cuteness typically evokes. It is important to note that the current project does not suggest that the only cuteness-relevant emotion is kama muta. Nevertheless, it will argue that this emotion is the predominant response. Other researchers in the field have welcomed Sherman and Haidt's paradigm. Nittono (2016), for example, has recently introduced a broader conceptualization of the cuteness emotion by proposing the construct of 'kawaii' (the Japanese term for 'cuteness'). He argues that this positive emotion is distinguished by qualities like moderate arousal, strong approach motivation and social orientation. The latter two correspond well with the concept of kama muta. However, according to kama muta theory, the intensity of state kama muta varies both individually, contextually as well

as within and between cultures (A. P. Fiske et al., in press; Seibt, Schubert, Zickfeld, Zhu, et al., 2017). The term "arousal" is also too broad to characterize the specific sensations and motivations of kama muta, which in any case involve tears that implicate the parasympathetic nervous system.

To our knowledge, only one experimental study has directly investigated the emotional responses to cuteness. In a series of experiments, Aragon, Clark, Dyer, and Bargh (2015) investigated people's reactions to cute, funny and neutral animal stimuli. Their results showed that people display both positive (e.g., smiles) and "negative" (e.g., tears) emotional expressions in response to cuteness. They interpreted tears as a display of negativity, and posited that cuteness evokes aggression that the perceiver needs to prevent being "overwhelmed" by positivity. In short, the authors propose that the emotional response to cuteness is sometimes so overwhelmingly positive that it evokes a counterbalancing opponent aggression response whose function is to regulate emotional balance, resulting in what they call dimorphous expressions of positive and negative emotions. However, this interpretation of tears is problematic. In two studies, Seibt et al. (in press) confirmed that self reports of being moved, increased closeness and moral gestures were solely connected to positive tears and not negative. Seen in light of the kama muta framework, it could be argued that the participants in Aragon et al's (2015) studies in fact experienced positive tears. It could further be reasoned that the observed response, instead of qualifying as aggression, is actually the expressive result of an intensely positive emotional experience.

Lastly, the potential link between the cuteness response and feelings of being moved has been explored indirectly by only one previous study. Batson, Lishner, Cook, and Sawyer (2005) asked undergraduate participants to either read about a vulnerable protagonist (child, dog, or puppy) recovering from a broken leg or a less vulnerable and less cute subject also recovering (adult student). Participants presented with one of the former narratives reported feeling more sympathetic, compassionate, tender, softhearted, warm, and moved compared to participants reading the latter narrative. Thus, a cute vulnerable agent triggered stronger feelings in the perceiver rated by participants as "being moved", compared to a less cute target. Taken together, these preceding findings encourage the notion that the typical predominant cuteness response is kama muta. The latter study suggests that feelings of sympathy, being moved, compassion, softheartedness, warmth and tenderness are salient aspects of the cuteness response. Indeed, these six adjectives (in self-ratings of response to a need target) form the items of the Empathic Concern Scale, which is a relevant measuring tool when studying cuteness as it specifically assess feelings of tenderness (Niezink, Siero, Dijkstra, Buunk, & Barelds, 2012).

Empathic Concern

The Empathic Concern (EC) Scale of the Interpersonal Reactivity Index (IRI) measures feelings of sympathy, concern, tenderness and compassion *oriented to vulnerable others* (Davis,

1983; Niezink et al., 2012). It has recently been speculated that cuteness facilitates complex social relationships by triggering compassion and empathy (Kringelbach et al., 2016). Indeed, studies suggest a link between empathic concern and cuteness. In three experiments, Lishner, Oceja, Stocks, and Zaspel (2008) found that participants felt more sympathy for infantile faces and voices compared to adult counterparts. Hence, pictures of humans high in Kindchenschema, compared to low in Kindchenschema, evoked more empathy towards the pictured humans (Lishner et al., 2008). This effect has been replicated with pictures of animals high and low in Kindchenschema (Zickfeld, Kunst, & Hohle, 2017). Empathy towards a cute animal may also lead to reduced willingness to eat its meat. Zickfeld, Kunst, et al. (2017) digitally altered pictures of farm animals to signal cues of high or low Kindchenschema, while measuring participants' cuteness perception of the animals and empathy towards them. Across four experiments, they detected an indirect mediation effect of cuteness on meat consumption through reported empathy for the animal. Trait empathic concern has also been proposed to be a reflection of the parental caretaking response to vulnerable human babies (Niezink et al., 2012). Lishner, Batson, & Huss (2011) suggest that through generalized learning this caretaking response extends to needy animals as well such as a vulnerable puppy. So empathic concern is described as a protective, caring and nurturing trait to care for both humans and animals. For example, people may feel tenderness when holding their baby in their arms or looking into the big eyes of a tiny kitten.

Moreover, a recent meta-analysis of 16 studies found that the intensity of kama muta responses to video stimuli is correlated .35 with trait empathic concern (Zickfeld, Schubert, Seibt, & Fiske, 2017). This study also revealed that trait empathic concern is specifically related to three reliable physiological indicators of kama muta; positive tears, goosebumps or chills, and feelings of warmth. At the same time, empathic concern is not consistently linked to other affective states apart from, in a few studies only, sadness.

Humanization

Humanness consists of qualities that are distinctively and essentially human (Haslam, Bain, Douge, Lee, & Bastian, 2005). Humanization is the act of attributing such qualities to other people, non-human animals, or other beings. Additionally, anthropomorphism can be defined as a behavior of humanization of inanimate objects and nonhuman entities (Epley, Waytz, & Cacioppo, 2007). People tend to humanize companion animals such as pets. They might think of them as children, treat them similarly to humans, rely on them for affection and love (Serpell, 2003) or attribute highly intellectual mindsets in them (Sherman & Haidt, 2011). According to relational models theory (A. P. Fiske, 2004), having a relationship entails applying one of the four models, which are evolved ways of relating to other humans. Thus, when people form relationships with animals, they essentially treat them as humans. Studies have shown the benefits of having a

relationship with non-human animals (Fawcett & Gullone, 2001). In fact, findings suggest that the mere perception of a traditionally cute animal (i.e., a dog) can result in lowered physical activation to stressors and heightened positive affect (Rossbach & Wilson, 1992; Sevillano & Fiske, 2016). Moreover, people are likely to anthropomorphize animals when they are socially motivated to interact with the animal target as a result of perceiving a lack of social relation to other humans (Epley et al., 2007). Because cute animals evoke very strong approach, this indicates that people might be especially inclined to humanize cute animals.

There might also exist a link between kama muta and humanization of people. Humanness judgments (as a proxy for increased communal sharing) within out-groups have been found to be a good predictor of self-reported feelings of being moved or touched (Blomster & Seibt, 2017; Seibt et al., 2016). In a related vein, evolutionary theories suggest that humanization of non-human animals might have enabled humans to engage in supportive social relationships with them (Serpell, 2003). Thus, the mental act of humanization can be evoked by cuteness and in turn increase positive emotion.

Objectives of the current Studies

Despite the continuously growing academic interest in the study of cuteness (Dale, 2016), the existent literature on the emotion(s) that people feel when perceiving cuteness is scarce compared to the extensive research on most other emotions (Buckley, 2016). As a result, emotion researchers have failed to identify the exact emotion(s) that people typically experience in response to cuteness. One reason for this seems to be that the emotional construct of perceiving cuteness has not yet been named (Buckley, 2016). The current research attempts to address this demand by hypothesizing that what cuteness typically and predominantly evokes is kama muta. When testing this hypothesis, it is important to measure trait empathic concern, seeing as people high in this trait feel more sympathy, concern, tenderness and compassion oriented at vulnerable others. Cute animals are often perceived to be vulnerable (Lorenz, 1943) and feelings of tenderness and concern are thought to be evoked by a cute target (Niezink et al., 2012). Furthermore, people tend to humanize their pets by engaging in an affectionate social relationship with them (Serpell, 2003; Sherman & Haidt, 2011). Thus, a second main hypothesis of the current thesis relates to whether or not cuteness motivates communal sharing relationships. Two preliminary studies were implemented to explore these two main hypotheses while two experiments were conducted in order to test them empirically.

The first preliminary study used semi-structured interviews to explore potential relationships between cuteness and kama muta. The second preliminary study used an available dataset to examine if there was a correlation between averaged cuteness ratings for fourteen animals and self-reported ratings of being moved or touched by a different sample. The

objective of the first experimental study was to investigate whether or not kama muta in its different facets, including the typical sensations, may be evoked by cuteness, while measuring trait empathic concern as a possible moderator. The second study tested whether cuteness and kama muta ratings are higher in response to observation of an affectionate social interaction while measuring humanization, which may increase the perceiver's motivation to form communal sharing relationships as well as to add to the perception of cuteness. Hence, the second study predicted that signs of communal sharing in cute videos would evoke stronger cuteness perception by mediation of kama muta.

Preliminary Studies

The postulated relationship between kama muta and cuteness was first explored in two preliminary investigations, that subsequently inspired the hypotheses for the two experimental studies of the current project.

Qualitative Interview Study

An initial qualitative interview study set out to explore the following three goals: (1) Do people interacting with cute animals feel kama muta? (2) Do animal lovers experience the emotion they feel with cute animals in other settings? (3) Are there any additional aspects to take into account when conducting the subsequent experimental studies?

Method. Observation and open-ended, semi-structured qualitative interviews were conducted with Norwegian pet owners and animal shelter volunteers together with at least one cute animal (ranging from 1 to 7 animals) they were familiar with or knew well. The participants were asked about their emotions, thoughts and feelings in response to the animals. Written consent[5] was collected prior to conducting any interviews.

Informants. 24 men and women were approached at an animal shelter in Oslo, Norway and asked to participate in a study investigating emotional responses to everyday settings, such as interacting with animals. The seven people that agreed to participate in the study were all females, aged from 16 to 56 (M_{age} = 28.7, SD = 12.8), and included two volunteers, three visitors and two independent pet owners. All seven informants were interviewed in Norwegian.

Materials. The first goal was explored by using questions tapping into the same dimensions as the KAMMUS 1.8 scale of measuring kama muta (Seibt, Schubert, Zickfeld, & Fiske 2017). This is a validated psychometric scale consisting of five sub-scales aimed to measure the physiological reactions, motivations, labels, positivity and sharing, and appraisals of kama muta. A selection of four representative questions relating to similar dimensions as the KAMMUS were asked in order to address the first goal (e.g., "Do you experience any particular feelings when

[5] Included as appendix A.

you come here/spend time with your pet? If so, how often do you experience them?"). Three questions were set to explore the second goal (e.g., "When do these feelings typically occur?"), while the third goal was examined through six questions (e.g., "Is there something else you would like to tell me? Anything that you think I might have forgot to ask you?"). Thus, the interview guide (Appendix B) contained 13 overarching questions in total following a funneling structure, excluding additional follow-up questions. The guide was constructed on the basis of two initial test interviews with two postgraduate psychology students, which is crucial in order to evaluate and revise each question (Agee, 2009; Merriam & Tisdell, 2015).

Procedure. Based on two pilot interviews, the time span of the entire interview was estimated to range between 20 to 40 minutes, depending on the amount of detail and elaboration of the informants' individual answers. The informants were informed about this time estimation prior to participation. The duration of the seven final interviews varied from 15 to 70 minutes wherein the author as the interviewer took notes, which were elaborated by the author immediately after each interview was completed. The interviews were not audio recorded. Informants were also observed during the interview session by the interviewer paying attention to their body language, gestures and facial expressions while they talked and interacted with the animal(s). The interview itself only included the author as the interviewer, the informant and one or several cute animals. The informant was encouraged to engage with the animal(s) in a natural, everyday setting during the interview (e.g., playing with the animal, talking to it, petting and feeding it). Thus, each interview was conducted within a comparable context.

Findings. Each interview was re-organized into the three goals of interest to the study. Consequently, the extensive notes of each interview were divided in three sections, each relating to one goal.

Do people interacting with cute animals feel kama muta? The first goal was analyzed by counting the number of different sensations the women experienced, either by self-report or observation by the interviewer (see Table 1 for an overview).

All seven women reported feeling a very positive, pleasant feeling throughout the duration of the interview. They all attributed this feeling to the animal(s) they were interacting with. Taken together, the women reported feeling happy, calm, secure, safe, relaxed, completed and fulfilled: *"I just love cats! I feel calm. Relaxed. It's so quiet here with them. I feel very satisfied, really."* (Informant A, age 24).

Four women used the Norwegian word *rørt* [moved] voluntary (i.e., without the word being mentioned by the interviewer) when asked about how they would describe the feeling: *"... when he [informant's dog] does cute stuff like that, then I get really, really moved."* (Informant F, age 24). Two additional women reported feeling moved when asked directly about it. Only one

woman said that she did not feel moved or touched during the interview session as she explained she was not easily moved:

> I usually get moved in different situations than this [in an animal shelter surrounded by 5 cats]. Only when I'm around children or babies. Well actually, animals that help or cuddle with other animals can move me. That is very cute. (Informant C, age 31).

Nevertheless, she did report several of the kama muta sensations during her interaction with a kitten, specifically a warm sensation, moist eyes, and a feeling in the chest. Taken together, all seven women reported some of the physical sensations that often accompany a kama muta episode, in particular a floating feeling, moist eyes, and a warm sensation (Table 1). One of the women detailed the feeling in her chest evoked by her pet cat: "*It's like my heart expands, it gets filled to its capacity. It stretches. I can actually feel how it fills up with affection to the point where I can barely take it*." (Informant B, age 26).

Four women also expressed an increased motivation to communal sharing relationships after interacting with cute animals. One woman volunteered this information, while the other three reported the information in response to a question. One of the women reported leaving the animal shelter in a positive mood after every shift because the cats she took care of there made her happy. She had developed a very close bond with some of the cats and she loved the feeling of being needed by them. This, in turn, made her show her cat at home and her husband even more affection, care, and attention than she normally would. Three other women reported engaging in a similar behavior (i.e., showing increased devotion to family members, pets, and others whom they had formed a communal sharing relationship with) after working at or visiting the shelter. One of them described her increased motivation to communal relationships like this: *"Whenever I get that feeling after spending time with her* [informant's cat], *I just want to do kind things for others. I get really friendly*." (Informant E, age 56). Hence, the narratives of 4 out of 7 informants were clear indicators of communal devotion and commitment to others after spending time with a cute animal (i.e., the evoker). Moreover, six of the women's narratives were clear descriptions of the communal sharing relationship they had formed with their pets. One pet owner gave the following description of her relationship with her cat: *"I feel heard. Loved. I feel like I always have a friend, someone who really knows who I am deep down. A true best friend*." (Informant G, age 23).

Table 1. The physiological sensations that the women reported during the interview.

Sensation	Number of women (N = 7)			
	In total	Volunteered information	When asked	Observed
A floating, buoyant feeling	7	5	2	0
Moist eyes, teary-eyed	6	2	3	1
A warm feeling	6	5	1	0
Tears, crying	5	1	2	2
A feeling in the chest	5	3	2	0
Goosebumps, chills	4	1	3	0
Hand on chest (not a question, only observed)	4	0	0	4
Choked up	3	0	2	1
Difficulty speaking	3	2	0	1

Do animal lovers experience the emotion they feel with cute animals in other settings?

When asked questions related to the second study goal, four women drew lines to other contexts that are very likely to evoke kama muta. Two women expressed having the same feeling around their husband and boyfriend that they felt with the animals.

I would compare it with my boyfriend. You know, the feeling I have here right now [at the animal shelter surrounded by 7 kittens] is the same as what I usually feel around him. I feel safe and completed. It is reassuring somehow. It might not be the exact same because these are two completely different situations. But I do think the feeling is the same in both. For me anyway. (Informant B, age 26).

One additional woman compared the feeling to giving birth and being in love:

… I have certainly felt it [the feeling] before. [Interviewer: When?] After the birth of my first and second child. … Other times that I've felt this same emotion is when I was in love. I just feel happy. It's pure bliss, this feel-good experience. I feel like I'm helping the animal and I receive plenty in return. She [informant's cat] appreciates my affection and care, you know. She talks to me, purrs, and I can just tell how much she is enjoying herself. It's really rewarding. (Informant E, age 56).

These three women described the feeling in terms of feeling a sense of belonging and trust towards their partners and animals. They felt safe, secure and comforted in both contexts. One informant compared the feeling to the same one she experienced when she celebrated Christmas Eve with her family. She highlighted unity, love and happiness to describe the feeling she felt in both contexts. She mentioned having a warm feeling as a typical physical sensation in these contexts: *"I get this type of warm feeling almost.* [Interviewer: In which way is the feeling warm?] *I don't know. You are happy. Warm like the sun. Not a burning sensation, but more like a pleasant warmth from inside."* (Informant D, age 16). Together, these narratives appear to describe communal sharing between the informants and the animal(s). This finding from goal 2 further supports the discovery

of goal 1 that the informants' cuteness response seemed to constitute a kama muta episode.

One woman however labeled the emotion as context-specific to animals: *"This is a special kind of feeling. A distinct 'animal feeling' that I'm only able to have when I'm with them* [animals]." (Informant A, age 24).

Are there any additional aspects to take into account when conducting the subsequent experimental studies? The third study goal was analyzed by identifying shared themes brought up by more than one informant. Two such themes were revealed.

Narratives relating to caretaking and parental protection surfaced in five out of the seven interviews. One woman told how she and her dog have a child-parent relationship: *"He is like a small child. I feel this maternal instinct coming to life in me, I want to protect him, to take care of him."* (Informant F, age 24). Another woman described the mutual caretaking bond she had formed with her cat: *"She can always tell when I need her. She comes over and takes care of me, just like I take care of her. She puts her paws around my neck, almost like she is giving me a hug."* (Informant G, age 23). The three others who had similar narratives fit into these two portrayals.

