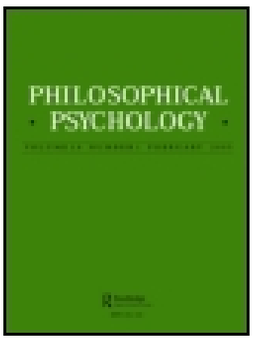

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Tactful animals: How the study of touch can inform the animal morality debate

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ABSTRACT

In this paper, we argue that scientists working on the animal morality debate have been operating with a narrow view of morality that prematurely limits the variety of moral practices that animals may be capable of. We show how this bias can be partially corrected by paying more attention to the touch behaviors of animals. We argue that a careful examination of the ways in which animals engage in and navigate touch interactions can shed new light on current debates on animal morality, like the study of consolation behavior, while also revealing further forms that animal morality may take that have been neglected so far, like capacities of tolerance or trust. This defense is structured as an analysis of the three main functions of touch: the discriminative function, the affiliative function, and the vigilance function.

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1. Introduction

Imagine the following scenario. You're at home when suddenly your housemate enters, crying. Not knowing what the matter is, you immediately walk up to her and put your arm around her, trying your best to console her. As you take a glance through the open door, you realize what happened: her car is in the driveway, and your cat lies motionless on the ground beneath it. You freeze and then push your housemate away. Trying to apologize, she grabs your hands, but you shake her off, rush outside, kneel down beside the car, and carefully place a hand on your cat's body. To your dismay, he doesn't respond. After sitting with him for a while, you gently pick up his limp body and cradle him in your arms.

This little tale illustrates the extent to which touch is naturally involved in our social interactions. In fact, humans can communicate a range of distinct emotions through touch alone (Hertenstein et al., 2009). Moreover, in human infancy, touch is a more important and earlier mode of social interaction than verbal communication (Hertenstein et al., 2006), and communicative touch has

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been postulated as the evolutionary precursor to language (Hertenstein et al., 2006). Not for nothing, touch is called "the first sense": it is the first sensory faculty to develop in the womb, and its neural receptor types are among the oldest in evolutionary history (Fulkerson, 2013, p. xii). All of this makes it likely that touch also plays an important role in the social lives of non-linguistic animals. Importantly, the interactions in the story we told are not only social, they have a moral hue, and indeed the characters use touch to express various *moral* emotions, such as sympathy, guilt, resentment, love, and grief. This gives rise to the question we want to address, namely, could the ways in which animals engage in and navigate touch interactions give us insight into their moral capacities?

In this paper, we will outline how the animal morality debate can benefit from a closer look at the role of touch in the social interactions of animals. This has been prompted by Maria Botero's work on primate[1] social cognition, in which she suggests that scientists studying joint attention and theory of mind need to move away from a focus on vision because touch as "the first sense" might be an earlier facilitator of these capacities (Botero, 2016, 2018a, 2018b). We think that the importance of these claims about the role of touch extends beyond the specific case of social cognition and the particular order of primates. Although the animal morality debate is not characterized by a bias toward vision, we will show that scientists have been operating with a different bias: a narrow view of morality that prematurely limits the variety of moral practices of which animals could be capable. This bias can be partially corrected by paying more attention to touch. Our aim is to argue that a careful examination of touch in animals can shed new light on current debates on animal morality, like the study of consolation behavior, while also revealing further forms that animal morality could take that have been neglected so far, like the capacities for tolerance or trust.

We will begin this paper by giving a quick overview of the animal morality debate[2] and showing how the issue of touch has received only scarce and implicit attention. We will then defend our claim that this needs to be remedied. This defense will be structured as an analysis of the three main functions of touch and their relevance for animal morality. The first two functions, the discriminative and the affiliative function, are acknowledged by Botero and, as we will argue, the reasons why they are important for animal morality are closely connected to the reasons why Botero considers them to be important for primate social cognition. The third function we will consider is the vigilance function as described by Filip Mattens (2017), which is not mentioned by Botero. While touch in its vigilance role may not be so relevant for social cognition, we will argue that this is a crucial function to consider when discussing the role of touch in animal morality.

Before we begin, we must make a short terminological clarification, since the term 'touch' is somewhat ambiguous. If we exclude all metaphorical and literary

uses, we can distinguish two broad meanings. On the one hand, 'touch' can be used to refer to (1) two physical entities coming into contact with each other, which can be either (a) the result of a purposeful action (e.g., "I touched her cheek") or (b) a non-voluntary event (e.g., "The two umbrellas were touching"). On the other hand, 'touch' can also refer to (2) the act of perceiving by means of the tactile sense (e.g., "She touched something slimy"), or to the tactile sense itself (e.g., "She can read by touch"). In this paper, we are mostly concerned with meaning 1a. However, since acts of purposefully coming into contact with a physical entity typically entail perception by means of the tactile sense, meaning 2 cannot be completely left aside. The only sense of the word 'touch' we are not concerned with is 1b, that is, non-voluntary touch. This is because we are concerned with touch interactions that are, to a certain degree at least, under the animals' control, for they are the ones that can be indicative of their cognitive and emotional capacities. In addition to excluding all forms of touch that occur non-voluntarily, we will also leave aside forms of touch that occur through a medium. This is purely for reasons of simplicity, since we do not in principle exclude that there are moral capacities that are expressed through distal touch (e.g., using a stick to probe or feel) or hybrid forms thereof (e.g., tacto-acoustic signals in dolphins).