Two women in the study seemed to humanize their pets. One gave the following description when asked about her relationship with her dog:

> He is family, like a little human. He understands when I talk to him. … He has a distinct personality. Whenever he does something human, like decide to go upstairs and get his favorite toy, that is super cute to me. That's a human ability, to make up your mind about something. That's when I find him the most endearing. (Informant F, age 24).

Her narrative suggests that the humanization of the cute animal added to its cuteness perception. Another woman's narrative indicates that the humanization of her pet evoked feelings that seemed to be kama muta:

> I once got really choked up when my youngest daughter was cycling with her [informant's dog], because that time she [the dog] was much more careful than she is when I'm cycling with her. That moved me. She understood that this was a child and that she had to be more cautious around her. She showed empathy and understanding, just like we [humans] do. (Informant E, age 56).

Discussion. Most of the women participating in this interview study reported several bodily sensations that usually accompany a kama muta episode, they used the vernacular label of *rørt* [moved] to describe the emotion of kama muta and they had seemingly established a communal relationship with the animals they were interviewed with. Thus, the women's emotional response to cuteness in this specific interview context appears to have been predominantly kama muta.

Kama muta can take place in a broad variety of contexts (Haslam, 2017). The women in this study described feeling a parental motivation to protect and care for the animals they had formed a communal sharing relationship with. Some of them even humanized their pets to the point where they thought of them as children. By comparing the emotion they felt in response to something cute to other kama muta contexts like celebrating Christmas with family or being in love, these women's narratives provide further support for the notion that an encounter with cuteness represents yet another kama muta episode.

The several shortcomings of this study should be mentioned. Obtaining a high degree of control of context, animal cuteness, and animal species was a subordinate concern seeing as the main goal of the study was merely to explore any potential relationship between cuteness and kama muta. Thus, the interview situation was not entirely matched between informants and both young and adult animals (thus displaying different degrees of Kindchenschema) and cats and dogs represented the cute protagonist in the study. Moreover, the low number of informants, consisting of women only, did not constitute a representative sample. Despite its limitations, the study did reveal narratives that indicated a connection between kama muta and cuteness, which encouraged further exploration of this assumed relationship.

Correlational Pilot Test

After obtaining an older data set from 2009, shared with us by two external researchers (Vingerhoets & Wildschut, 2009), we decided to run another preliminary study exploring the relationship between cuteness and subjective feelings of being moved and touched.

Method. The data file included responses from a survey where Dutch participants (N = 367) rated how physically moved (1 item: "*Does this picture evoke physical sensations/do you feel physically moved?*" [Wekt dit plaatje lichamelijke beroering op?]) and touched (1 item: "*Is this picture touching?*" [Raakt dit plaatje u?]) they felt on a 5 point Likert scale (1 = *not at all*, 5 = *to a very high degree*) in response to viewing 14 animal pictures; 7 young and 7 adult animals. In a separate survey, we had Norwegian participants (N = 7) rate the same stimulus set of animal pictures for cuteness (1 item: "How cute do you find this animal?") on a 7-point Likert scale, ranging from 0 = *not cute at all* to 6 = *very cute*.

According to Lorenz' theory of Kindchenschema, the young animals were expected to be judged cuter than the adult animals. The mean of ratings of being moved and touched from the 367 Dutch participants was correlated with the cuteness ratings of the 7 Norwegian participants. We predicted that the cuteness ratings would correlate positively with scores on being moved and touched.

Findings. Within the Norwegian sample, all seven pictures of young animals were rated as cuter than the 7 pictures of adult animals. A Pearson's correlation analysis across the 14 images

(i.e., with image rather than participant as unit of analysis) did indeed reveal a positive correlation between Norwegians' averaged ratings of cuteness per image and Dutch averaged ratings of being moved ($r = .73$, $p = .003$) and touched per image ($r = .82$, $p < .001$).

Discussion. The pilot test revealed significant strong correlations between one sample's ratings of being moved and touched and another sample's cuteness ratings. The Norwegian cuteness ratings were highly consistent, which is why 7 raters were enough to produce reliable estimates. Similar to the preceding interview study, the limitations to the exploratory pilot test were apparent. First, the analysis was based on only 14 images. Secondly, only a few Norwegians judged the cuteness of the animals. Hence, due to the exploratory nature of both preliminary studies and their evident shortcomings, we cannot draw strong conclusions from either study. But this was not the goal. The aim of this pilot test was merely to explore the relationship between cuteness and kama muta. Taken together, the findings from both studies encouraged the idea that cuteness evokes kama muta. Consequently, in an attempt to elaborate the findings of the two exploratory studies through a systematic experimental approach, the first study was implemented.

Study 1

The main objective of the first study was to experimentally investigate whether cuteness evokes kama muta. The main experimental hypothesis (H1) predicted that the participants would report stronger kama muta ratings across all components (i.e., the vernacular labels, motivation to form or strengthen CS-relationships, emotional valence, and bodily sensations of kama muta) in response to a cute video as opposed to a control video. Further, we predicted that KAMMUS subscales would all correlate with participant ratings of the cuteness of each video.

A secondary focus of the study related to inter-individual differences. Based on the high relevance of trait empathic concern (EC) in the study of cute affect, and the finding that trait EC is consistently correlated with kama muta (Zickfeld, Schubert, et al., 2017), we included the IRI measure of EC (Niezink et al., 2012). We predicted that people high in trait EC, compared to people low in this trait, would rate the videos in the experimental condition as cuter (H2a) and feel stronger kama muta in response to these videos (H2b).

The study was also expected to reveal some gender differences due to the strong empirical indication that women are more responsive towards cuteness than men, as revealed by the review of the literature. Consequently, we predicted that (H3a) women would rate the experimental videos higher on cuteness and also (H3b) report stronger kama muta affect than men. Additional demographically based hypotheses predicted that people with children would report stronger cuteness perceptions (H4a) and kama muta ratings (H4b) for the experimental videos than people with no children. Similarly, we predicted that pet owners would have higher cuteness (H5a) and

kama muta ratings (H5b) in response to the cute videos compared to people with no pets.

A final interest of the study, of a more exploratory nature, was to compare the potential effect of cuteness on kama muta between two western cultures, namely Norway and the US. Thus, the study (see Appendix E for full survey) was distributed in two independent samples: one Norwegian and one American.

Method

Participants. One hundred and seventy-six Norwegian participants were recruited through convenience sampling on Facebook, while 121 American participants were recruited via Amazon Mechanical Turk. Participants in the latter sample received 0.90 USD as compensation for their participation. The total sample from both countries comprised 297 participants.

Exclusion criteria. Responses were excluded based on the following three a priori criteria; did not complete the survey, $N = 15$; did not watch one or both videos, $N = 73$; watched one or both videos with sound, $N = 74$ (the third criteria will be explained in a following section). This resulted in an exclusion of 162 of the initial 297 responses. This final sample of 135 responses comprised 74 females (54,8 %), 60 males (44,4 %, 1 missing; 0,7 %), with an age range of 16-63 years ($M = 32.4$, $SD = 10.5$). Seventy Americans (51,9 %), 56 Norwegians (41,5 %) and 8 people with other nationalities (6,6 %) participated (1 missing; 0,7 %). The participants were also asked how many children they had: none ($N = 102$, 75,6 %), one ($N = 11$, 8,1 %), two ($N = 10$, 7,4 %) or more than two ($N = 11$, 8,1 %, 1 missing; 0,7 %). Sixty-nine people (51,1 %) did not have a pet while 65 (48,1 %) did (1 missing; 0,7 %).

Materials. The study used 8 pretested video clips of 20 to 40 seconds as stimuli, which represented the two conditions of the study; the cute (experimental) and the non-cute (control). Both the cute- and the non-cute stimulus set consisted of four videos each (see Appendix G for links to the videos).

Pretest of stimuli. Sixteen YouTube video clips, eight in each condition, were pretested in a between-subjects design (N = 8) on mean cuteness-ratings of a single item ("How cute is this animal to you?"). Responses were given on a 7-point Likert scale, ranging from 0 (not cute at all) to 6 = (very cute). Four of the highest (in the experimental group) and lowest ranking videos (in the control group) were selected as the stimuli for study 1 (see Appendix G for video links and means). The videos in the experimental condition featured young cute animals (e.g., a kitten), while the control condition featured adult, non-cute animals (e.g., a proboscis monkey). Each video clip contained a single animal protagonist. The videos were edited to exclude other people or animals apart from the sole target animal in an attempt to exclude any indicators of a CS relationship between the animal and other subjects. Similarly, participants were asked to mute the sound on their computers because some of the videos featured auditory communication that was

indicative of communal relationships (e.g., a pet owner speaking to her dog in a very affectionate way). This was done so that the videos only differed on the independent variable of cuteness.

Measures[6]. Perceived cuteness of the animals in the videos was measured by a cuteness scale of nine items (e.g., "It is adorable") developed by the author and Alan Page Fiske. The scale was constructed based on a thorough review of the literature while attempting to identify the strongest predictors of visual Kindchenschema cuteness. The experience of kama muta was assessed by version 1.8 of the validated KAMMUS scale. Specifically, responses concerning the subscale of the labels of kama muta, indicating subjective feelings, (6 items: e.g., "I was moved"), the subscale of physical sensations (12 items: e.g., "Goosebumps or hair standing up"), the subscale of motivation to form or strengthen CS-relationships (7 items: e.g., "I felt more strongly committed to a relationship") and emotional valence (2 items: e.g., "I had positive feelings") were collected. Both scales included distractor items and recorded responses on an agree-disagree continuum of a 7-point Likert scale, where 0 = *not at all* and 6 = *a lot*. The Interpersonal Reactivity Index (IRI, Davis, 1983) measured trait empathic concern where participants were asked to rate 9 items such as "I am often quite touched by things that I see happen" on a 5-point Likert scale, ranging from 1 (*does not describe me well*) to 5 (*describes me very well*).

Design and procedure. This study employed a repeated measures design. Each participant took part in both conditions, which were counterbalanced and presented in random order. One video from each category was randomly selected from their respective stimulus set of four videos. Thus, each participant viewed two videos in total. After watching each video, the participants were first asked to fill out the cuteness scale and second the KAMMUS measure of kama muta. The scales were presented in this fixed order in both conditions. Then, participants were asked to respond to the IRI measure of empathic concern. Finally, they were asked to provide demographic information: gender, age, nationality, number of children and whether or not they owned any pets. The design of the study is visualized in Figure 1.

[6] Full scales of the KAMMUS and cuteness scale in English and Norwegian are included as appendices C and D.

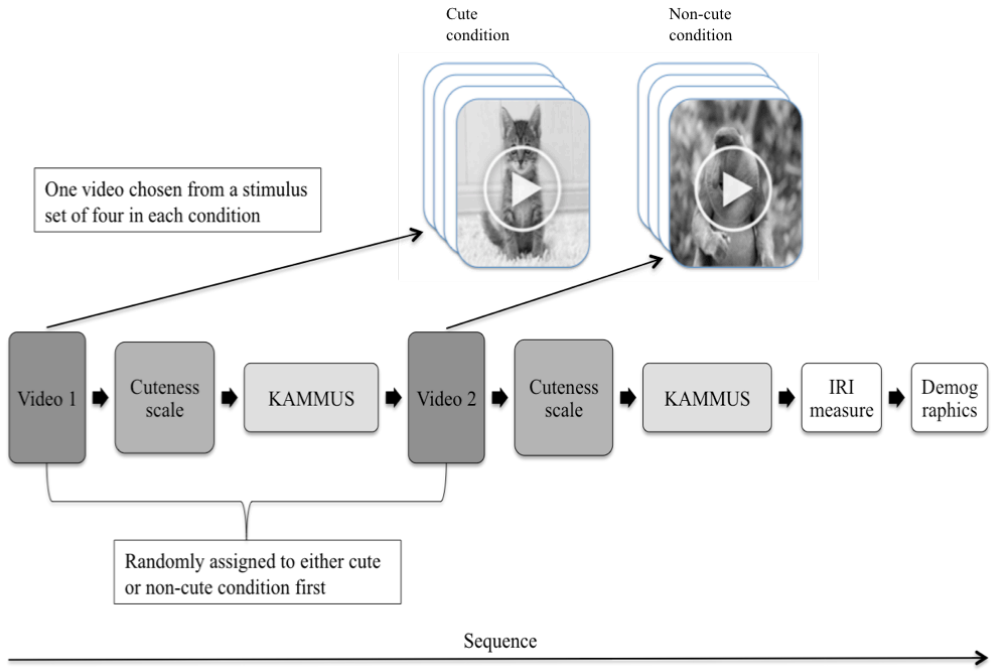

Figure 1. Visualization of the design of Study 1.

Results[7]

Factor analysis of cuteness scale. The data collected from the 9-item cuteness scale, excluding distractor items (control condition: α =.80, cute condition: α =.88), were subjected to a principal components factor analysis with oblimin rotation (see supplementary material in Appendix G for full procedure, scree-plot, factor loadings and communalities). The factor analysis suggested a two-factor solution. Six positively worded cuteness items and three reverse-coded items formed factor 1. However, a reliability analysis of the 9-item scale revealed that the reversed items did not correlate with the other six items of the scale. Consequently, the 3 reverse-coded items were excluded from the scale, leaving a six-item cuteness scale measuring only one factor.

Manipulation check. Averaged responses of the revised 6-item cuteness scale were combined into a cuteness index for both the cute condition and the control condition. In order to check whether or not the experimental videos elicited the intended reactions, (i.e., that they were perceived to be very cute), a repeated measures ANOVA was performed in SPSS 24 using the GLM command. Cuteness ratings for the two video conditions were set as DV, order (cute first vs. non-cute first) was set as factor, while condition (cute vs. non-cute) were set as a within subject factor. The videos did in fact evoke this intended perception. The videos featuring young animals such as a kitten were seen as considerably cuter (M = 5.74, SD = 1.39) than the control videos featuring adult animals like a proboscis monkey, as revealed by a main effect (M = 2.01, SD = 1.24, $F(1, 132) = 703$, $p < .001$, $\eta_p^2 = .842$). There was however an interaction effect between

[7] All statistical analyses in Study 1 and Study 2 were performed in SPSS 24.

condition and order on cuteness ratings ($F(1, 133) = 15.5$, $p < .001$, $\eta_p^2 = .105$), meaning that the first video the participants saw was judged as cuter than the second one. A test of pairwise comparisons[8] revealed that this order effect was only significant for the control videos ($p < .001$) and not for the experimental videos ($p = .230$). That is, the non-cute videos were assessed as cuter when they were presented first rather than second while cuteness perception for the experimental videos was not affected by order at all. Thus, the video manipulation was deemed successful.

Indexing. A series of general linear models were constructed to test the hypotheses; one model tested each hypothesis in which "a"-hypotheses relate to cuteness perceptions and "b"-hypotheses test emotions of kama muta. An index of the subscale of kama muta labels was created by averaging three items: "I was moved", "I was touched" and "It was heartwarming" (control: α =.70, cute: α =.90)[9]. Two other components were indexed in a similar fashion: 12 items of bodily sensations (control: α =.83, cute: α =.85), and 7 items of motivation (control: α =.92, cute: α =.94). To form an index of overall positivity, we subtracted the negativity score from the positivity score. These four components were treated as multivariate indicators of kama muta, given that they are correlated, but distinct aspects of kama muta. Our main hypothesis test for effects on kama muta thus consisted in testing the multivariate effect of a variable on kama muta across the four components, followed up by testing which of the subcomponent(s) showed the effect. Averaged scores on the 6-item cuteness scale for each video condition created an index for cuteness ratings (control: α =.91, cute: α =.94), while scores on the 9-item IRI measure indexed trait empathic concern (α =.91).

Intercorrelations of kama muta components. To check whether the four kama muta components could be assumed to tap into the same underlying construct, we computed their intercorrelations (see Table 2). Intercorrelations were generally large, except for the valence component for the adult animal videos, which did not correlate with the other three components. Given that the KAMMUS scale was designed to diagnose kama muta, and that the adult videos were chosen to evoke no kama muta, we take the strong correlations for the cute videos as supportive of the underlying construct assumption.

Table 2. Intercorrelations of the kama muta components labels, sensations, motivation and valence and their correlations with cuteness ratings. Below the diagonal for responses to cute animal videos, above the diagonal for responses to adult animal videos, and on the diagonal intercorrelations between the corresponding responses to cute and adult animals (e.g., labels for cute video and labels for non-cute video).

[8] All pairwise comparisons were run with Bonferroni corrections.
[9] According to the preregistrated analyses.

	Labels	Sensations	Motivation	Valence	Cuteness
Labels	.95**	.52**	.49**	-.18	.34**
Sensations	.74**	.63**	.72**	-.16	.52**
Motivation	.74**	.74**	.47**	-.12	.51**
Valence	.52**	.46**	.38**	-.11	.25**
Cuteness	.47**	.43**	.31**	.65**	.14

** Correlation is significant at the 0.01 level (2-tailed).

We also calculated the correlations of the four kama muta components with the cuteness scores. Here, we found that all components correlated positively with perceived cuteness for both adult and cute animals. This is a first, correlational test of our hypothesis that the emotion evoked by seeing cute animals is, in fact, kama muta.

Hypothesis 1. In order to assess whether cute videos evoked stronger kama muta ratings across all components (i.e., the vernacular labels, motivation, emotional valence, and bodily sensations) of the KAMMUS scale than the control videos, we constructed a general linear model. In this model, we put the four components as dependent variable, order[10] as factor, condition as a within subject factor, and added the interaction of order*condition. We found an overall main effect of condition on kama muta, $F(4, 129) = 79.945$, $p < .001$, $\eta_p^2 = .713$. By looking at the individual effects on the four kama muta components, we found significant main effects of condition on all four (labels: $F(1, 132) = 66.9$, $p < .001$, $\eta_p^2 = .337$, sensations: $F(1, 132) = 98.1$, $p < .001$, $\eta_p^2 = .426$, motivation: $F(1, 132) = 44.8$, $p < .001$, $\eta_p^2 = .254$, valence: $F(1, 132) = 325$, $p < .001$, $\eta_p^2 = .712$). Thus, cute videos evoked significantly more kama muta (labels: $M = 3.00$, $SE = .15$, sensations: $M = 1.98$, $SE = .08$, motivation: $M = 2.11$, $SE = .12$, valence: $M = 3.75$, $SE = .19$) than non-cute videos (labels: $M = 2.63$, $SE = .11$, sensations: $M = 1.37$, $SE = .05$, motivation: $M = 1.39$, $SE = .07$, valence: $M = -.116$, $SE = .08$).

The model further revealed a small interaction effect between condition and order on kama muta, $F(4, 129) = 3.55$, $p = .009$, $\eta_p^2 = .099$, where participants reported stronger ratings on the labels, sensations, motivation, and valence in response to the cute video when the non-cute video was presented first (labels: $M = .3.12$, $SE = .20$, sensations: $M = 2.11$, $SE = .11$, motivation: $M = 2.31$, $SE = .16$, valence: $M = 3.96$, $SE = .26$) rather than second (labels: $M = 2.98$, $SE = .22$, sensations: $M = 1.85$, $SE = .12$, motivation: $M = 1.90$, $SE = .18$, valence: $M = 3.53$, $SE = .28$).

Judging by the descriptive statistics of the scores on the labels (Table 3), it appears that the feeling of cuteness was best labeled as *heartwarming*.

[10] Presentation order of the videos was included as a factor in all models, but order effects were only reported if significant.

Table 3. Descriptive statistics of three kama muta labels (i.e., first 3 items of section 5 of the KAMMUS).

	Cute condition / Control condition (N = 134)			
	Mean	SD	Range (1-7)	Skew
It was heartwarming	4.06 / 1.51	1.91 / 1.16	1-7 / 1-7	-.231 / 2.56
I was moved	2.43 / 1.63	1.81 / 1.23	1-7 / 1-7	.956 / 2.11
I was touched	2.67 / 1.46	1.82 / 1.07	1-7 / 1-6	.698 / 2.56

Hypothesis 2a. Another general linear model was created to test whether people high in trait EC would rate the videos in the experimental condition as cuter than people low in this trait. Cuteness ratings were used as DV, order as factor, empathic concern as a covariate, and video condition as a within subject factor. The model revealed a main effect of empathic concern on cuteness ratings, $F(1, 131) = 18.4$, $p < .001$, $\eta_p^2 = .123$. Thus, people high in trait empathic concern (1 SD above the mean) found both videos to be cuter ($M = 4.21$, $SE = .12$) than people low in this trait (1 SD below the mean) ($M = 3.51$, $SE = .12$). Furthermore, an interaction effect between condition and empathic concern on cuteness ratings was detected, $F(1, 131) = 13.8$, $p < .001$, $\eta_p^2 = .095$, supporting our prediction that people high in EC rated particularly the experimental videos as cuter (cute video: $M = 6.36$, $SE = .15$, non-cute video: $M = 2.06$, $SE = .15$) than people low in EC (cute video: $M = 5.15$, $SE = .16$, non-cute video: $M = 1.87$, $SE = .15$).

Hypothesis 2b. A similar model as in H2a was created, only switching the DV of cuteness ratings to the four kama muta components, to test if high trait empathic concern would evoke more kama muta as opposed to low trait EC. A main effect of empathic concern on overall kama muta ($F(1, 131) = 18.4$, $p < .001$, $\eta_p^2 = .123$) found that people high in trait empathic concern reported significantly more kama muta in response to both videos (labels: $M = 3.35$, $SE = .17$, sensations: $M = 1.82$, $SE = .08$, motivation: $M = 2.04$, $SE = .11$, valence: $M = 2.26$, $SE = .13$) than people low in this trait (labels: $M = 2.32$, $SE = .17$, sensations: $M = 1.53$, $SE = .08$, motivation: $M = 1.45$, $SE = .11$, valence: $M = 1.37$, $SE = .13$). This effect was thus revealed to be significant for all four components (labels: $F(1, 131) = 18.3$, $p < .001$, $\eta_p^2 = .122$, sensations: $F(1, 131) = 6.38$, $p = .013$, $\eta_p^2 = .046$, motivation: $F(1, 131) = 14.4$, $p < .001$, $\eta_p^2 = .099$, valence: $F(1, 131) = 22.7$, $p < .001$, $\eta_p^2 = .147$).

Furthermore, an interaction effect between condition and empathic concern on overall kama muta ($F(4, 128) = 7.40$, $p < .001$, $\eta_p^2 = .188$) confirmed our hypothesis that particularly the experimental videos evoked more kama muta for people high in EC (labels: $M = 3.65$, $SE = .19$, sensations: $M = 2.25$, $SE = .11$, motivation: $M = 2.62$, $SE = .16$, valence: $M = 4.58$, $SE = .25$) compared to people low in EC (labels: $M = 2.44$, $SE = .19$, sensations: $M = 1.70$, $SE = .11$, motivation: $M = 1.58$, $SE = .16$, valence: $M = 2.90$, $SE = .25$). This interaction effect was

significant for all four components (labels: $F(4, 128) = 14.5$, $p < .001$, $\eta_p^2 = .100$, sensations: $F(4, 128) = 20.1$, $p < .001$, $\eta_p^2 = .133$, motivation: $F(4, 128) = 19.9$, $p < .001$, $\eta_p^2 = .132$, valence: $F(4, 128) = 15.4$, $p < .001$, $\eta_p^2 = .105$).

Hypothesis 3a. In order to see whether women would rate the experimental videos higher on cuteness than men, we created a model with cuteness ratings as DV, order and gender as factors, video condition as a within subject factor, and added interactions of order*condition*gender, and video condition*gender. The main effect of gender on cuteness ratings was non-significant ($F(1, 131) = .955$, $p = .330$, $\eta_p^2 = .007$), detecting no gender differences in cuteness perception of both videos.

However, an interaction effect between condition and gender was significant, $F(1, 131) = 6.03$, $p = .015$, $\eta_p^2 = .044$. Thus, confirming our predictions, women did find the experimental videos significantly cuter ($M = 5.99$, $SD = .16$) than men ($M = 5.48$, $SD = .18$).

Hypothesis 3b. Testing if the experimental videos would evoke more kama muta in women than in men, we created a similar model as in H3a, only replacing cuteness ratings with the four kama muta components as DV. The main effect of gender on overall kama muta was non-significant ($F(4, 128) = .476$, $p = .753$, $\eta_p^2 = .015$), thus finding no gender difference in reported kama muta feelings overall in response to both videos.

Furthermore, the interaction effect between condition and gender on overall kama muta was also non-significant ($F(4, 128) = 2.15$, $p = .079$, $\eta_p^2 = .063$) finding no evidence that the experimental videos evoked more kama muta, as measured by the aggregated four components, for women than men. However, individual effects of the components found a significant interaction effect of gender and condition on sensations ($F(1, 131) = 4.94$, $p = .028$, $\eta_p^2 = .036$) motivation ($F(1, 131) = 4.33$, $p = .039$, $\eta_p^2 = .032$) and valence ($F(1, 131) = 4.68$, $p = .032$, $\eta_p^2 = .034$), but not on labels ($F(1, 131) = .793$, $p = .375$, $\eta_p^2 = .006$). Hence, women experienced significantly more physical sensations ($M = 2.08$, $SE = .10$), motivation ($M = 2.25$, $SE = .16$) and emotional valence ($M = 4.04$, $SE = .25$) in response to the cute videos compared to men (sensations: $M = 1.85$, $SE = .12$, motivation: $M = 1.92$, $SE = .18$, valence: $M = 3.38$, $SE = .28$).

Hypothesis 4a. A model with cuteness ratings as DV, order and children (parents vs. no children) as factors, video condition as a within subject factor, and added interactions of order*video condition*children, and video condition*children, was created to test if people with children would perceive the experimental videos as cuter than people with no children.

Both the main effect of children on cuteness ratings ($F(1, 131) = .109$, $p = .742$, $\eta_p^2 = .001$), and the interaction effect between condition and children ($F(1, 131) = .431$, $p = .512$, $\eta_p^2 = .003$) was non-significant. Thus, no effects of having children or not in cuteness perception of neither video were found, and, contrary to our hypothesis, parents did not perceive the experimental

videos to be cuter than people with no children.

Hypothesis 4b. In order to assess whether parents felt more kama muta in response to the experimental videos than people with no children, we constructed a similar model to H4a, replacing the DV of cuteness ratings with the aggregated kama muta score of the four components. The main effect of children on overall kama muta was significant ($F(4, 128) = 3.93$, $p = .005$, $\eta_p^2 = .109$), thus indicating that parents felt more kama muta overall in response to both videos than non-parents. However, individual effects of children on the four kama muta components revealed only a significant effect on labels ($F(1, 131) = 7.21$, $p = .008$, $\eta_p^2 = .052$), suggesting that parents reported significantly more subjective feelings of being moved ($M = 3.43$, $SE = .25$) than non-parents ($M = 2.65$, $SE = .14$).

An interaction effect between condition and children on overall kama muta was also significant ($F(4, 128) = 3.29$, $p = .013$, $\eta_p^2 = .093$) indicating support for our prediction that the experimental videos evoked more kama muta in parents compared to non-parents. More specifically, parents reported significantly higher ratings for labels ($M = 3.77$, $SE = .29$, $F(1, 131) = 9.02$, $p = .003$, $\eta_p^2 = .064$) and motivation ($M = 2.55$, $SE = .24$, $F(1, 131) = 9.50$, $p = .003$, $\eta_p^2 = .068$) compared to non-parents (labels: $M = 2.82$, $SE = .16$, motivation: $M = 1.96$, $SE = .14$), but not for sensations ($F(1, 131) = 2.41$, $p = .123$, $\eta_p^2 = .018$) and valence ($F(1, 131) = .039$, $p = .844$, $\eta_p^2 = .000$).

Hypothesis 5a. To assess whether pet owners perceived the experimental videos to be cuter than people with no pets, a model was created with cuteness ratings as DV, order and pet (pet owners vs. no pets) as factors, video condition as a within subject factor, and added interactions of order*condition*pet, and condition*pet. A significant main effect of pet on cuteness ratings ($F(1, 131) = 5.14$, $p = .025$, $\eta_p^2 = .038$) indicated that pet owners perceived both videos, taken together, to be cuter ($M = 4.06$, $SE = .12$) compared to people with no pets ($M = 3.67$, $SE = .12$).

Pet owners did not find the experimental videos significantly cuter compared to people with no pets, as revealed by a non-significant interaction effect between condition and pet on cuteness ratings, $F(1, 131) = 1.85$, $p = .176$, $\eta_p^2 = .014$.

Hypothesis 5b. The prediction that the experimental videos would evoke more kama muta in pet owners as opposed to people with no pets, was tested through a similar model to H5a by replacing cuteness ratings with the aggregated kama muta score as DV.

The model revealed no significant main effect of pets ($F(4, 128) = .546$, $p = .702$, $\eta_p^2 = .017$) or interaction effect between condition and pets ($F(4, 128) = .425$, $p = .791$, $\eta_p^2 = .013$) on kama muta. Hence, the data did not support our hypothesis that cute videos evoked more kama muta in pet owners than in people without pets.

Exploratory factor analysis of sensations. To explore whether some of the kama muta

sensations are more typical for responses to cuteness than the rest of the sensations, we put the data acquired from the cute condition through a principal components exploratory factor analysis with oblimin rotation. This revealed a three-factor solution according to Kaiser's criterion of Eigenvalues above 1 (see the supplementary material in Appendix G for full procedure, scree-plot, factor loadings and communalities). The three-factor solution was further confirmed by a scree plot and a subsequent Horn's parallel analysis (Horn, 1965). Factor one comprised 6 items (control: α =.77, cute: α =.89), factor two 4 items (control: α =.84, cute: α =.82) and factor three 2 items (control: α =.81, cute: α =.94). The three factors have been named "kama muta sensations", "kama muta cuteness sensations" and "kama muta positive tears". Kama muta sensations such as goosebumps are bodily sensations that typically occur when kama muta is evoked (Seibt, Schubert, Zickfeld, Zhu, et al., 2017). However, participants reported slightly stronger levels for three of these sensations (i.e., *goosebumps or hair standing up, chills or shivers, I took a deep breath or held my breath*) in response to the control videos rather than for the cute videos. It is possible that these were elicited due to awe or fear of some of the featured non-cute animals (e.g., a white shark). The four sensations called kama muta cuteness sensations intuitively appear to accompany cute affect and were thus termed accordingly. According to the descriptive statistics for the three factors (Table 4), the cuteness sensations do indeed appear to be the best descriptors of how the participants reacted to the cute videos.

Table 4. Descriptive statistics of the 12 physical sensations (i.e., section 1 of the KAMMUS).

	Cute condition / Control condition (N = 134)			
	Mean	SD	Range (1-7)	Skew
Factor 1: Kama muta sensations				
Goosebumps or hair standing up	1.21 / 1.29	.786 / .802	1-7 / 1-5	4.89 / 3.15
Chills or shivers	1.18 / 1.54	.754 / 1.14	1-7 / 1-6	5.34 / 2.33
A swelling or tingling feeling in the center of the chest	1.57 / 1.25	1.25 / .808	1-7 / 1-6	2.48 / 3.77
Choked up or a lump in the throat	1.23 / 1.11	.840 / .470	1-7 / 1-4	4.87 / 4.79
I put one or both hands to my chest	1.28 / 1.20	.826 / .848	1-7 / 1-7	3.91 / 5.47
I took a deep breath or held my breath	1.37 / 1.44	1.02 / 1.15	1-7 / 1-7	3.24 / 3.11
Factor 2: Kama muta cuteness sensations				
A warm feeling in the center of the chest	2.87 / 1.36	1.97 / .953	1-7 / 1-6	.546 / 3.09
I said something like "awww"	3.37 / 1.44	2.35 / 1.13	1-7 / 1-7	.317 / 2.96
Buoyant or light	3.03 / 1.83	1.98 / 1.35	1-7 / 1-6	.429 / 1.41
Refreshed, energized, or exhilarated	3.00 / 1.97	1.92 / 1.44	1-7 / 1-6	.425 / 1.26
Factor 3: Kama muta positive tears				
Moist eyes	1.35 / 1.12	.983 / .549	1-7 / 1-5	3.34 / 5.88
Tears	1.13 / 1.06	.635 / .402	1-7 / 1-5	7.05 / 8.22

To compare the sensations across the three subscales, we ran a 2 (video condition) x 3 (Sensation factor) repeated ANOVA, with order as between factor. As expected, cute videos evoked more sensations than adult videos, $F(1, 132) = 146.75$, $p < .001$, $\eta_p^2 = .53$; cuteness sensations were higher than crying and kama muta sensations, $F(1.47, 194) = 30.29$, $p < .001$, $\eta_p^2 = .19$, and cuteness sensations were highest in the cute video condition, resulting in an interaction of sensations and video condition, $F(1.6, 209) = 26.07$, $p < .001$, $\eta_p^2 = .17$. Posthoc tests showed that for the cute videos, only the cuteness sensations differed from the other two subscales, mean difference .72 [1.02; .42] from crying subscale .85 [.65; 1.04] and from kama muta sensations. For the adult videos, all subscales differed from each other.

Exploratory analyses. Separate analyses, employing the same repeated measures ANOVA as all the preceding analyses, were run to test for any additional effects of the remaining two demographic variables: age and nationality. No effects of neither variable were detected. Thus, the exploratory research question, comparing Norwegians and Americans, revealed no significant differences between the two cultures.

Discussion

The main hypothesis of the study was confirmed. We found strong evidence corroborating our supposition that participants would have higher scores across all of the kama muta components when watching the cute videos as opposed to the control videos. Hence, cuteness evoked significantly stronger motivation to engage in CS-relationships; more intense bodily sensations; more subjective feelings of being moved, touched and heartwarmed; and more positive feelings. These data support the theory that cuteness evokes kama muta in the perceiver. This finding complements previous research. More specifically, the heightened bodily response to cuteness compliments the findings from a recent study by Esposito et al. (2015). The authors found that participants experienced greater physiological activation, as measured by facial temperature, in response to photographs of infant faces compared to adult faces. This effect of increased facial warmth in response to infantile stimuli was also found to be stronger in women than men. Another study, investigating the underlying motivations for consuming cat-related media content and its potential consequences for the Internet user, found that consumption of this media evoked positive emotions and energized the perceiver (Myrick, 2015). Participants in Myrick's study felt motivated to share the cute video experience with other people and wanted to watch the video again. This fits very well with kama muta theory, which labels kama muta as a predominantly positive emotion that may increase self-reported energy and motivation to share the experience again and with others (Seibt, Schubert, Zickfeld, & Fiske, 2017; Seibt, Schubert, Zickfeld, Zhu, et al., 2017).

We also identified certain physical sensations that were termed as cuteness specific

sensations, beyond other kama muta sensations such as goosebumps and chills. These sensations may accompany any other kama muta experience, but the data suggest that they are especially salient in response to cuteness. Indeed, in vernacular English, cute affect is often expressed by saying something along the lines of 'aww' (Buckley, 2016). The data from the current study further corroborate previous claims that cuteness evokes a general warm feeling in the perceiver (Genosko, 2005).