2. The neglecting of touch in the animal morality debate

As Fitzpatrick (2017) rightly points out, there are two distinct discussions contained in the animal morality debate. One discussion, exemplified by the theoretical work of authors such as Bekoff and Pierce (2009) and de Waal (e.g., de Waal, 1996), but especially by the empirical studies done in labs and in the field, concerns the distribution in nature of certain psychological capacities that are generally understood to be indicators of (proto-)morality: capacities such as empathy, altruism, and inequity aversion. The other discussion, present in the work of philosophers such as Korsgaard (2006) and Rowlands (e.g., Rowlands, 2012), centers on whether these psychological capacities actually deserve the label 'moral'. The first debate is more of an empirical endeavor, and the second one consists of conceptual analysis and clarification. In this paper, we are mostly concerned with the first of these debates, that is, with addressing the empirical study of the distribution in nature of moral capacities. Although we will offer some conceptual reasons for linking touch to morality, our main aim is to highlight how a close analysis of the touch interactions of animals could provide evidence of psychological capacities that are directly or indirectly involved in moral practices. Those readers who remain uneasy about the use of the term 'morality' to describe animal behavior can reinterpret our arguments as a discussion of proto-morality in animals.[3]

If we understand the animal morality debate in the first way described above, then we can distinguish three broad research foci: the altruism cluster, the

fairness cluster, and the empathy cluster.[4] The altruism cluster consists of studies that investigate animals' capacity to engage in altruistic helping, that is, helping behavior that involves no direct gain or even a direct loss for the helper, where the relevant behavior is motivated by concern for the other and not the result of pure self-interest. In addition to many observational reports of wild animals helping each other (e.g., Bates et al., 2008; Park et al., 2012), there are also several experimental studies in this cluster. The latter can be divided into two rough groups. The first one corresponds to what could be called the 'active helping' experimental paradigm, where animals are given the option of helping an individual who is distressed or otherwise in need.[5] The second group of studies in the altruism cluster corresponds to what is known as the 'prosocial choice' experimental paradigm, where animals can choose to spontaneously benefit another individual who is not necessarily in need nor actively asking for help.[6]

The fairness cluster consists of studies that investigate whether animals possess a sense of fairness. In the field of comparative psychology, this is exemplified by the inequity aversion studies, where pairs of animals are rewarded unequally for performing the same task and their reactions observed to see if they track this inequality.[7] Animals' sense of fairness has also been a research focus of observational studies, predominantly those concerned with social play. Social play in mammals often involves behavioral patterns that are similar to those used in predation or mating. To avoid misinterpretation during play, these animals often use play markers. Different species of canids, for instance, use the play bow as a signal (Bekoff, 1977), and chimpanzees have been found to increase their play signaling when the mother of their play partner is in close proximity, presumably as a way of preventing her from intervening and ending the play bout (Flack et al., 2004). In order to play "fairly," mammals also engage in self-handicapping, which occurs when an animal does not use her full strength when playing with another individual, and role-reversing, which takes place when an animal engages in a behavior that does not correspond to her relative place in the hierarchy (Špinka et al., 2001).

The last big research focus corresponds to the empathy cluster. This comprises studies on emotional contagion, the spontaneous "catching" of another's emotion, which is widely viewed as a basic form of empathy. This ability is commonly tested in animals by providing them with visual or auditory access to emotional cues from another individual, and measuring whether there are any signs of emotional state-matching in the witnessing subject.[8] The empathy cluster is also made up of experimental and observational studies that have documented consolation behavior, which is a form of affiliative behavior directed at individuals in distress and is thought to be triggered by empathic processes. Apparent consolation has been observed in a wide range of animals, including some avian species (see Table 1).

Table 1. Consolation studies and the criteria used to identify consolation behavior. In italics: those criteria that necessarily entail touch; most of the other listed behaviors can involve touch too.