We further detected moderate but consistent effects of trait empathic concern, supporting our hypotheses. As predicted, people high in empathic concern found the experimental videos to be cuter than people low in this trait. Surprisingly, beyond our predictions, they also found the control videos to be cuter. Furthermore, people high in this trait reported stronger kama muta in response to the cute videos than people who scored lower in empathic concern. People high in empathic concern also scored higher overall on the kama muta labels, kama muta sensations, cuteness sensations, positive tears and motivation in response to both cute and non-cute videos. Nonetheless, these greater ratings were especially evident in the cute condition. Thus, people high in trait empathic concern appear to be more responsive to cuteness (even extending beyond Kindchenschema) and have a stronger affective response to it.

In accord with our prediction, women found the experimental videos to be cuter than men did. They also reported stronger kama muta in response to cuteness. Namely, women reported more intense sensations, stronger motivation and more positive feelings in response to the cute videos than men. Both of these findings might be due to cultural gender norms making it more acceptable for women to be sensitive to cuteness and report their emotional reaction to it.

The hypotheses predicting that parents would be more sensitive to cuteness and feel more kama muta in response to the cute video, were partly supported. Hypothesis 4a was not confirmed, finding no evidence that parents perceived the experimental videos to be cuter than people with no children. Hypothesis 4b indicated support for our prediction showing that parents in the current study had more subjective feelings of being moved (as measured by the labels subscale) and motivation in response to both videos than non-parents. However, the number of parents ($N = 32$) and non-parents ($N = 102$) participating in the study were disproportionate, resulting in slightly lower power than if the cell sized were more even. Hence, future studies would need to replicate this effect.

Finally, the predictions that pet owners, as opposed to people without pets, would be more responsive to both cuteness and kama muta in reaction to the cute video were not supported by the results. That is, cute videos did not evoke more kama muta in pet owners nor did they find the experimental videos significantly cuter than people without pets. These data could not replicate previous results revealing an interaction effect between pet ownership and Kindchenschema ($p =$

.001), finding that pet owners rate high infantile faces of both animals and humans as cuter than low infantile faces (Borgi et al., 2014). Beyond our predictions, pet owners did, however, perceive both videos combined as significantly cuter than non-owners.

In sum, the results from this study demonstrated that cuteness typically evokes kama muta. Wishing to elaborate on the effect of cuteness on kama muta, a second study was designed. The idea behind Study 2 was already conceived during the process of gathering stimuli for this first study. When selecting videos for pretesting, it proved challenging to locate cute videos without any cues of communal sharing. That is, most cute videos featured a tender interaction between the cute animal protagonist and others, signaling a communal relationship. Videos in which a single, cute animal was featured by itself were not only less common, but also less popular (as estimated by comparing views, likes, and shares on YouTube). As a result, the following question arose: Why is video content of cute animals more popular when it includes a caring interaction? It might be because such video content is more likely to evoke kama muta. This would accord with all prior experimental studies of kama muta showing that this emotion is evoked by observing sudden intensification of CS (Schubert, Zickfeld, Seibt, & Fiske, in press; Seibt, Schubert, Zickfeld, & Fiske, 2017; Seibt et al., in press; Seibt, Schubert, Zickfeld, Zhu, et al., 2017). Similarly, some of the motivational aspects evoked by kama muta is to experience the kama muta episode multiple times and share the experience with others. If video content featuring a combination of cuteness and a caring interaction indeed evokes kama muta, then this might explain why such videos are especially popular.

Study 2

The main objective of this study was to investigate whether indicators of communal sharing in videos (high vs. low), mediated through kama muta, would affect cuteness perception. Hence, it was hypothesized that watching an affectionate dyadic interaction between two cute animals (i.e., high CS videos) would evoke more kama muta and increase cuteness perception as opposed to watching the same two animals by themselves, only interacting minimally (i.e., low CS videos).

The study outlined three main research questions. We anticipated that (H1) the high CS videos would be judged as being cuter than the low CS videos; and that (H2) they would evoke more kama muta, as measured by the kama muta sensations and labels. A further prediction stated that (H3) the effect of video condition on cuteness perceptions would be mediated by kama muta, as measured by the kama muta sensations (model 1) and labels (model 2).

Three secondary hypotheses relating to humanization of the animal protagonists in the videos and trait empathic concern were formed as a result of the findings from the preliminary

interview study and Study 1. Consequently, we predicted that (H4), as in Study 1, people with high trait empathic concern would find the videos in both conditions cuter than people with a lower score on this trait. Based on the findings from goal three of the preliminary qualitative study, we expected that (H5) the high CS videos would lead to more perceived humanness of the animal protagonists than the low CS videos. The high CS condition was hypothesized to increase humanization of the animals because the cues of communal sharing might function as a reminder of close relationships, which have been linked to humanness (Haslam & Loughnan, 2014). Moreover, (H6) perceived humanness was predicted to be positively related with all three kama muta components.

All predictions and planned analyses were preregistered on the 20th of September, 2016 at www.AsPredicted.com.

Method

Participants. 201 participants were recruited in Norway through (1) convenience sampling on Facebook and (2) through a student research participation pool at the University of Oslo, responding to a request to participate in a study (see Appendix F for full study) investigating emotional responses to video stimuli. Participants recruited via the student pool had the opportunity to participate in the study only for educational reasons; they were told that if they selected this option their data would not be analyzed, and consequently their data was in fact excluded. As in Study 1, the online study questionnaire was offered to the participants in either Norwegian or English; they chose whichever language they preferred.

Exclusion criteria. Prior to analyzing we had decided to exclude participants on the following two criteria: participated for educational purposes only (N = 27), more than 20 % missing values (N = 11). This resulted in a total sample of 163 responses, consisting of 111 females (67,6 %), 33 males (20,2 %) and 1 other (0,6 %; 11,3 % missing values) with a mean age of 24,5, ranging from 16 to 63 years (SD = 7.92). Among the 163 participants whose data were analyzed, 135 were Norwegians (82,6 %) and 10 people with other nationalities (6,1 %) participated (11,3 % missing values). The participants were also asked how many children they had: none (N = 127, 78,0 %), one (N = 8, 5,2 %), two (N = 3, 1,8 %) or more than two (N = 4, 2,4 %; 12,5 % missing values). Fifty-five people (33,6 %) owned a pet while 89 (54,4 %) did not (11,9 % missing values).

Materials. The study used 8 videos of 30 to 40 seconds each, created for the specific purpose of serving as stimuli for Study 2 (see Appendix G for links to the videos). The stimuli represented the two conditions of the study with four videos in each stimulus set: high versus low communal sharing. The videos featured two subjects (either two animals or one animal and one

human[11]) engaging in an affectionate interaction (high CS) and not interacting at all (low CS). As an example, one high CS video displayed a puppy snuggling with his mother, while one low CS video showed two kittens lying apart on a blanket giving minimal attention to each other. We used four different scenarios (two with puppies and two with kittens), which were pairwise matched in that apart from the manipulation of low CS and high CS everything between the two video conditions was held constant (i.e., the movement of the protagonists, the same two protagonists, the same background, setting, and lighting).

Stimuli creation. Raw footage of puppies and kittens (at animal shelters and cat and dog breeders in Oslo and Stavanger, Norway) was captured by a digital video camera (Canon 5D mark II with a 50 mm lens) and edited using digital editing software (iMovie 10.1.2). The 22 final videos of approximately 2–3 minutes in length were uploaded to YouTube as unlisted videos. Eight of these were selected as the final video stimuli (based on picture quality, matched species and how well they represented the two video conditions) by the author and two other researchers and were further cropped to 30–40 seconds in length.

Measures. The revised 6-item scale from Study 1 measured perception of cuteness; 3 negatively worded items (e.g., "The video was not cute") and 3 positively worded items (e.g., "The video was adorable"). A single item developed by the main supervisor of the author was added to the cuteness scale to assess humanization of the animal protagonist(s) in the videos: "The animal(s) in the video seemed human to me". Kama muta was assessed by version 2.0[12] of the KAMMUS scale, by 3 sub-scales; Physical sensations (14 items: e.g., "Moist eyes"), communal sharing appraisals (10 items: e.g., "I observed an incredible bond") and labels (7 items: e.g., "It was heartwarming"). Answers on both scales were again on a 7-point Likert response-scale ranging from 0 (*not at all*) to 6 (*a lot)*. Empathic concern was again measured by the empathic concern subscale of the Interpersonal Reactivity Index (IRI) (Davis, 1983). All measures except the IRI contained distractor items (not included in item numbers indicated above).

Design and procedure. The study employed a repeated measures within-participants design. Each participant took part in both conditions of communal sharing by watching one video from each, thus seeing two videos in total. Each participant was presented with one cat video and one dog video, with one drawn from the high CS condition and the other drawn from the low CS condition. The presentation order of the videos was random and counterbalanced (e.g., first low CS dog then high CS cat). After each video, the participants filled out the cuteness scale including the humanization item, and then the KAMMUS scale. After watching both videos they were asked

[11] In videos showing a human, only the hands of the person were shown in the videos, in order to limit participants' cuteness appraisals solely to the animal.
[12] The outcome of a validation process of the KAMMUS scale version 1.8 emerged after the completed data collection of Study 1, which resulted in a revised KAMMUS version 2.0.

to fill out the IRI measure of empathic concern and indicate their gender, age, nationality, number of children, and whether or not they owned any pets. The design of the study is visualized in Figure 2.

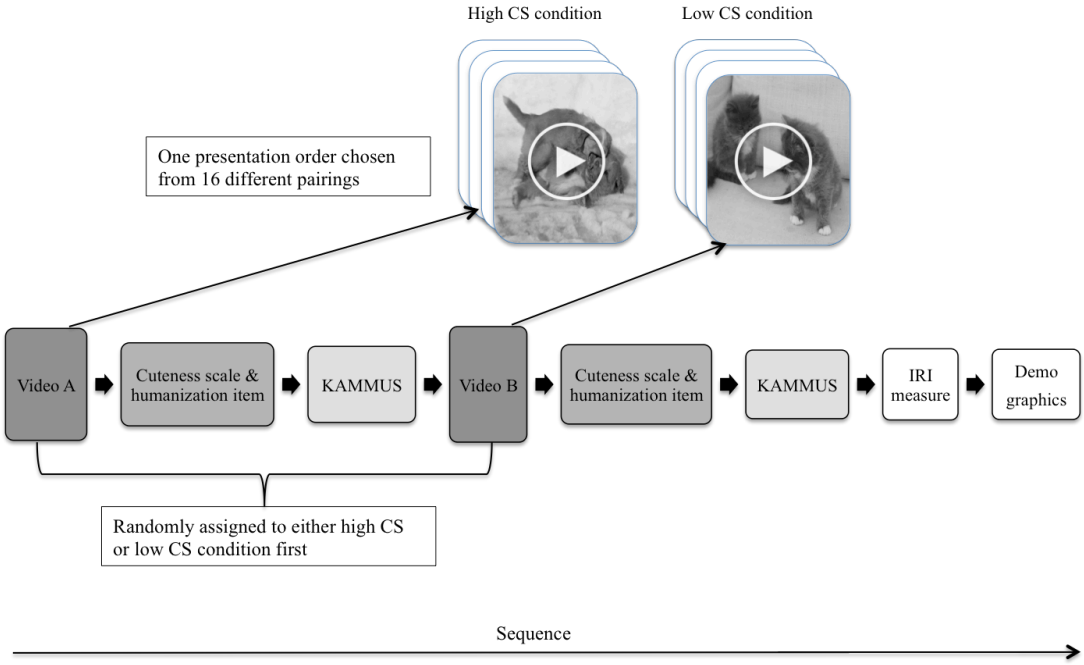

Figure 2. Visualization of the design of Study 2.

Results

A series of multilevel models constructed using the MIXED command in SPSS 24 were used to test the hypotheses. The final dataset constituted of a total of 326 video reactions.

The internal consistency of all measures and indicators was assessed by means of Cronbach's alpha. Three average scores were created as indicators of kama muta: (1) the ten items appraising a communal sharing relationship (CS appraisals; cute: $\alpha = .96$, control: $\alpha = .95$), (2) the fourteen items of physical sensations (kama muta sensations; cute: $\alpha = .89$, control: $\alpha = .91$), and (3) the three first items of the labels subscale of kama muta (kama muta labels; cute: $\alpha = .86$, control: $\alpha = .85$)[13]. Furthermore, the 7-item IRI measure comprised an index of trait empathic concern ($\alpha = .63$), while the 6-item scale revised from Study 1 was indexed to assess perceived cuteness (cute: $\alpha = .78$, control: $\alpha = .71$).

Manipulation check. As a manipulation check, we tested whether the high CS videos would be perceived as containing more communal sharing than the low CS videos, as measured by appraisals of perceived intensification of CS appraisals.

[13] Only the first 3 items, rather than all 7, of the labels subscale of the KAMMUS were selected as an index for this subscale due to the results of Study 1 showing that these three items were the strongest predictors of participants' cuteness ratings. This three-item index of the labels subscale was also preregistered.

A mixed model was constructed with the CS appraisals as dependent variable, video condition (high vs. low CS), animal species (cat vs. dog), video version (which particular video was shown out of each stimulus set), and presentation order (first high CS vs. first low CS) as factors, while interactions of video condition*presentation order, and animal species*video version, were added. This multilevel model was repeated for H2 and H3a and H3b. The main effects of animal, order, video version, and the two interaction effects were included in all four models of H1, H2, H3a, and H3b in order to control for error variance due to order and stimuli as well as to check whether the effect was stronger for some pairs and in a particular order.[14]

Regarding the manipulation check, a main effect of video condition significantly predicted scores on CS appraisals (high CS: $M = 3.66$, $SE = .12$, low CS: $M = 2.24$, $SE = .12$, F (1, 145) = 104.1, $p < .001$). The interaction between animal species and video version was significant, F (1, 252) = 8.70, $p = .003$. This interaction effect revealed that our videos featuring dogs evoked slightly stronger CS appraisals in the high CS condition than our cat videos did (dogs high CS: $M = 3.25$, $SE = .16$; cats high CS: $M = 3.11$, $SE = .17$; see Figure 3). Hence, the manipulation check was successful: the video stimuli in the high CS condition evoked significantly stronger CS appraisals than the videos in the low CS condition.

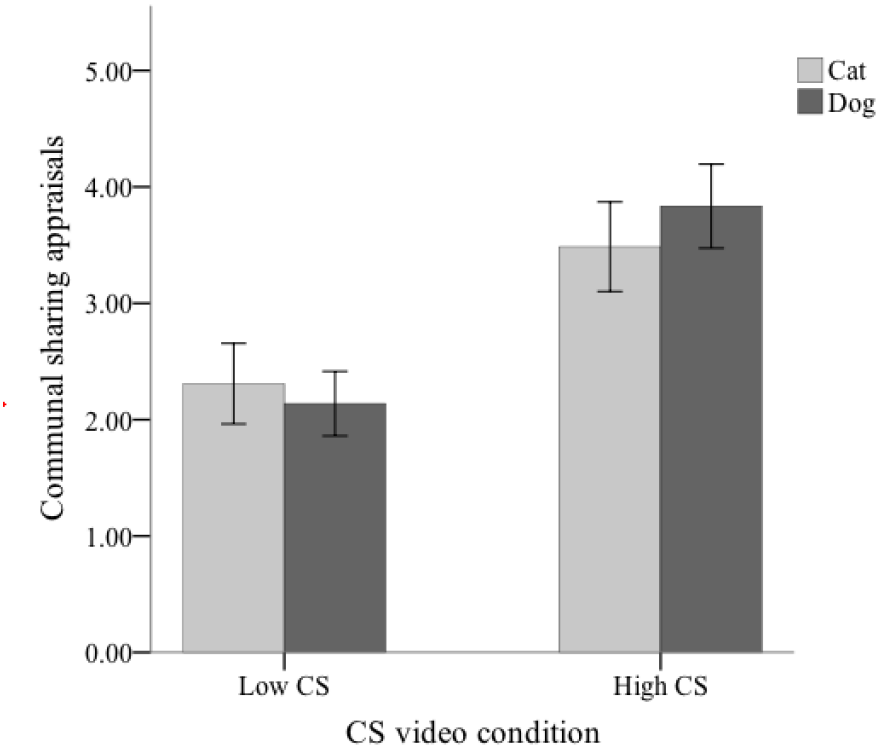

Figure 3. Mean ratings for CS appraisals (7-point scale) in both video conditions and animal species. Error bars represent standard errors of the mean (+/- 2 *SE*).

[14] Non-significant control variables are not reported.

Hypothesis 1. A similar mixed model was used to test the second hypothesis of whether the high CS videos would be rated as cuter than the low CS videos, by replacing the CS appraisals with cuteness ratings as dependent variable, and only including the interaction of CS appraisal*order. This model revealed that the video condition significantly predicted scores on the cuteness scale, F (1, 146) = 49.5, p < .001, where pairwise comparisons showed that the high CS videos were rated as cuter (M = 5.02, SE = .08) than the low CS videos (M = 4.26, SE = .09). Animal species also predicted cuteness ratings as cats (M = 4.79, SE = .08) were seen as cuter than dogs (M = 4.48, SE = .09, F (1, 145) = 8.47, p = .004; see Figure 4.