Study	Species	Other-directed affiliative behaviors used as consolation indicators
de Waal & van Roosmalen, 1979	Chimpanzees	*Kissing, embracing, hold-out-hand, touching*, submissive vocalizations
Kutsukake & Castles, 2004	Chimpanzees	*Allo-grooming, sitting in contact, gentle touching, kissing, embracing, wrapping an arm around another, passing touch, mounting, grasping testicles*, playing, inspecting another's genitals
Palagi et al., 2004	Bonobos	*Contact-sitting, grooming, touching (gentle patting or stroking movements), sociosexual behaviors*, play
Cordoni et al., 2006	Gorillas	*Contact-sitting, embracing, grooming, touching, touching in walk*, playing
Seed et al., 2007	Rooks	*Bill twining*
Fraser et al., 2008	Chimpanzees	*Kissing, embracing, grooming, finger-in-mouth touching, gentle touching*, playing, submissive pant-grunt greeting
Palagi & Cordoni, 2009	Wolves	*Body contact, social licking*, social play, inspecting, social sniffing
Cozzi et al., 2010	Horses	*Mutual grooming, friendly contact*, nasal sniff, body sniff, genital sniff, play, approach, follow
Fraser & Bugnyar, 2010	Ravens	*Contact-sitting, preening, beak-to-beak touching, beak-to-body touching*
McFarland & Majolo, 2012	Barbary macaques	*Grooming, body contact, mutual teeth chattering*, successful <1.5 m approaches
Clay & de Waal, 2013	Bonobos	*Embracing, socio-sexual contact (genito-genital contact, mounting, copulating, genital touch), touching, grooming, contact-sitting, holding, patting*, playing, inspecting
Palagi & Norscia, 2013	Bonobos	*Grooming, touching, contact-sitting, embracing, kissing, socio-sexual interactions*, social play, food-sharing
Baan et al., 2014	Wolves	*Body contact, nose-touch, licking*, playing, greeting, sniffing, inspecting
Palagi et al., 2014	Japanese macaques, Tonkean macaques	*Grooming, contact-sitting, touching, playful contacts, mounting, manipulating genitals, copulating, kissing, mouthing, cheek-to-cheek, fase-holding*, fase-sniffing
Plotnik & de Waal, 2014	Asian elephants	*Body contact*, vocalizations
Burkett et al., 2016	Prairie voles	*Licking, grooming*
Quervel-Chaumette et al., 2016	Dogs	Affiliative behaviors: *rubbing one's own body alongside that of the partner, greeting (licking the lips of the partner, whilst tail wagging)*, play, sniffing any body part; time spent in proximity

As one can see from this quick overview, the topic of touch has received scarce attention in these debates. In the tests that are commonly used to study these moral capacities in animals, the experimental subjects, when there is more than one, are usually separated from each other in order to facilitate testing and avoid any confounding factors. Thus, the test conditions tend to physically prevent animals from touching one another. Obviously, this is not the case in field studies, where the natural interactions of wild animals are observed. Although animals often touch each other when they engage in helping and play behaviors, this specific issue has not been the explicit focus of studies to date. An exception to this lack of attention to animal touch is provided by the consolation studies.

Consolation behavior in animals was first described by de Waal and van Roosmalen (1979). It is defined as "an increase in *affiliative contact* in response to and directed toward a distressed individual, such as a victim of aggression, by an uninvolved bystander, which produces a calming effect" (Burkett et al., 2016, p. 375, our emphasis). Thus, the idea of touch ("affiliative contact") is present in the very definition of this behavior. However, even though the majority of criteria used to identify consolation involve the animals touching in one way or another (see Table 1), scientists do not explicitly reflect on this, to the extent that 'touch' is often listed as a separate behavior instead of as a common denominator. The general focus of the consolation studies has been on who is involved in the consolation interaction, what happened immediately before the consolation event, what happened afterward, and what the motives are of the consoler. Although consolation is largely thought to occur *via touch*, the implications of this are not explicitly reflected upon.

This lack of attention to touch comes at an explanatory cost, since the neurophysiology of affiliative touch can shed some light on why consolation is comforting.[9] It has recently been discovered that nerve fibers found in hairy mammalian skin, which covers major parts of most mammalian bodies, seem to be specifically attuned to processing social touch, especially affiliative touch in the form of slow, gentle stroking (Löken et al., 2009; McGlone et al., 2014). These nerve fibers, called C-tactile afferents, apparently process slow, gentle touch as "pleasant" and "affiliative" the way other nerve fibers, for example, process noxious stimuli as "painful" (Löken et al., 2009). Consolation behavior in the form of slow, gentle touch is thus likely to be especially effective in having a calming effect. Of course, other factors like social context also influence how touch is ultimately experienced. CT afferents point to a significant "social bias" of the mammalian nervous system, however. The importance of considering these socially-attuned nerve fibers is further underlined by the fact that they have been found in all species examined, that is, primates, pigs, rats, mice, guinea pigs, rabbits, and cats, and it has been suggested that all mammals possess them (Morrison, 2012; Pitcher et al., 2016). Despite its explanatory potential, the neurophysiology of affiliative touch is hardly considered in the consolation

studies.[10] We propose that greater attention to the identification of consolation behavior with a certain kind of touch may inform research in this area.

This overview of the animal morality debate not only shows that scientists have paid only scarce and implicit attention to the issue of touch, but also that they have operationalized morality in a rather narrow way. There are many other ways of being moral[11] besides being empathic, altruistic, and averse to inequity. These include being grateful, caring, trusting, tolerant, and loyal, as well as being resentful, envious, jealous, disgusted, and cruel. This narrow conception of morality is not the sole fault of the scientists, but is surely influenced by moral philosophers, who have traditionally attempted to reduce morality to one or two key capacities. Naturally, there are exceptions on both sides. Among the scientists, Bekoff (Bekoff & Pierce, 2009) has defended a pluralistic account of morality. Among the philosophers, Pierce (Bekoff & Pierce, 2009), Rowlands (2012), Monsó & Andrews (Forthcoming), and Rutledge-Prior (2019) have also given accounts of animal morality that presuppose a pluralistic framework. We propose that this pluralistic approach is the way to go, since opting for a narrow operationalization of morality could amount to a premature reduction that fails to do justice to the range of moral practices of which animals are potentially capable. Though some of these practices may be out of reach for animals, this should not be assumed without empirical investigation.

We will argue that animals' touch interactions could reveal nuances in the practices thus far considered in the animal morality debate (such as consolation and social play), while at the same time providing evidence of some of these alternative ways of being moral. Our focus throughout the paper will be on potential cases of what we call *moral practices*, which we define as those that involve the exercise of moral capacities. Since we do not want to circumscribe our claims to a particular account of moral capacities, the readers should understand this term in a broad sense, as capacities that imply a "sensitivity to [some of] the good- or bad-making features of situations" (Rowlands, 2012, p. 230) or as those whose exercise conveys information about a being's moral character (Parrott, 2019). We understand moral capacities to include moral emotions (those that are involved both in pro-social and in anti-social behavior), as well as other capacities that can't be classified as emotions but could still be said to "track" moral properties (in the sense given by Rowlands, 2012), such as trust, care, or normative capacities.[12] For the purposes of this paper, it is not necessary that we take a stand on whether any of these capacities on their own are enough to endow an animal with full-blown morality. Instead, what we will argue is that looking at animals' touch interactions has the potential to help reveal many of these (proto-)moral capacities.[13] In what follows, we will explain this by analyzing the three functions of touch and their connection to potentially moral practices. Though we will separate these

three functions for analytic purposes, it is important to bear in mind that, in reality, they intertwine and support each other.

3. The discriminative function of touch and its importance for animal morality

Touch in its discriminative function serves as a perceptual source of information. When the body of a being with a tactile sense comes into contact with a physical entity, there is some information made available to that being about the qualities of the entity being touched, such as its shape, temperature, motion, texture, malleability, and so on. This is the discriminative function of touch, and it cannot be reduced to the touching of inanimate objects; rather, it extends to touching other living beings. For this reason, Botero has argued that discriminative touch must be factored into discussions on primate social cognition (Botero, 2016, pp. 1203–1204). In this section, we will show how this should be extended to the animal morality debate.

In arguing for the importance of discriminative touch in primate social cognition, Botero is going against the general trend in debates and experiments on this topic, which, as she herself points out, have been characterized by an almost exclusive focus on the visual sense. Joint attention, for example, is commonly understood as a triadic interaction occurring between two subjects who coordinate their attention on one object. Although attention is not necessarily linked to visual perception, most of the research on joint attention in primates has been circumscribed to testing their ability to follow another's gaze on an object (see Carpenter & Call, 2013 for a review). Research on theory of mind in primates has likewise privileged the visual mode. Although theory of mind refers to the general ability to attribute mental states to others, a significant proportion of studies attempts to determine whether primates possess a theory of mind by studying whether they can understand what others can and cannot see (see Andrews, 2017 for a review). Even those studies that focus on the attribution of a different type of mental state, namely, emotions, tend to emphasize the sense of vision. Indeed, a common method for measuring emotions in primates concentrates on their facial expressions, which are a visual way of expressing emotions, and most of the experiments that have been carried out to determine whether primates can attribute emotions to others have tested for their ability to visually discriminate facial expressions of emotions (e.g., Parr, 2001, 2003).