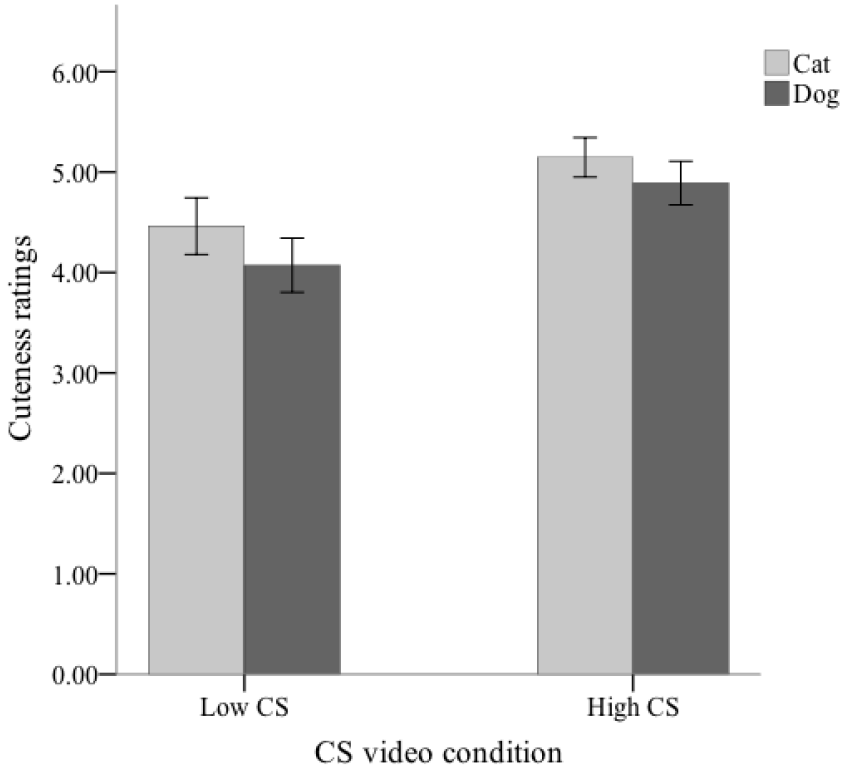

Figure 4. Mean cuteness scores (7-point scale) by video condition and animal species. Error bars represent standard errors of the mean (+/- 2 *SE*).

Hypothesis 2. Several mixed models were created to test the prediction that high CS videos would evoke more kama muta, as measured by the mean score of the sensations (model 1) and the mean score of the labels (model 2). Model 1 was tested by setting the sensations as DV, while the labels were put as DV in model 2. Both models were confirmed. Video condition significantly predicted scores on kama muta sensations, F (1, 128) = 8.26, p = .005, where high CS videos evoked stronger sensations (M = 1.91, SE = .08) than low CS videos (M = 1.67, SE = .07). Similarly, video condition also significantly predicted scores on kama muta labels, F (1, 141) =

28.7, $p < .001$, where high CS videos evoked stronger subjective feelings of kama muta ($M = 3.32$, $SE = .13$) than low CS videos did ($M = 2.60$, $SE = .13$); see Figure 5.

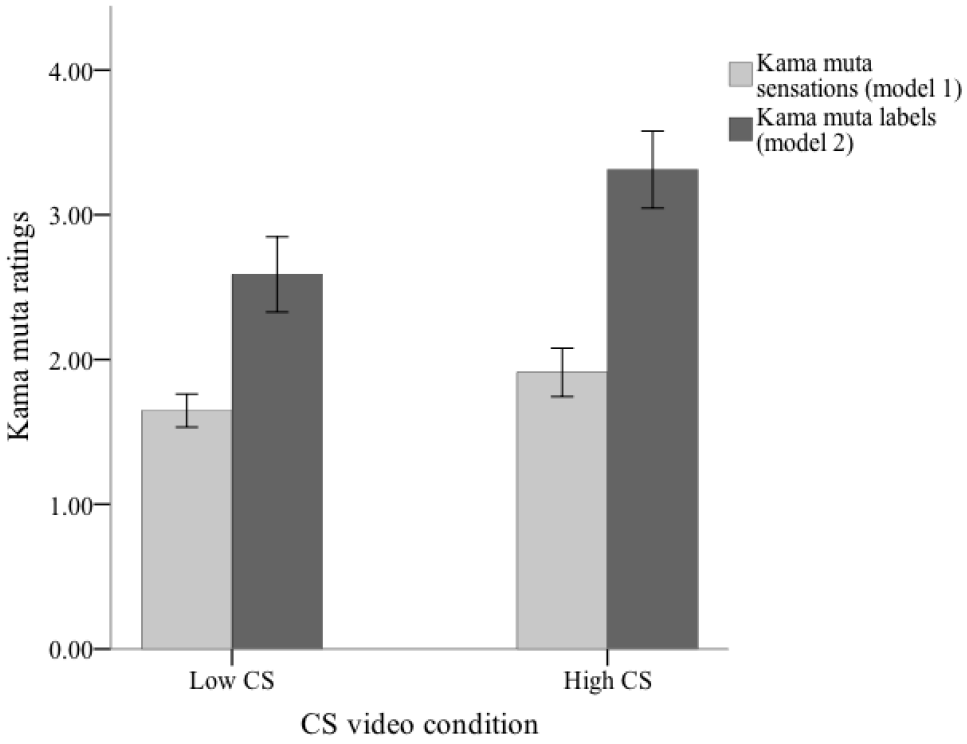

Figure 5. Mean score of kama muta sensations and kama muta labels (7-point scales) by video condition. Error bars represent standard errors of the mean (+/- 2 *SE*).

Hypothesis 3. A mediation analysis was conducted next, to test whether the effect of video condition on cuteness appraisals (as revealed by H1) was either fully or partially mediated by kama muta, as measured by the sensations (model 1) and labels (model 2). Exploring mediation in multilevel models calls for different tests than those used in linear regression (Bauer, Preacher, & Gil, 2006), so the possible mediation by kama muta was tested using three mixed models: (1) to obtain path *a*, a multilevel regression of the mediator on the independent variable was performed, while (2) paths *b* and c' were determined by finding the regression of the dependent variable on the mediator and the independent variable, and last, (3) a regression of the dependent variable on the independent variable revealed path *c*. Coefficients for the indirect effect were manually calculated and standardized according to Bowman (2012), while a confidence interval for the indirect effect was estimated with the Monte Carlo method (Falk & Biesanz, 2016)[15].

Testing the first model of whether the kama muta sensations mediated the relationship between video condition and cuteness perceptions, an indirect effect of the sensations was revealed, $B = .13$, [.04, .23]. The second model also detected an indirect effect of the kama muta

[15] By use of the following website: https://msu.edu/~falkcarl/mediation.html (see appendix G).

labels, *B* = .28, [.17, .39]. Both the sensations and the labels partially mediated the main effect of video condition on cuteness perceptions (see Figure 6 for both path models). Thus, the high CS videos showing two animals affectionately interacting with each other evoked kama muta which then positively influenced cuteness ratings of the animals.

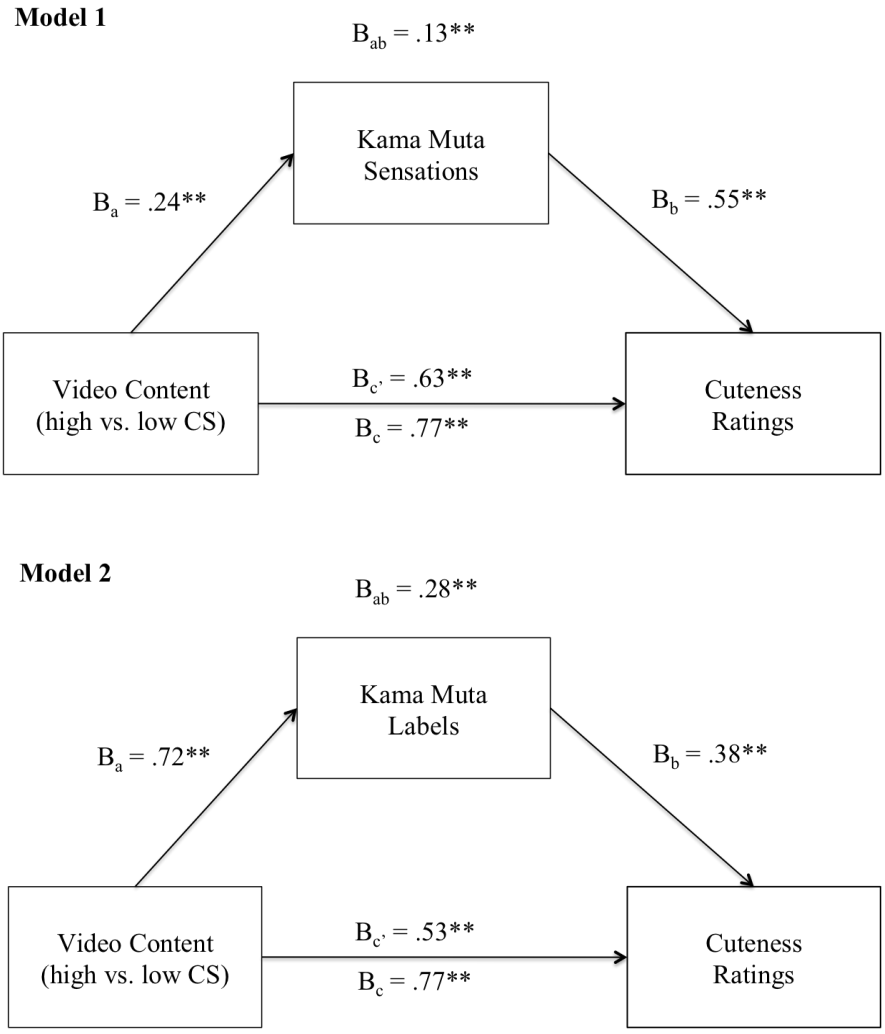

Figure 6. Mediation analyses of H3. Path diagram showing the direct (c'), indirect (a*b), and total effect (c) of video content on cuteness ratings and its partial mediation of the kama muta sensations (model 1) and the kama muta labels (model 2). ** = $p < .001$, * = $p < .05$.

Hypothesis 4. To test whether people with high trait empathic concern found the videos in both conditions cuter than people with a lower score on this trait, we used a mixed model similar to the preceding regression models. Cuteness ratings were set as DV, CS appraisals, order, animal species and version as factors, empathic concern as a covariate, and interaction of animal species*version and CS appraisals*order were added. Cuteness perceptions were set as the dependent variable; video condition, presentation order, animal species, and video version were

included as fixed factors; trait empathic concern was added as a covariate. This model revealed a main effect of trait empathic concern on cuteness perception, F (1, 144) = 10.8, p = .001, B = .23 [.09, .36]. Hence confirming our predictions, people high in empathic concern (1 SD above the mean) perceived both videos (high CS: M = 5.23, SE = .11; low CS: M = 4.46, SE = .11) as cuter than people low in this trait (1 SD below the mean; high CS: M = 4.77, SE = .12; low CS: M = 4.00, SE = .12).

Hypothesis 5. We employed a similar multilevel model with the single humanization item as the dependent variable to test whether the animals in the high CS videos were perceived as more human than the animals in the low CS videos. The model revealed a main effect of video condition on humanization, F (1, 145) = 5.39, p = .022. Consistent with our hypothesis, the animals in the high CS video condition were judged to be more human (M = 3.53, SE = .15) than the animals in the low CS group (M = 3.18, SE = .14).

Hypothesis 6. In order to test the prediction that perceived humanness would be related to the CS appraisals, sensations and labels, a multi-level analysis was conducted, with perceived humanness as criterion and appraisals, sensations and labels as continuous predictors. In line with our predictions, scores on the humanization of the animal protagonists increased along with scores on the CS appraisals (B = .25, F (1, 244) = 15.42, p < .001), sensations (B = .40, F (1, 290) = 9.22, p = .003), and labels (B = .18, F (1, 296) = 4.08, p = .044). Thus, animals that were perceived as more human evoked stronger kama muta than animals that were judged less human.

Discussion

The predicted main effect of video content for H1, H2, H3 were all confirmed. Thus, the high CS videos were rated as cuter than the low CS videos, they evoked stronger appraisals of communal sharing, and stronger kama muta, both when measured by the kama muta sensations and when measured by the kama muta labels.

The mediational effect of the third hypothesis confirmed our prediction that kama muta partially mediated the relationship between video condition and cuteness perceptions. Thus, the high CS videos evoked stronger kama muta than the low CS videos did, which in turn increased the cuteness perception of the animals. The effect was albeit partial rather than full, which suggests that the high CS videos would still be considered cuter than the low CS videos without the mediation of kama muta. However, both model 1 and 2 of the mediational effect raise questions about the causal direction between cuteness and kama muta. According to the models both physiological responses like tearing up and subjective feelings of being moved partially mediated the effect of video condition on cuteness. The order of the measurements suggests cuteness as cause and kama muta as effect, seeing as participants first judged the cuteness of the videos and then appraised the strength of their kama muta state. Hence, when feeling kama muta

people tend to perceive cute protagonists as even cuter than if they were not in a kama muta state. Thus, the salient pull of cute Kindchenschema features appears to have evoked kama muta in the participants. However, this relationship is more complex as established by the observed difference in kama muta and cuteness scores between the high and low CS conditions. Manifest cues of communal sharing between cute animals evoke more kama muta and increase cuteness perceptions of the animals, compared to the absence of direct cues of CS. That is, watching a caring, tender interaction between two cute animals is significantly cuter than watching the same two animals without observing an affectionate relationship. In addition to issues of cause and effect, the mediational model further sparks attention related to helping behavior and caretaking. The high CS videos were designed to signal strong cues of communal sharing. A communal relationship promotes the motivation to care for one's relational partner (Simão & Seibt, 2014). This particular finding thus represents empirical evidence that kama muta as evoked by cuteness motivates communal sharing.

The analysis of H4 revealed that people high in empathic concern perceived both videos as cuter than people low in that trait. This finding replicates that of Study 1 where scores on trait empathic concern predicted cuteness judgements of both traditionally cute and non-cute animals (i.e., possessing Kindchenschema traits vs. not). It thus appears that the trait of empathic concern includes a heightened susceptibility to cuteness, at least that of animals. Furthermore, the results also confirm the fifth hypothesis of the present study, that the animals in the high CS condition would be rated as more human than the animals in the low CS group. This finding is an experimental replication of the qualitative finding from goal three of the interview study, where two informants reported an increase in their perception of the cuteness of their pets when they behaved like humans. Moreover, these two findings from H4 and H5 can be elaborated when interpreted in light of previous research showing that the more human we perceive an animal to be, the more empathy we feel towards it. Rae Westbury and Neumann (2008) investigated empathic responses to non-human protagonists. Participants were presented with film stimuli of humans and non-human animals differing in degree of similarity to humans (i.e., birds, quadruped mammals, and primates) in victimized circumstances (i.e., distressing, violent, or oppressive). They measured physiological reactions, including skin-conductance responses and facial corrugator electromyographic activity as well as trait empathy and state empathy ratings. Animals more similar to humans evoked higher subjective empathy, physiological skin-conductance response, and corrugator activity than animals less similar to humans. This finding fits the results from the present study that high CS videos featuring animals that participants perceived as more human evoke more physical sensations than low CS videos showing animals perceived to be less human. Finally, the findings support the prediction that perceived humanness would be positively

predicted by kama muta (in a statistical, not causal sense, due to the multi-level nature of the data), as measured by the CS appraisals, sensations and labels. Hence, the more human the animals appeared, the stronger kama muta was evoked. Based on the preceding findings, animals in videos depicting cues of communal sharing were judged as the most human. Consequently, humanization and communal sharing seem to be overlapping concepts.

General Discussion

Despite its prevalence, the emotion that people feel in response to cuteness has been studied very little. Consequently, research within this highly lacking field has been requested (Buckley, 2016; Sherman et al., 2012). In an attempt to address this demand, the current project has postulated that cuteness typically evokes *kama muta*; a social-relational emotion that often is labeled in English as *moved*, *touched*, and *heartwarming* (Seibt, Schubert, Zickfeld, & Fiske, 2017). What evokes kama muta is sudden intensification of communal sharing. So it was further hypothesized that this theorized kama muta response to cuteness is mediated by observing an affectionate interaction, meaning an intensification of communal sharing. These two main hypotheses were experimentally tested, respectively in two studies. Responses from almost 300 combined participants supported both hypotheses.

Kama Muta as the typical Cuteness Response. The first study demonstrated that videos of cute animals evoked significantly more intense physical sensations, stronger motivation to communal relationships, subjective feelings given relevant labels, and more positive feelings, compared to videos of non-cute animals. These are all typical reactions to a kama muta inducing experience. More specifically, out of the three most common labels of kama muta, *moving*, *touching*, and *heartwarming*, the latter was the best descriptor of the feeling evoked by watching a video of a cute animal. Thus, it appears that participants could best describe the cuteness emotion as heartwarming. This finding complements that of Batson et al. (2005) where cuteness (of a dog, puppy, child) evoked subjective feelings of being *moved*. Moreover, out of a list of 12 physiological responses that typically accompany a kama muta episode, four were termed *kama muta cuteness sensations* as they were revealed to be the strongest predictors of cuteness scores. These four sensations, *a warm feeling in the center of the chest, saying something like "awww", feeling buoyant or light,* and *feeling refreshed, invigorated or energetic*, complements findings from previous studies. Firstly, facial warmth (Esposito et al. (2015) increases when viewing photos of infants. Secondly, the emotional response to cuteness is typically vocalized by saying "aww" (Buckley, 2016). Thirdly, earlier research has demonstrated that watching online content of cute cats increase subjective energy levels, attention, contentedness, cheer, hope, and happiness (Myrick, 2015). In the current studies, however, participants responses to the bodily sensations

were highly varied. As assumed, some people experienced few to no sensations, while others reported several of them. A minority even reacted with positive tears to the 30 second-long video clips featuring a single cute animal. Taken together, these findings are highly consistent with kama muta theory. Hence, it appears that cuteness can indeed evoke the heartwarming emotion of kama muta.