Botero suggests that the operationalization of socio-cognitive capacities via the visual modality results in a limited understanding of social cognition in primates. She points out, for instance, that chimpanzees' facial features lack the salient contrasts that, in our case, allow for an easy visual detection of the subtle facial movements that indicate emotions (Botero, 2018b, p. 373). This means that the discrimination of facial expressions may not play such an important role

in the attribution of emotions amongst chimpanzees. In addition, chimpanzee mothers rarely use prolonged gaze as a form of interaction with their offspring. However, during the first nine months, infant chimpanzees spend most of their time in close contact with their mothers, who carry them around as they go about their day. By means of this touch interaction, the infant chimpanzee learns about the mother's reaction to different stimuli, thereby gaining information on her perspective and on the world surrounding them (Botero, 2016, pp. 1204–1205). Botero considers that, due to similarities in neurophysiology and infant development across primate species, these points probably generalize to other apes. Discriminative touch thus likely constitutes the very first source of social information that apes make use of, and by means of it, they can learn "that there are others and that these others have a different perspective, two basic traits of joint attention and theory of mind" (Botero, 2018b, p. 377).

Since discriminative touch is a source of social information, and moral practices require social information, discriminative touch can support moral practices. In order to respond in ways that are morally appropriate or that exemplify the use of a moral capacity, the animal first has to gauge the social situation.[14] In certain circumstances, namely, when there is bodily contact involved, the relevant social information can be gauged by means of touch. For instance, in the case of consolation behavior, the consoler can gain tactile information on whether the other is tense or relaxed, which can be used to determine when the contact should go on and when it can stop. Likewise, the appropriate duration of other affiliative behaviors, like grooming, can be informed by touch, for example, the groomer can use touch to discriminate when the recipient is annoyed by or uninterested in this interaction.

Touch can also be used to gain information about other morally relevant features of situations besides emotions. An example of this is provided by the literature on animals' reactions to conspecifics' deaths. Death can be construed as morally relevant, insofar as, other things being equal, it is a bad-making feature of situations that calls for a certain reaction in beings who care about the deceased. In order to respond in a morally laden way to death, animals would have to first discriminate that they are dealing with a dead individual, which could, in principle, be done through touch. In fact, a variety of social mammals have been witnessed insistently touching or nudging corpses (for reviews, see Fashing & Nguyen, 2011; Boesch, 2012, Chapter 7; Anderson, 2016). The meaning of this behavior is unclear, but it entails bodily contact and thus offers the animals tactile information that points to the state of the dead conspecific: she is not responding the way she usually would to touch, and she does not *feel* the way she used to, for example, because of limpness or, later, *rigor mortis* and coldness. The death of a conspecific can thus be grasped to a degree by means of the tactile sense. Similarly, touching injured, disabled, or sick conspecifics may provide information on their state – for example, when they flinch or respond

unusually to a common form of touch – thus providing a reason to adapt one's interactions with them.

Another example of situations in which social information can be gained by means of touch are play fights and aggressive encounters. Puppies are often described as not yet knowing their own strength, which may well be said for any mammalian young at a certain developmental stage. Rough-and-tumble play provides an opportunity to learn about one's own and others' strength, information that is gathered most prominently through touch. Moreover, tactile information about the other's strength and character gained through play and aggressive interactions can shape relationships and determine one's own and the other's status, which could in turn provide a context for many moral practices. Deciding, for instance, if and when to share food with, groom, help, or console another will depend on the characteristics of the preexisting relationship.

These are just some examples of how touch can contain morally relevant social information regarding others' characteristics and present state, as well as one's capacities and relationship to others. Lack of attention to the discriminative powers of touch can result in scientists misconstruing or simplifying the range of social information available to an animal in a certain situation. For instance, some scientists have speculated that monkey mothers who carry the mummified remains of their dead infants for extended periods of time perhaps do so because they haven't properly processed the change in the infant's state, given that the mummification allows the corpse to retain its shape and still be visually recognizable as an infant (e.g., De Marco et al., 2018). This ignores how radically different a dead infant will *feel* from the very first moment when compared to a live one. Incorporating the study of touch as a medium for social information can thus give us a richer and more accurate account of the mechanisms underlying the behavior of animals and has the potential to help us uncover moral practices.

4. The affiliative function of touch and its importance for animal morality

Touching another individual is not only a source of information, it can also be a form of affiliation. Although the term 'affiliation' refers to any behavior that serves to strengthen social bonds, it often takes the form of voluntary bodily contact between individuals, for example, in the context of parental[15] care (Feldman, 2011) or social grooming (Spruijt et al., 1992). In this section, we will argue that affiliative touch is linked to morality (1) *indirectly*, due to the causal connection between parental touch and normal development, and (2) *directly*, since affiliative touch could be an expression of moral emotions.