Communal Sharing. The second study revealed that the effect of cuteness on kama muta from Study 1 was significantly larger when adding signs of communal sharing. That is, observing an affectionate interaction between two cute animals evoked more kama muta than observing the same two protagonists without the interaction. Witnessing a caring and tender relationship between others is typically moving and heartwarming in itself (Seibt et al., in press). As the first study revealed, simply observing a single cute animal is also moving and heartwarming. When these two elements are combined, as in Study 2, they add to the heartwarming feelings, inducing an even stronger kama muta state. Besides further establishing the main result from Study 1 that cuteness can evoke kama muta, this particular finding also help validate previous research. Earlier studies on the kama muta emotion have found that appraisals of communal sharing are strong predictors of a kama muta episode (Seibt, Schubert, Zickfeld, Zhu, et al., 2017). In conjunction with the results presented here, this further validates kama muta as the typical cuteness emotion.

The finding that including CS interactions increased both cuteness perceptions and kama muta offers a potential explanation to the question that in fact initiated Study 2: Why is online video content of cute animals more popular when it includes a caring interaction? It may be that these videos evoke a stronger kama muta state, which is an emotional state that people actively seek out and want to experience again and again (A. P. Fiske et al., in press).

Gender Differences. The results from the first experimental study presented in this thesis provides further evidence for the consistent finding from the existing literature that women are more responsive to cuteness than men. Confirming our expectations, women responded more strongly than men to the video manipulation of Study 1, judging the cute videos as cuter. Women also reported significantly more intense physical sensations, stronger communal sharing motivation, and positive valence than men. However, despite its reliable effect, this apparent gender difference might be due to cultural gender norms. Women might be more willing than men to report their reaction to cuteness and thus admitting to having an emotional response to it. Or women may have learned to experience the emotions expected and valued in them. Cuteness is frequently linked to femininity, vulnerability, and incompetence (Ngai, 2005). Consequently, responding to cuteness with an emotional reaction does appear to conflict with the contemporary Western stoic male stereotype (Brody, 2000). This idea would be in line with previous research by Parsons et al. (2011); they investigated a potential gender difference in care giving behavior as

evoked by cuteness by having 71 non-parent men and women rate the cuteness of infant faces and their 'wanting' of the infants. Their results indicated that women are more likely to report cuteness sensitivity than men, despite no gender difference in actual motivational incentive to experience cuteness. An alternative explanation for the observed gender differences might be due to women's current phase in their menstrual cycle. Cuteness discrimination (i.e., ability to identify the most cute baby from a set of pictures) has been shown to improve during ovulation (Lobmaier, Probst, Perrett, & Heinrichs, 2015). Likewise, through the use of digitally altering photos of infant faces to manipulate cuteness, Sprengelmeyer et al. (2009) found that young women (aged 19-26) and middle-aged women (aged 45-51) were the most sensitive to differences in infantile cuteness as compared to men (aged 19-26 and 53-60) and older women (aged 53-60). In a subsequent study, the authors compared pre- and postmenopausal women and women taking oral contraceptives or not. They found that both premenopausal women and young women taking oral contraceptives had higher cuteness sensitivity as compared to the other two groups of women. These results indicate that reproductive hormones might affect cuteness sensitivity.

Empathic Concern. Beyond the main hypotheses, results from both studies indicate a link between cuteness sensitivity and trait empathic concern. People high in this trait were affected more strongly by the cute videos, which consequently induced stronger kama muta. Specifically, one finding from Study 1 went beyond our predictions, revealing that not only did people high in trait EC find typically cute animals as cuter than people low in this trait, but they also judged non-cute animals as cuter. This finding could possibly be an artifact of individual differences in willingness to report tender, caring emotions, rather than actual differences in trait empathic concern. Men who want to portray themselves as 'masculine' in a tough, imperturbable manner might rate themselves as less responsive to needy others and cute animals. That is, this apparent correlation could be a result from both measures (i.e., IRI and KAMMUS) being affected by the same impression management factor.

Humanization. As opposed to videos of non-interacting cute animals, videos with signs of communal sharing between cute animal protagonists were considered significantly cuter and evoked stronger kama muta. Why? The answer to this might lie in the fact that the animals in these videos were humanized more than the same animals appearing in a video without an interaction. Adding to this, another finding revealed a significant positive correlation between scores on humanization and communal sharing, suggesting that these two concepts are overlapping. Individuals that have a communal sharing relationship trust each other and are unified in a single essence (A. P. Fiske, 2004). These relational characteristics can be argued to be uniquely human as they might involve secondary emotions such as love and tenderness that some might imagine animals do not experience (Demoulin et al., 2004). Consequently, any agent capable of forming a

communal relationship with others may be attributed human qualities (i.e., humanized) as a result. Following that reasoning, observing two animals engaging in affectionate interaction that the perceiver interprets as indexing a communal relationship could lead the perceiver to humanize the affectionate animals.

Limitations of the current Studies

It is worth noting some shortcomings to the current studies. As reported in Study 1, several order effects were detected in between-subjects analyses. This might be due to anchoring effects. It might be that participants relied on the combined informational value of Video 1 and the cuteness scale as an anchor on how to respond to the subsequent cuteness of Video 2. This fits the actual pattern of the means of cuteness, showing that when a non-cute video was presented first it was judged as more cute then when it was shown second. Another possible explanation to the observed order effects of Study 1 is demand effects. The experimental videos combined with the subsequent cuteness scale might have evoked a certain response in participants. That is, it could seem implied that the videos were supposed to be judged as more or less cute. It might appear socially undesirable to rate an animal as "not at all" cute. Whatever the reason for the order effects of the first study, it was likely the result of an essential limitation to the study design. The fixed order of the cuteness scale and the KAMMUS scale could have been counterbalanced in an effort to reduce the informational order effects of these two measures. Including filler scales or tasks, directing attention away from the variables of interest to the study, could further have helped to reduce the observed demand characteristics. Nonetheless, a couple of precautions were taken beforehand in an attempt to reduce such social desirability. Filler items were included in all subsections of the KAMMUS scale of kama muta as well as in the cuteness scale. The video conditions were also counterbalanced in both studies. Based on the order effects of Study 1, we also expected some carryover effect from one condition to the other in the following study. However, no such order effects were found in Study 2.

Other limitations of the current studies concern the data collection and quality. The use of convenience sampling and relatively high drop-out and exclusion rates do not threaten the internal validity (as the experimental conditions were fully randomized), but they do suggest that the sample may not have been representative especially of the Norwegian population on relevant dimensions. For example, people sensitive to cuteness may have been more likely to actually complete the whole study. This was less of a problem for the US sample, as we paid those participants, and had to exclude less of them. In this light, the parallel findings in Study 1 for the US and Norway are encouraging.

A statistical problem in the present studies was the high skew of some of the measures. For example, the sensations of tears or goosebumps were rarely reported, contributing to skewed

distributions of the scales. To check the robustness of the findings for such measures, these analyses should thus be repeated using a transformation that normalizes the distribution, or using parameter-free statistics. Fortunately, this problem only appeared in a few of the scales, and most findings were highly robust with a significance level of .001. Thus, this problem does not appear to invalidate the findings obtained.

Finally, the studies would ideally use a larger stimulus set with a broader representation of animal species in order to demonstrate that the effects are highly generalizable, while determining which species and breeds evoke how much kama muta state and cuteness ratings. Furthermore, while we the goal of the study was to test whether kama muta is the emotion evoked by seeing cuteness, we only tested this with videos of animals. Thus, it remains to be shown whether our results hold for other cute agents, notably human babies, children, some adults, and artistic creations such as cartoon characters.

Implications and Directions for Future Research

People's response to cuteness is one of the most compelling human behaviors (Kringelbach et al., 2016), and one that scholars have generally ignored. This effect that cuteness has on us may intuitively appear innocuous but it is already being exploited through manipulative commercial advertising in an attempt to increase profit (Nenkov & Scott, 2014b; Nittono, 2016). Nonetheless, it can also be of great societal value, extending far beyond consumerism and merchandizing, even the marketing of charities. Internet users are already proactively consuming content of cute animals in an attempt to induce a feel-good emotion (Myrick, 2015) that the current project have postulated to be kama muta. This research on the interplay between cuteness and kama muta might facilitate progress in interventions directed at promoting unity, care, empathy and prosocial behavior. Non-profit organizations and agents of public policy can utilize this information in strategies aimed at evoking support or opposition for various messages. Moreover, this knowledge can be implemented in environmental campaigns attempting to increase awareness of an issue subject or raise donations to worthy causes. This latter utility, however, ought to be explored through additional research. Seeing as cuteness is frequently linked to perceived vulnerability and distress (e.g., Gross, 1997; Nenkov & Scott, 2014a), which is hypothesized to evoke pity and sympathy (Cuddy et al., 2007) it would be interesting to see if the vulnerability of cute targets elicits helping behavior. Likewise, since perceiving cute animals entices people to connect to them in communal sharing relationships, this should lead to feelings of kama muta, which in turn motivates care for both the animals themselves, and apparently for others. Future studies might therefore seek evidence that the kama muta response evoked by cuteness motivates people to extend care, help, and compassion to others.

Other suggestions for coming studies relate to a focus on cultural comparisons. The

participants in the current studies were recruited from two cultures that lack a name for the emotion felt in response to cuteness. When provided with a list of suggested labels, they chose *heartwarming* as the best descriptor of their cuteness response. It would be interesting to test this within one of the few cultures that do seem to have a word for the cuteness emotion. Hence, it might be fruitful to compare the *heartwarming* term to the Japanese "*kawaii"*, which roughly translates to the English "*cute"* (Nittono, 2016) and is a word often used to describe this emotion. Furthermore, the results from the current studies revealed a small but significant effect of positive tears evoked by cuteness. Again, it might be purposeful to test whether this effect increases in a culture that cultivates the cuteness emotion. Finnish, Estonian, and Hungarian have definite words for the emotional response to cuteness. Does this affect the strength or nature of that response?

A final direction for subsequent research moves into a clinical domain. From its onset, Animal Assisted Therapy (AAT) quickly became a favored therapeutic tool among many clinical professionals (Altschiller, 2011). The overall effect of AAT on improving emotional well-being has been thoroughly documented by a meta-analysis (Nimer & Lundahl, 2007). It would be interesting to see whether kama muta mediates this therapeutic effect. There are also programs that bring animals to visit hospital patients. Do kama muta responses to the visiting animals affect the patients' recovery?

Ethical Considerations

The present studies received ethical approval from the Department of Psychology's Research Ethics Committee at the University of Oslo (reference number: 864760). The present studies were exempt for ethical approval from both the Norwegian Centre for Research Data (NSD) and Regional Committees for Medical and Health Research Ethics (REK). NSD approval was unnecessary due to participants' right to anonymity, not gathering any sensitive information like religious beliefs and occupation or obtaining any directly recognizable information such as name or IP-address (Forbrukerombudet & Datatilsynet, Oslo 2004; NESH, 2016). The studies were also exempted from REK approval because they did not involve any medical or health-related aspects ("Om å søke REK," n.d.).

Minors from the age of 15 years can decide autonomously when it comes to decisions relating to education and/or organizational membership (Barne- & likestillingsdepartementet, 2016). Thus, only people at the age of 15 years or older was eligible, and sought out, to participate as informants and participants. Every participant had to give their consent prior to any participation in the preliminary exploratory study and both experimental studies. They were thoroughly informed about their rights as participants (e.g. right to withdraw at any point, right to access their data and request them be deleted) and received detailed instructions. All participants were given a debriefing of each study upon completion, detailing the purpose of the study as well

as the rationale behind conducting it. They were also provided with the author's contact information should they have any questions or comments about their participation. None of the studies utilized any deception.

Conclusion

Visual features such as large eyes, a small nose, facial features low on the head (leaving a high forehead), and a round face comprise the Kindchenschema; people perceive this schema as cute. Such cute features are neotenous, meaning they are characteristic of infants and gradually diminish with maturation. Mammalian survival depends on parents nurturing and protecting their offspring into viable adults. For this reason, the neoteny of cuteness is thought to elicit a fundamental caretaking response in the perceiver, which is triggered by an emotional reaction. This emotional response to cuteness has generally been ignored as a research topic and consequently, the emotion that cuteness usually evokes has remained unidentified. In an attempt to address this research gap, the current project postulated the emotional construct of kama muta as the predominant cuteness response. As a social-relational emotion often denoted in English as *touching*, *moving*, and *heartwarming*, or in Norwegian as *å bli rørt,* kama muta is evoked by a sudden intensification of a communal relationship. The present project further hypothesized that signs of communal sharing would mediate the effect of kama muta on perceptions of cuteness. Two preliminary and two experimental studies set out to test these predictions and the subsequent results provided strong experimental support for them. Thus, these studies obtained evidence that the kama muta emotion is reported as perception of cuteness and that observing communal sharing relations contribute to both the kama muta emotions and ratings of cuteness.

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Appendix A – Informed Consent

Informed consent for preliminary exploratory study

Background and purpose

This is a request for you to participate in a research study that intends to investigate people's emotional responses to various everyday situations, especially within an animal-human interaction. The goal is to better understand how people react to different situations, why they react that way and how reactions differ across individuals.

What does the study entail?

Your participation in this study will involve taking part in a qualitative interview, where you will be asked about your thoughts and feelings in response to a social interaction. You might also be asked to recall and reflect on your previous, most salient, emotional experiences. You will also be asked some personal information about yourself, such as your gender and age. You may choose not to answer certain questions without providing any specific reason. You may also request a break if and when you need one, at any point during the interview.

Based on pilot interviews, the estimated duration of the interview will range between 20 to 40 minutes, depending on how detailed your answers are. Your responses will be noted down and may be used in the dissemination of the results of the study. It will, however, not be able to identify you from your responses.

Potential advantages and disadvantages

You will hopefully find it enjoyable and exciting to reflect upon your own feelings, emotions and previous experiences. You will mostly be asked to reflect upon positive emotional experiences. It is possible that you might recall some negative experiences that, in turn, could trigger some negative affect during or after the interview is concluded.

What will happen to the information about you?

The information and data that are registered about you will only be used in accordance with the purpose of the study as described above. All the data will be processed confidentially. If your responses appear in the results of the study, your name and all other identifiable information will be altered for your anonymity. It will not be possible to identify you in the results of the study when these are disseminated.

Voluntary participation

Participation in the study is voluntary. You can withdraw your consent to participate in the study at any time and without stating any particular reason. This will not have any consequences for your further treatment. If you wish to participate, indicate your consent below before proceeding. If you agree to participate at this time, you may later on withdraw your consent without your treatment being affected in any way. If you later on wish to withdraw your consent or have questions concerning the study, you may contact Kamilla Knutsen Steinnes (kksteinnes@gmail.com).

Privacy

The information that is retained about you is only the answers you give in the interview. Your data will be stored on password-secured computers and encrypted Flash Drives.

Right to access and right to delete your data

If you agree to participate in the study, you are entitled to have access to the information that is registered about you (i.e., read your transcribed interview). You are further entitled to correct any mistakes in the information that has been registered. If you withdraw from the study, you are entitled to demand that the collected samples and data are deleted, unless the data have already been incorporated in analyses or used in scientific publications.

Information about the outcome of the study

You are entitled to receive information about the result of the study. Please contact Kamilla Knutsen Steinnes, kksteinnes@gmail.com, to do so.

I have fully understood the information stated above, and I am hereby willing to participate in the study:

Yes ☐ No ☐

Signature:

Informed Consent Study 1 & 2

Background and purpose

This is a request for you to participate in a research study that aims to gain a better understanding of people's emotional responses to user-generated media content, namely YouTube videos.

What does the study entail?

Participation in this research will take approximately 10-15 minutes. During the study you will be presented with two short videos. After watching each video, you will be asked to answer some questions related to your feelings, thoughts and physical reactions. Finally, you will be asked some questions about your personality.

Potential advantages and disadvantages

The study might give you an insight, and thus a heightened self-awareness, into your own emotions. Specifically, you will gain a deeper knowledge about how you react to certain types of videos that are commonly shared on social-media communities, such as YouTube. None of the videos that you will be presented with feature any graphic violence, disturbing scenes, or material of a sexual nature. There are no known disadvantages of participating in this study.

What will happen to the information about you?

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

Voluntary participation

Voluntary participation Participation in the study is voluntary. You can withdraw your consent to participate in the study at any time and without stating any particular reason. This will not have any consequences for your further treatment. If you wish to participate, you will have to indicate your consent below before proceeding. If you agree to participate at this time, you may later on withdraw your consent without your treatment being affected in any way. If you later on wish to withdraw your consent or have questions concerning the study, you may contact kksteinnes@gmail.com. If you participate on the basis of a mandatory course requirement you can exit the study at any time while still getting credit. We ask you to finish the questionnaire. You can however leave out questions that you do not wish to answer. If you decide to cancel your participation in this research, please explicitly state this in the form on Sona systems. In that case you will still receive full credit.

Privacy

Information that is retained about you is only the answers you provide in the questionnaire. No identifiable information, such as IP-address, will be collected. If you participate via MTurk, a temporary random code number links your participation in the study to the MTurk HIT. That number is deleted three days after your participation.

Releasing material and data to other parties

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

Right to access and right to delete your data and samples

If you agree to participate in the study, you are entitled to have access to what information is registered about you. You are further entitled to correct any mistakes in the information we have

registered. If you withdraw from the study, you have the right to request that your data be deleted, unless they have already been incorporated into analyses or used in scientific publications. Contact, kksteinnes@gmail.com to do so.