The link between parental touch and development was demonstrated by the infamous maternal deprivation studies first conducted in the 1950s. In

one of these studies, by Harlow (1958), infant monkeys were taken from their mothers and were either offered a surrogate made of bare mesh wire or one draped in soft cloth. When given a choice between the two conditions, the monkeys strongly preferred the cloth surrogate, even when only the wire surrogate provided food. While monkeys in both surrogate conditions took in the same amount of milk and gained the same amount of weight, the monkeys in the wire surrogate condition showed psychosomatic symptoms, which lead Harlow to conclude that "the wire mother is biologically adequate but psychologically inept" (Harlow, 1958, p. 677). Furthermore, in an open-field test, where Harlow put surrogate-raised monkeys in a room with novel stimuli, either with or without the cloth surrogate, he found that in the condition where the surrogate was available, the infants displayed fewer behavioral signs of stress. The surrogate thus seemed to function as a "source of security" (Harlow, 1958, p. 679).

This research led to two novel insights relevant for our case that have been supported by follow-up studies: first, parental touch and not, as previously assumed, the providing of food by the parent, seems to be crucial in the emergence of the parent-infant *attachment*, and second, touch seems to decrease negative arousal. This apparent soothing effect is immediate, but parental touch has also been found to positively influence stress response in the long term, improving the adequacy of the individual's response to stressors and her ability to cope with stress throughout her life (for a review, see Hertenstein et al., 2006). Importantly, the significance of parental touch for the normal development of attachment and emotional self-regulation is a constant across mammalian species (Hertenstein et al., 2006; Feldman, 2011[16]).

The capacities for attachment and emotional self-regulation are indirectly relevant for morality because they enable the emergence of sociality. We understand sociality as a prerequisite for morality, since the ability to abandon a self-centered stance is necessary for one's attitudes to be directed toward the welfare of others.[17] As Botero argues, emotional self-regulation, facilitated by the soothing effect of parental touch, is a precondition for being able to pay attention to others (Botero, 2018b, pp. 376–377), which is critical for behavior to be *other*-directed. Furthermore, concern for others can be motivated and modulated by attachment, for which the parent-infant attachment seems to act as a blueprint. This first attachment facilitates the emergence of capacities that are necessary for forming further social bonds, such as play tendencies (Lékevy et al., 2003) or social discrimination, the ability to distinguish familiar from unfamiliar conspecifics (Kentrop et al., 2018). The latter has also been found to play a crucial role in the triggering of empathic mechanisms across species (de Waal & Preston, 2017). Therefore, parental touch facilitates basic capacities necessary for moral practice.

Parental care isn't only indirectly relevant for animal morality, however; it could also be a *direct* expression of moral capacities. To the extent that the parent is motivated by a moral emotion, such as love, whenever she grooms, holds, or nurses her infant, we can speak of her affiliative touch as a moral practice in itself. Affiliative touch, however, is not exclusive to parent-infant interactions, but is instead an integral part of the social lives of many animals at all developmental stages and across different sorts of relationships. Therefore, affiliative touch can also be an expression of moral emotions beyond the parent-infant bond. The most obvious example, which is widely studied and well-documented in the literature, is consolation behavior. This behavior, as explained in Section 2, occurs as a response to distress behavior in others and most often takes the form of affiliative touch. Consolation, in turn, is generally thought to be motivated by empathy or sympathy (see, e.g., de Waal & Preston, 2017), so affiliative touch would be functioning here as an expression of these moral emotions.

Affiliative touch can also point us to other moral emotions beyond empathy, sympathy, and parental love. The potential of affiliative touch to uncover further moral emotions has to do with the strong social significance that this interaction has in many animal societies. Although some of these emotions may ultimately be beyond the reach of (most) animals, we propose grief, gratitude, jealousy, and resentment as exemplary moral capacities that could either be expressed by affiliative touch or through its prevention, disruption, or evasion. Grief may be manifested by means of affiliative contact toward a corpse, including grooming, prolonged holding, and protective behaviors such as preventing others from touching it.[18] Gratitude could be expressed by spontaneous affiliative touching directed at a benefactor. Jealousy, as a negative emotion evoked by affiliation between others, could take the form of attempts to prevent affiliative touch or to disrupt its occurrence. Lastly, resentment could be expressed in the aftermath of a conflict by avoiding the offender's touch, ignoring attempts at affiliation, or engaging in aggressive responses to affiliation attempts. The ways and contexts in which animals manifest and respond to affiliative touch could thus give us insight into moral capacities that have received little attention in the animal morality debate so far. In addition, they also point to the importance of performing field studies, since these capacities could never be detected without considering the social context and history in which they are embedded and without allowing for animals to freely and spontaneously engage in social interactions with their conspecifics.