Contact information and funding

The study is funded by the Department of Psychology of the University of Oslo, Norway. A team at the University of Oslo is conducting this research. You can contact Kamilla Knutsen Steinnes, kksteinnes@gmail.com, for questions and comments regarding the study.

Information about the outcome of the study

You are entitled to receive information about the result of the study. Please contact the research team to do so. At the end of the study you will be informed about the scientific rational for conducting it.

This study tests a scientific hypothesis, so you are asked to be serious and committed if you do decide to take part. In addition, this research is part of the research participation exercise. For that reason, you may now choose to participate for educational purposes only. In that case, your data will not be used. Check below if you want to choose that option.

❍ I want to participate for educational purposes only. Do not analyze my data.

I have read the text above and I am willing to participate in the present study. (Note. Choosing 'No' will end the survey)

❍ Yes: I want to participate.
❍ No: I do not want to participate.

Appendix B – Interview guide used in preliminary exploratory study[16]

Date of interview

Context of interview (surroundings, location etc)

Volunteer or visitor? *

Informant information (demographics)

Gender:
Age:
Children?
Any pets growing up?
Current pets?

Guidelines for questions and structure

1. How do you feel right now? [Goal 1]
2. How long have you worked/volunteered here? / Have you visited before? * [Goal 3]
   i. Why did you start working here? / Why did you decide to visit?
   ii. What makes you keep coming (if applicable)?
3. How long have you had your pet for? / How well do you know this animal? [G1]
4. Do you experience any particular feelings when you come here/spend time with your pet? If so, how often do you experience them? [G1]
5. Can you recall any particularly salient positive feelings while being here/with your pet? [G3]
   i. Why do you think you remember this/these specific situation(s)?

[16] Please note that the original document was prepared in Norwegian and that the current document is the English translation from the original version.
* Only applies to informants volunteering, working or visiting animal shelters.

6. Can you recall any particularly salient negative feelings while being here/with your pet? [G3]
    i. If so, why do you think you remember this/these?
7. When do these feelings typically occur? [Goal 2]
    i. What, in your opinion, is it that makes you feel this way? What evokes these feelings in you?
8. Do these feelings usually occur in a specific place or location? If so, where and why do you think that is? [G2]
9. Have you ever felt these types of feelings when you are not around this animal? [G2]
    i. When?
    ii. How often?
10. When you experience these feelings, do you think of anything specific? Do you feel like doing something special? [G3]
11. What do you usually do after you have had these feelings? [G3]
12. Have you noticed any physical changes when you get these feelings? Which ones? [G1]
    i. Do you get moist eyes or tears?
    ii. Goosebumps?
    iii. A lump in the throat; difficulty speaking?
    iv. Any feeling in the chest? Warm or cold sensation?
    v. Do you ever say anything in the moment?
    vi. Do you ever feel buoyant or light? Energized or refreshed?
13. Is there something else you would like to tell me? Anything that you think I might have forgot to ask you? [G3]

Appendix C - KAMMUS Scale

KAMMUS version 1.8 used in Study 1

Section 1: Physical sensations		
Item	*English*	*Norwegian*
1	Moist eyes	Fuktige (tårevåte) øyne
2	Tears	Tårer
3	Goosebumps or hair standing up	Gåsehud eller hår reiser seg
4	Chills or shivers	Frysninger eller skjelvinger
5	A warm feeling in the center of the chest	En varm følelse i midten av brystet
6	A swelling or tingling feeling in the center of the chest	En svulmende eller prikkende følelse i midten av brystet
7	Choked up or a lump in the throat	En klump i halsen
8	I put one or both hands to my chest	Jeg la en eller begge hender på brystet
9	I took a deep breath or held my breath	Jeg tok et dypt åndedrag eller holdt pusten
10	I said something like “awww”	Jeg sa noe slikt som ”tnåååå”
11	Buoyant or light	Svevende eller lett
12	Refreshed, energized, or exhilarated	Forfrisket, energisk eller oppkvikket

Section 2B: Communal sharing appraisals		
Item	*English*	*Norwegian*
1	I observed an incredible bond	Jeg oberverte et utrolig bånd
2	I observed an extraordinary sense of connection	Jeg oberverte en fantastisk forbindelse
3	I observed a special sense of belonging	Jeg oberverte en spesiell følelse av tilhørighet
4	I observed an exceptional sense of closeness appear	Jeg oberverte at en utrolig følelse av nærhet oppstod
5	I observed the emergence of a remarkable feeling of oneness	Jeg oberverte at en unik følelse av enhet oppstod
6	I observed a unique kind of love spring up	Jeg oberverte at en unik type kjærlighet oppstod
7	I observed a phenomenal feeling of being appreciated	Jeg oberverte en utrolig følelse av å bli verdsatt
8	I observed an unbelievable feeling of being wanted	Jeg oberverte en utrolig følelse av å være ønsket
9	I observed an astonishing sense of being needed	Jeg oberverte en utrolig følelse av å være behøvd
10	I observed an extraordinary feeling of being welcomed	Jeg oberverte en fantastisk følelse av å være velkommen
11	I observed exceptional care being given	Jeg oberverte at eksepsjonell omsorg ble gitt
12	I observed a great kindness	Jeg oberverte stor vennlighet

Section 3 & 4: Motivation to communal relations		
Item	*English*	*Norwegian*
Section 3		
1	I felt like telling someone how much I care about them	Jeg følte for å fortelle noen hvor mye jeg bryr meg om dem
2	I wanted to hug someone	Jeg hadde lyst til å gi noen en klem
3	I wanted to do something extra-nice for someone	Jeg hadde lyst til å gjøre noe kjempesnilt for noen
4	I felt especially friendly toward nearly everyone	Jeg følte meg spesielt vennlig mot nesten alle andre
5	I felt more strongly committed to a relationship	Jeg følte en sterkere forpliktelse til et forhold
Section 4		
1	I was eager to tell my friends or family about the experience	Jeg var ivrig etter å fortelle vennene mine eller familien min om opplevelsen
2	I wanted to have the experience all over again together *with* others	Jeg ønsket å ha opplevelsen om igjen *sammen* med andre

Section 5: Emotional valence & labels		
Item	*English*	*Norwegian*
Section 5: Valence		
α	I had positive feelings	Jeg hadde positive følelser
β	I had negative feelings	Jeg hadde negative følelser
Section 5: Labels		
1	It was heartwarming	Det var hjertevarmende
2	I was moved	Jeg var beveget
3	I was touched	Jeg var rørt
4	It was a nostalgic moment	Det var et nostalgisk øyeblikk
5	It was a poignant experience	Det var en gripende opplevelse
6	I identified with something larger than myself	Jeg følte meg som en del av noe større enn meg selv

In all sections, Likert scales, 0 = *not at all* to 6 = *a lot*. Sections are presented in the order indicated; items are randomized within each section.

KAMMUS version 2.0 used in Study 2

Section 1: Physical sensations		
Item	*English*	*Norwegian*
1	Moist eyes	Fuktige (tårevåte) øyne
2	Tears	Tårer
3	Goosebumps or hair standing up	Gåsehud eller hår reiser seg
4	Chills or shivers	Frysninger eller skjelvinger
5	A warm feeling in the center of the chest	En varm følelse i midten av brystet
6	Some feeling in the center of the chest	En følelse i midten av brystet
7	Choked up	Gråtkvalt/tårekvalt
8	A lump in the throat	En klump i halsen
9	Difficulty speaking	Vanskelig for å snakke
10	I put one or both hands to my chest	Jeg la en eller begge hender på brystet
11	I took a deep breath or held my breath	Jeg tok et dypt åndedrag eller holdt pusten
12	I said something like “awww”	Jeg sa noe slikt som ”tnåååå”
13	Buoyant or light	Svevende eller lett
14	Refreshed, energized, or exhilarated	Forfrisket, energisk eller oppkvikket

Section 2B: Communal sharing appraisals		
Item	*English*	*Norwegian*
1	I observed an incredible bond	Jeg oberverte et utrolig bånd
2	I observed a special sense of belonging	Jeg oberverte en spesiell følelse av tilhørighet
3	I observed an exceptional sense of closeness appear	Jeg oberverte en utrolig følelse av nærhet oppstod
4	I observed the emergence of a remarkable feeling of oneness	Jeg oberverte at en spesiell følelse av enhet oppstod
5	I observed a unique kind of love spring up	Jeg oberverte at en unik type kjærlighet oppstod
6	I observed a phenomenal feeling of being appreciated	Jeg oberverte en utrolig følelse av å bli verdsatt
7	I observed an astonishing sense of being needed	Jeg oberverte en utrolig følelse av å være ønsket
8	I observed an extraordinary feeling of being welcomed	Jeg oberverte en fantastisk følelse av å være velkommen
9	I observed exceptional care being given to someone	Jeg oberverte at eksepsjonell omsorg ble gitt
10	I observed a great kindness	Jeg oberverte en kjempesnill handling

Section 3 & 4: Motivation to communal relations		
Item	*English*	*Norwegian*
Section 3		
1	I felt like telling someone how much I care about them	Jeg følte for å fortelle noen hvor mye jeg bryr meg om dem
2	I wanted to hug someone	Jeg hadde lyst til å gi noen en klem
3	I wanted to do something extra-nice for someone	Jeg hadde lyst til å gjøre noe kjempesnilt for noen
4	I felt especially friendly	Jeg følte meg spesielt vennlig
5	I felt more strongly committed to a relationship	Jeg følte en sterkere forpliktelse til et forhold
Section 4		
1	I was eager to tell my friends or family about the experience	Jeg var ivrig etter å fortelle vennene mine eller familien min om opplevelsen
2	I wanted to have the experience together *with* others	Jeg ønsket å ha opplevelsen *sammen* med andre

Section 5: Emotional valence & labels		
Item	*English*	*Norwegian*
Section 5: Valence		
α	I had positive feelings	Jeg hadde positive følelser
β	I had negative feelings	Jeg hadde negative følelser
Section 5: Labels		
1	It was heartwarming	Det var hjertevarmende
2	I was moved	Jeg var beveget
3	I was touched	Jeg var rørt
4	It was a nostalgic moment	Det var et nostalgisk øyeblikk
5	It was a poignant experience	Det var en gripende opplevelse
6	I felt a part of something larger than myself	Jeg følte meg som en del av noe større enn meg selv
7	I felt in love	Jeg følte meg forelsket

In all sections, Likert scales, 0 = *not at all* to 6 = *a lot*. Sections are presented in the order indicated; items are randomized within each section.

Appendix D - Cuteness Scale

Cuteness Scale used in Study 1		
	English	*Norwegian*
Item		
1	It is adorable	Det er bedårende
2	It is repulsive [Reversed]	Det er frastøtende
3	It is sweet	Det er elskverdig
4	It is huge [Reversed]	Det er kjempestort
5	It looks so soft	Det ser veldig mykt ut
6	It looks really old [Reversed]	Det ser veldig gammelt ut
7	It is cute	Det er søtt
8	It is cuddly	Det er veldig kosete
9	I would like to pet it	Jeg har lyst å klappe det
A	It is amusing [Distractor]	Det er underholdende
B	It is interesting [Distractor]	Det er interessant
C	It is funny [Distractor]	Det er morsomt

Revised Cuteness Scale used in Study 2		
	English	*Norwegian*
Item		
1	It is adorable	Det er bedårende
2	It is not sweet [Negative]	Det er ikke elskverdig
3	It looks so soft	Det ser så mykt ut
4	It is not cute [Negative]	Det er ikke søtt
5	It is cuddly	Det er veldig kosete
6	I would not like to pet it [Negative]	Jeg ville ikke likt å klappe det
A	It is amusing [Distractor]	Det er underholdende
B	It is not interesting [Distractor]	Det er ikke interessant
C	It is funny [Distractor]	Det er morsomt

Responses were recorded on a Likert reponse scale, from 0 = *not at all* to 6 = *a lot*

Appendix E – Study 1 Questionnaire

1. Informed Consent	See Appendix A
2. Introduction	Welcome to the present study. In this study we want to investigate people's responses to various video clips. You will be presented with two short video clips, which lasts about 20-40 seconds each. After each video clip you will be asked to fill out some questionnaires concerning your responses to the video clip. Finally, you will be asked some additional questions about your personality. The study will take about 10 to 15 minutes to complete. Please minimize all distractions and watch the clips intently. The clips are trimmed as parts of longer videos, but you will just need to watch the short clip that shows up on your screen. Both video clips should be muted, so please turn off the sound on your computer or smart phone. If you have trouble with video playback try to reload the page. You are now going to watch the first video. Whenever you push the Next Button, the video should start automatically. If not, then just push the play button. When the video is finished (approx. 20-40 sec), you can press the next button to get through to the questionnaire. Please remember to turn off the sound.
3. Video Condition I	[Video 1: cute or non-cute]
4. Cuteness Scale	See Appendix D
5. KAMMUS Section 1;3;4;5	See Appendix C
6. Video Condition II	See 3 through 5
7. IRI Measure of Trait EC	For each item, please indicate how well it describes you:

	Does not describe me well (1)	(2)	(3)	(4)	Describes me very well (5)
I often have tender, concerned feelings for people less fortunate than me.	❍	❍	❍	❍	❍
Sometimes I don't feel very sorry for other people when they are having problems.	❍	❍	❍	❍	❍
When I see someone being taken advantage of, I feel kind of protective towards them.	❍	❍	❍	❍	❍
Other people's misfortunes do not usually disturb me a great deal.	❍	❍	❍	❍	❍
When I see someone being treated unfairly, I sometimes don't feel very much pity for them.	❍	❍	❍	❍	❍
I am often quite touched by things that I see happen.	❍	❍	❍	❍	❍
I would describe myself as a pretty soft-hearted person	❍	❍	❍	❍	❍

8. Demographics — Age; gender; nationality; number of children; pet owner or not

9. Debriefing — The main focus of this study was to investigate people's responses to cuteness. Specifically, we predict that if someone responds to seeing something cute, then that response is being moved or touched.
You were asked to watch two videoclips in a randomized order; one "cute" and one "not-cute" video. After each video, you filled out a scale that is set to measure cuteness (i.e. how cute you perceived the subject in the video to be) and a second scale that is set to measure the feeling of being moved or touched. We expect that the scores in each of these scales will be notably lower when they were filled out in association with the non-cute video, compared to the cute-video. We further expect to find a positive correlation between higher scores on one scale and higher scores on the other scale, and vice versa. That is, we think that if you perceived a video as cute, then it is likely that you also felt moved or touched by that same video. Conversely, if you did not think that a video was very cute, then we predict that you also did not feel very moved or touched by it. Lastly, you were asked to fill out a few items related to sympathy. We think that people who score higher on these sympathy-items also score higher on the scale that measures being moved or touched.
If you want additional information about the study, or would like to obtain the study results, then you are most welcome to contact Kamilla Knutsen Steinnes, kksteinnes@gmail.com.

Appendix F – Study 2 Questionnaire

1. Informed Consent — See Appendix A

2. Introduction — Welcome to the present study.
In this study we want to investigate people's emotional responses to various videos. You

will be presented with two short video clips, which will last approximately 30-40 seconds. After watching each video clip, you will be asked to answer some questions related to the feelings, thoughts or physical reactions that you might have had in response to the videos. Finally, you will be asked some additional questions about your personality. The survey will take about 10-15 minutes to complete. Please minimize all distractions and watch the clips intently. Both video clips are muted and thus will not feature any sound. If you have trouble with video playback try to reload the page. You are now going to watch the first video. Whenever you push the Next Button, please push the play button in order to start the video. When the video is finished (approx. 30-40 sec), you can press the next button to get through to the questionnaires.

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3. Video Condition I

[Video 1: high CS or low CS]

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4. Cuteness Scale & Humanization

Please rate to what extent you agree with each of the following statements:

	Not At All (0)	(1)	(2)	(3)	(4)	(5)	A Lot (6)
The video was adorable	❍	❍	❍	❍	❍	❍	❍
The video was not sweet	❍	❍	❍	❍	❍	❍	❍
The subject(s) in the video looked so soft	❍	❍	❍	❍	❍	❍	❍
The video was not cute	❍	❍	❍	❍	❍	❍	❍
The subject(s) in the video was cuddly	❍	❍	❍	❍	❍	❍	❍
I would not like to pet the subject(s) in the video	❍	❍	❍	❍	❍	❍	❍
The video was amusing	❍	❍	❍	❍	❍	❍	❍
The video was not interesting	❍	❍	❍	❍	❍	❍	❍
The video was funny	❍	❍	❍	❍	❍	❍	❍
The animal(s) in the video seemed human to me.	❍	❍	❍	❍	❍	❍	❍

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5. KAMMUS Section 1;2B;3;5

See Appendix C

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6. Video Condition II

See 3 through 5

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7. IRI Measure of Trait EC

See Appendix E

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8. Demographics

Age; gender; nationality; number of children; pet owner or not

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9. Debriefing

The main focus of this study was to investigate whether communal sharing (represented by an affectionate social relationship) can increase cuteness-perception by mediation of a positive emotional response. During the study, you were presented with two videos. Both

of the videos featured cute animals with large eyes, small noses and chins and jerky body-movements. These characteristics are all parts of what makes up 'Kindschenschema-cuteness'. However, the videos differed in social interaction. You saw one video that featured a minimal social interaction between two subjects (either two animals or an animal and a person), and one video that featured an affectionate relationship between them. After each video, you filled out a scale that is set to measure cuteness, i.e. how cute you perceived the animals in the video to be. A second scale measured your emotional responses to the videos through a specific emotional concept called 'kama muta', which includes whether or not you felt moved by them. We predict that you scored higher on the emotional scale (i.e. felt more moved) and the cuteness-scale after you watched the affectionate video compared to your scores on both scales after the non-affectionate video. You also answered a question about how human you found the animals to be. Positive social relationship have been found to increase perceived humanness. We anticipate that the animals in the affectionate video seemed the most human to you, due to the positive interaction it featured. Lastly, you were asked to fill out a few questions related to sympathy. We anticipate that highly sympathetic people will find both videos cuter than people who are less sympathetic by nature. Please do not discuss this study with others or disclose any information about it. If you want additional information about the study, or would like to obtain the study results, then you are most welcome to contact us, kksteinnes@gmail.com.