5. The vigilance function of the tactile sense and its importance for animal morality

Filip Mattens (2017) has argued that there is a third function that can be attributed to the tactile sense, namely, the vigilance function. Mattens criticizes philosophers of touch for their excessive focus on the hands and the discriminative function of touch. Hands or organs with the function of touching *in order to feel* are a rare feature once we move beyond the primate order, and yet, we attribute a tactile sense, at the very least, to all mammals. That is because the tactile sense is not something that is circumscribed to hands but, rather, is a body-wide feature. This, he argues, suggests that the basal function of the tactile sense is not its discriminative function:

> Although not all areas of the body are used for touching, nearly every single area can sense when something touches it. Because it signals when and where an animal is being touched, tactile sensitivity functions like a surveillance system: it keeps a watch on the animal's body. (Mattens, 2017, p. 690)

The vigilance function of the tactile sense is distinct from its discriminative function. This is easily illustrated by considering cases in which you are touched by something that is not anticipated by your other senses and thus met with a startle response: "as soon as you sense the slightest contact, you flinch back. You do not wait until it is clear whether the object is injurious; you flinch back before you even know *what* touched you" (Mattens, 2017). Touch in its vigilance function is not meant as a means for exploring objects, but as a way of protecting the body. This function of touch, therefore, "does not first and foremost serve the animal's desire to touch, but rather [her] need to know that [she] is *being* touched" (Mattens, 2017).

The vigilance function of touch thus points us to the body's vulnerability. The tactile sense watches over the body because whenever something touches our body, there is a potential threat to our health and integrity. Indeed, when an animal touches another, she is invading their bodily space, thus becoming a potential threat to them while also risking injury herself. Both animals are made more vulnerable by this interaction. As we will argue in this section, studying how animals navigate this increase in vulnerability that occurs as a result of touch may illuminate further moral capacities. In particular, it has the potential to reveal capacities of trust, care, and tolerance, moral capacities involved in antisocial behavior, such as cruelty and normative capacities.

Although, until now, it has barely been taken up as a research topic in the animal morality debate, trust can be plausibly regarded as a moral capacity insofar as it is likely a necessary mechanism (or at least a very useful one) for a moral society to function. Moral societies are generally regarded as ones in which individuals do not merely pursue their own selfish desires, but rather decide to cooperate and look out for others' interests too (e.g., Tomasello, 2016). In order to ensure that this works, members of the society need to give trust that

the others will reciprocate (Tomasello, 2016, p. 162ff). Trust may also be involved in other interactions beside reciprocity, however. Whenever animals engage in behaviors like grooming, contact sleeping, or social play, they are placing themselves in a situation that makes them more vulnerable, and insofar as it is under the animal's control to place herself in this situation, we could speak of a capacity of trust in the other, which would be more or less explicit depending, perhaps, on how aware the animal is that the other could hurt her.

It could, however, be argued that common behaviors like grooming, contact sleeping, and social play do not necessarily imply that the animals involved trust each other; instead, perhaps they have merely learnt which touch behaviors are safe or effective. This may be true, but it does not necessarily exclude an explanation in terms of trust. Instead, this learning process might precisely amount to a development of trust. Trust does not have to be something that is explicitly present in the animal's mind as a propositional judgment, such as "This individual can be trusted." Rather, trust may be a capacity that is implicit in their *choosing* to place themselves in a situation that makes them more vulnerable.

Another objection here might be that the very neurophysiology of touch, which we discussed in Section 2, makes these sorts of affiliative interactions pleasurable for the animals so that there is no role for trust to play. Rather, the animals are just motivated to encourage what they feel as a pleasant stimulus. We believe that it is quite likely that part of the motivation for engaging in affiliation is indeed that it is inherently rewarding. However, two things must be borne in mind. The first one is that the individual initiating the affiliation might not get pleasure out of it right away, and still, this individual is also risking injury. Second, and relatedly, the fact that the neurophysiology of touch ensures that affiliation is pleasant does not mean that things can't go wrong. Not all attempts at affiliation are successful. For the animal on the receiving end, there is always the risk of misreading the situation, interpreting as an affiliative approach what is not. This would likely mean that the animals who purposefully allow others to touch them implicitly trust them.

The capacity of trust may also be manifested in certain touch behaviors that some animals engage in and that seem to create vulnerability as a gesture of reassurance or friendliness. One example first described in chimps has been aptly named 'vulnerable contact behavior' and consists of inserting a finger into another's mouth (Nishida et al., 2010, p. 145), either to appease another in distress or to reassure oneself. de Waal (1989) puts the use and risk of this behavior into context:

> Chimpanzees have a habit of putting their fingers or the back of one hand between the teeth of dominant group members. A friendly gesture, it is also a test of the dominant's state of arousal and often is used in ambiguous situations. I experienced it

> myself when performing psychological experiments with two juvenile chimpanzees at the University of Nijmegen. Each day I spent hours in a room with them, and occasionally their constant mischievousness would get on my nerves. They would notice the slightest irritation and hurry over to fill my mouth with their big hands. Of course, I never bit, but in the Arnhem colony I have seen quite a few instances when fingers were not treated so gently during appeasement attempts. Young chimpanzees of three years or less, who may have lacked the experience to judge whether the gesture was safe or not, were almost always the victims of such bites. (p. 80)