Appendix G – Supplementary Material

Pretest of video stimuli for study 1

Condition	Mean cuteness score	Video link	Timeframe (min:sec - m:s)
Experimental/Cute			
Video 1	**5,75**	https://www.youtube.com/watch?v=8HVWitAW-Qg	0:55 – 1:19
Video 2	**5,50**	https://www.youtube.com/watch?v=_v94XqFW4Qw	0:04 – 0:37
Video 3	**5,25**	https://www.youtube.com/watch?v=JlWlnBWVQLE	0:34 – 1:13
Video 4	**5,25**	https://www.youtube.com/watch?time_continue=437&v=15XN60jQ3e0	0:22 – 0:57
Video 5	4,50	https://www.youtube.com/watch?v=-d_hu0O_ww4	0:17 – 1:05
Video 6	4,50	https://www.youtube.com/watch?v=hhoQqN9oUpo	4:27 – 4:52
Video 7	4,25	https://www.youtube.com/watch?v=nDyu-z8q7ko	1:59 – 2:44
Video 8	3,75	https://www.youtube.com/watch?v=amtuB-2wGeQ	0:02 – 0:33
Control/non-cute			
Video 1	**1,25**	https://www.youtube.com/watch?v=jZuUGJRtreI	0:45 – 1:14
Video 2	**1,50**	https://www.youtube.com/watch?v=VqPMP9X-89o	1:24 – 1:57
Video 3	**1,75**	https://www.youtube.com/watch?v=H8oQBYw6xxc	1:18 – 1:52
Video 4	**2,00**	https://www.youtube.com/watch?v=c1C9rM76BpI	1:20 – 1:44
Video 5	2,50	https://www.youtube.com/watch?v=b3w9ZbRQIek	3:35 – 3:54
Video 6	2,50	https://www.youtube.com/watch?v=57wyRdd1gj0	13:10 – 13:39
Video 7	2,75	https://www.youtube.com/watch?v=VTV23B5gBsQ	0:05 – 0:33
Video 8	3,25	https://www.youtube.com/watch?v=5ckHs6rEBJE	2:17 – 2:42

Note. Four videos in each condition with the highest (experimental group) and lowest ranking (control group) on cuteness are outlined in bold. These eight videos were selected as stimuli for study 1.

Links to video stimuli

Study 1		
Protagonist	**Video link**	**Length in min**
Cute condition		
Bunny	https://www.youtube.com/embed/_v94XqFW4Qw?start=4&end=37	0:33
Kitten 1	https://www.youtube.com/embed/JlWlnBWVQLE?start=34&end=82	0:48
Kitten 2	https://www.youtube.com/embed/15XN60jQ3e0?start=437&end=459	0:22
Kitten 3	https://www.youtube.com/embed/8HVWitAW-Qg?start=55&end=79	0:24
Non-cute condition		
Mimic octopus	https://www.youtube.com/embed/H8oQBYw6xxc?start=78&end=112	0:34
Proboscis monkey	https://www.youtube.com/embed/c1C9rM76BpI?start=80&end=104	0:24
Anglerfish	https://www.youtube.com/embed/VqPMP9X-89o?start=84&end=117	0:33
Great white shark	https://www.youtube.com/embed/jZuUGJRtreI?start=45&end=70	0:25

Study 2		
Pair/Protagonists	**Video link**	**Length in min**
High CS condition		
A/Kitten and human	https://www.youtube.com/watch?v=ngxg-ZhojVY	0:46
B/Two kittens	https://www.youtube.com/watch?v=qbnYWZKwgMk	0:47
C/Two puppies	https://www.youtube.com/watch?v=JfXMMoVQHHs	0:25
D/Puppy and mother	https://www.youtube.com/watch?v=pBUxVELko10	0:44
Low CS condition		
A/Kitten and human	https://www.youtube.com/watch?v=_RCqVy3TPkw	0:33
B/Two kittens	https://www.youtube.com/watch?v=3w_gVmSEI2w	0:44
C/Two puppies	https://www.youtube.com/watch?v=gvJqMQy8P2M	0:30
D/Puppy and mother	https://www.youtube.com/watch?v=zeln7wS5wPY	0:27

Study 1 Factor Analyses

Factor analysis of cuteness scale. The data collected from the 9-item cuteness scale, excluding distractor items (α =.87), were subjected to a principal components factor analysis with oblimin rotation and Kaiser's criterion of Eigenvalues above 1. The factor analysis suggested a two-factor solution (Table A). Six positively worded cuteness items and three reverse-coded items formed factor 1 (Eigenvalue: 4.786) and 2 (Eigenvalue: 1.877), respectively. This model explained a total of 74 % of the score variance (factor 1: 53,2 %, factor 2: 20,9 %). The two-factor solution was further confirmed by a scree plot (Figure A) and a subsequent Horn's parallel analysis (Horn, 1965). Both the Eigenvalue of factor 1 from the factor analysis (4.786) and factor 2 (1.877) was

above the randomly generated value from the parallel analysis for factor 1 (1.486) and 2 (1.324) and was therefore kept. Factor 3 was discarded due to its factor analysis Eigenvalue (.656) being below its parallel analysis value (1.215). However, a reliability analysis of the 9-item scale revealed that the two extracted factors were unrelated. Corrected total item correlation found that the six cuteness items ('It is adorable' = .864, 'It is sweet' = .786, 'It looks so soft' = .768, 'It is cute' = .871, 'It is cuddly' = .815, 'I would like to pet it' = .763) and the three reversed items ('It is repulsive' = .129, 'It is huge' = -.020, 'It looks really old' = .105) formed two orthogonal variates. Consequently, the 3 reverse-coded items were excluded from the scale, leaving a six-item cuteness scale measuring only one factor (α =.95).

Table A. The table shows the three extracted factors from a PC factor analysis of the cuteness scale (9 items) as well as each item's communalities and factor loading on all three factors.

	Factor loadings		Communalities
Indicators	Factor 1	Factor 2	
Factor 1: Cuteness items			
It is adorable	**.926**	.020	.857
It is sweet	**.880**	-.032	.776
It looks so soft	**.856**	.007	.732
It is cute	**.931**	.028	.867
It is cuddly	**.892**	.020	.796
I would like to pet it	**.864**	-.039	.749
Factor 2: Reversed items			
It is repulsive	.041	**.842**	.710
It is huge	-.095	**.781**	.621
It looks really old	.051	**.744**	.555

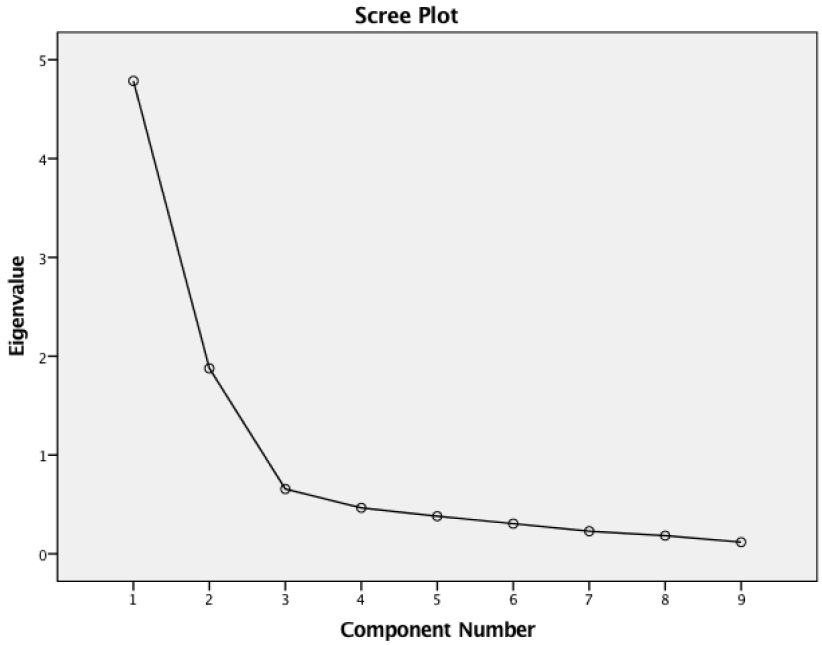


Figure A. Scree plot illustrating the Eigenvalues of all 9 items of the cuteness-scale, excluding distractor items.

Factor analysis of physical sensations. Participants were asked to rate to what extent they experienced a 12-item list of physical sensations, such as goosebumps. Because we were mainly interested in impressions to the cute videos, we also expected more variance in the cute condition contra the control condition. Thus, we decided to only put the data acquired from the cute condition through an exploratory factor analysis while running a Cronbach's alpha reliability for both conditions (control: α =.83, cute: α =.85). Consequently the averaged ratings of the physical sensations for the cute group were subjected to a principal components exploratory factor analysis with oblimin rotation, which revealed a three-factor solution according to Kaiser's criterion of Eigenvalues above 1. A requested scree plot displayed an overview of all the Eigenvalues of the 12 items, including values below 1. This graphical illustration revealed a rather clear break-off point between the first three factors and the remaining nine (see Figure B). Taken together, they explained a total variance of 73,931 % (factor 1: 44,484 %, factor 2: 18,081 %, factor 3: 11,366 %). All 12 items of Section 1 of the KAMMUS whose factor loadings exceeded .40, were extracted. However, the residuals of the items being tested were not normally distributed. We consequently chose to run a parallel analysis (Horn, 1965) to further establish the number of factors to be extracted. We compared the Eigenvalue of each factor resulting from the exploratory factor analysis with the new randomly generated values (equivalent to 95. percentile) from the parallel analysis. The first, second and third extracted factor were kept because they had Eigenvalues before rotation of 5.338, 2.170 and 1.364 respectively, which were all above the values from the results of the parallel analysis (1.584 for factor 1, 1.431 for factor 2 and 1.314 for factor 3). Factor 4 was discarded due to its Eigenvalue from the factor analysis being lower (.672) than its Eigenvalue of 1.220 from the parallel analysis. Thus, according to both the scree plot and the parallel analysis, three factors should be extracted, which corresponded to the initial three-factor solution of the exploratory PC factor analysis. Factor one comprised 6 items (control: α =.77, cute: α =.89), factor two of 4 items (control: α =.84, cute: α =.82) and factor three of 2 items (control: α =.81, cute: α =.94). These are listed in Table B. The three factors have been named "kama muta sensations", "kama muta cuteness sensations" and "kama muta positive tears". Kama muta sensations such as goosebumps are bodily sensations typically associated with kama muta. The four sensations called kama muta cuteness sensations intuitively appear to accompany cute affect and were thus termed accordingly.

Table B. The table shows the three extracted factors from a PC factor analysis of physical

sensations (Section 1 of the KAMMUS) as well as each item's communalities and factor loading on all three factors.

	Factor loadings			
Indicators	Factor 1	Factor 2	Factor 3	Communalities
Factor 1: Kama muta sensations				
Goosebumps or hair standing up	**.919**	-.026	-.050	.813
Chills or shivers	**.923**	-.085	-.006	.800
A swelling or tingling feeling in the center of the chest	**.481**	.345	-.024	.465
Choked up or a lump in the throat	**.876**	-.030	.102	.791
I put one or both hands to my chest	**.815**	.050	.097	.740
I took a deep breath or held my breath	**.811**	.015	-.042	.655
Factor 2: Kama muta cuteness sensations				
A warm feeling in the center of the chest	.130	**.764**	-.087	.641
I said something like "awww"	-.022	**.829**	-.152	.628
Buoyant or light	-.075	**.758**	.317	.764
Refreshed, invigorated or energetic	.021	**.715**	.310	.747
Factor 3: Kama muta positive tears				
Moist eyes	.029	-.016	**.948**	.902
Tears	.059	.030	**.940**	.926

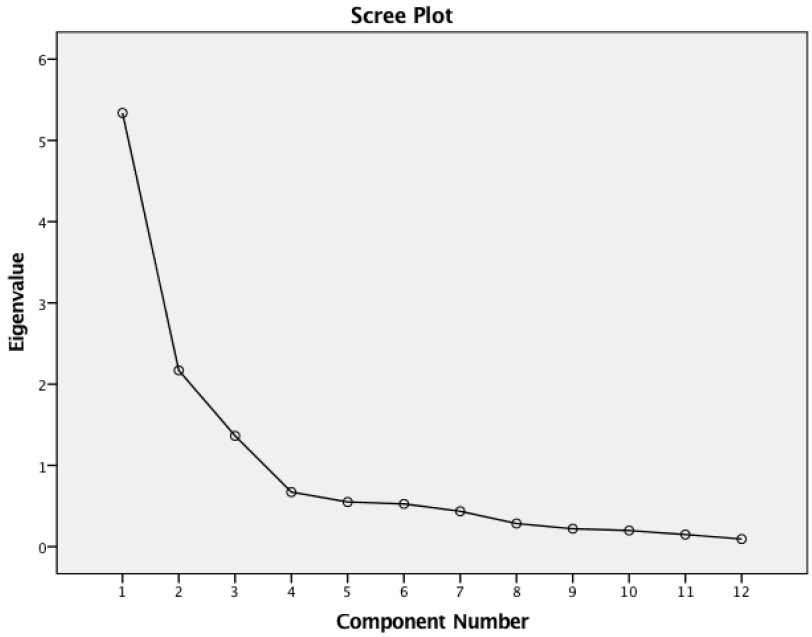
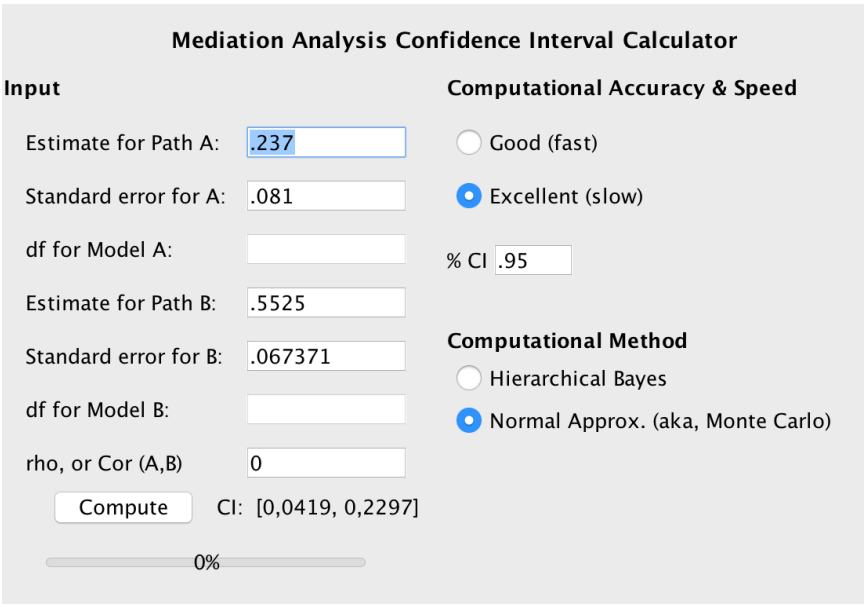


Figure B. Scree plot illustrating the Eigenvalues of all 12 items of the physical sensations of the KAMMUS section 1.

Study 2: Confidence interval calculator for the mediation of H3

①



②

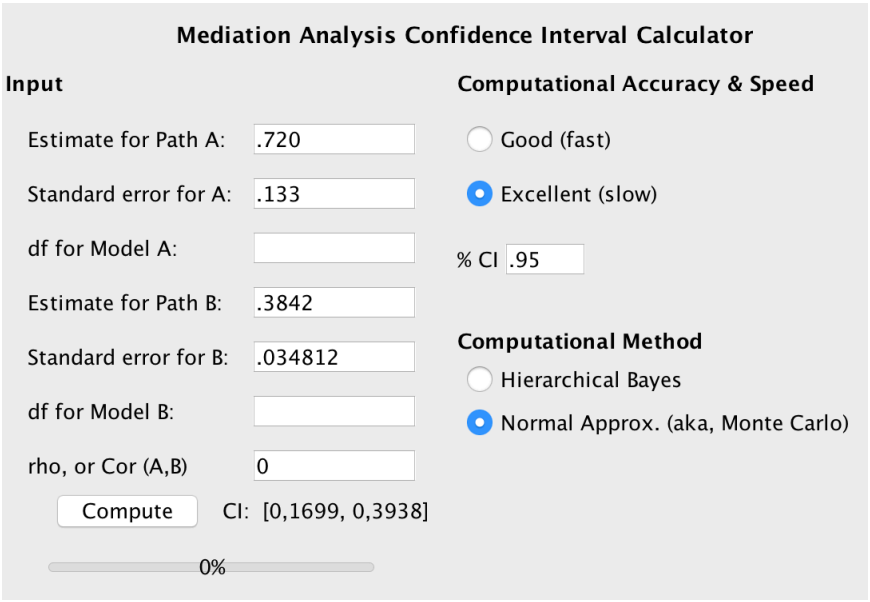


Figure C. The figure shows the estimated confidence interval of the indirect effect of kama muta sensations (inset ①) and kama muta labels (inset ②) on video condition and cuteness perception using the Monte Carlo method.