Vulnerable contact behavior also takes other forms amongst primates. Once again in the context of peace-keeping, de Waal (1989) describes the following behavior:

> Male chimpanzees often finger each other's scrotum at moments of mild tension, a gesture irreverently known among field-workers as ball bouncing. Is there a more convincing way of indicating friendly intentions than by touching these vulnerable parts? (p. 79)

Anecdotal evidence also points to the consolidation of alliances by means of gently holding another's testicles in other primates (e.g., Balter, 2010). Vulnerable contact behavior has also been witnessed in elephants, who will touch or put their trunk inside the mouth of a distressed conspecific (Plotnik & de Waal, 2014, p. 12). A recent study on captive orcas also documents what appears to be vulnerable contact behavior: the orcas were found to occasionally put their snouts together, and then, one of them would insert her tongue into the mouth of the other, who would gently bite it. The authors interpret this as an affiliative gesture (Sánchez–Hernández et al., 2019).

Even if we were to favor a more intellectualistic notion of trust that excluded these behaviors from counting as expressions of such, these sorts of interactions could still point us to the capacity of care or tact. A chimpanzee holding another's testicles or an orca biting another's tongue are examples of situations in which an animal could very easily hurt the other, but she apparently puts care into making sure that this doesn't happen. This also extends beyond vulnerable contact behavior. For instance, controlling the strength with which one bites during play or carrying one's offspring in the mouth with the exact pressure needed to hold them without hurting them could also constitute examples of animals exhibiting care. To be sure, whether or not these count as instances of care or tact will be a function of the amount of behavioral flexibility and self-control possessed by the animal. If she could not perform the behavior any other way, then it would not make sense to say that she is putting care into how she does it. This is not particularly problematic, however, since the study of moral capacities in animals must, in any case, go hand-in-hand with the study of animal self-control (see [redacted]).

There may be more to learn about the moral capacities of animals if we look further, beyond gentle touch. For instance, young animals of various species often play with each other or with adults in ways that can be quite painful. These individuals enjoy enormous levels of tolerance from the older members of the group. In the case of young chimpanzees, for instance, de Waal writes, "they can do nothing wrong, such as using the back of a dominant male as a trampoline, … or hitting an older juvenile as hard as they can" (de Waal, 2014, p. 189). Tolerance is also a moral capacity that has not received the attention it deserves. Having a young chimp use your back as a trampoline or hit you as hard as she can must hurt. If it were an older chimp doing it, this would trigger an aggressive response in return, so it is possible that there is an inhibition of aggression going on that could also plausibly be regarded as a moral capacity. The fact that social tolerance and the inhibition of aggression have not been considered as research topics in the animal morality debate highlights a bias toward moral capacities that are manifested actively. One can also, however, exercise a moral capacity by refraining from doing things.

The ways in which animals navigate each other's vulnerability could thus give us evidence of various moral capacities, but what about cases in which the animals purposefully hurt each other? The animal morality debate has until now focused almost exclusively on prosocial behavior and its underlying mechanisms. We suggest that it's also important to look at antagonistic and antisocial interactions in our search of moral capacities beyond the human species. Consider the following description of an aggressive altercation among captive chimpanzees:

> Luit was alpha for only ten weeks. The Yeroen–Nikkie alliance made a comeback with a bloody vengeance one night during which the two allies together severely injured Luit. Apart from biting off fingers and toes and causing deep gashes everywhere, the two aggressors removed Luit's testicles, which were found on the cage floor. Luit died on the operating table due to loss of blood from the fight, which took place in a night cage with only the three senior males present. Given the victim's massive injuries and the relatively few injuries sustained by the other two, we must assume a remarkable level of coordination between Nikkie and Yeroen. (de Waal, 1998, p. 211)

To be clear, by citing this example, we do not mean to imply that this incident necessarily amounted to a moral practice. Perhaps Nikkie and Yeroen were motivated by a non-moral desire to rise in the social hierarchy. The interaction could, however, have had a moral component if, for instance, Nikkie and Yeroen enjoyed and purposefully prolonged Luit's suffering. While this single anecdote is far from definitive, the fact remains that chimpanzees are capable of very sophisticated social cognition (suggesting that they might have understood that Luit was suffering) and exhibit high levels of behavioral flexibility (suggesting that they might have had a certain degree of control over the way in which the killing was performed).

Thus, the extreme violence displayed is noteworthy and justifies paying more attention to cases like this.

Lethal intra-specific coalitionary aggression in chimpanzees has also been documented in the wild, both within and outside the instigators' own social group (e.g., Kaburu et al., 2013; Pruetz et al., 2017). Additionally, non-predatory inter-specific killings have been witnessed in several mammalian species. For instance, killer whales have been described to kill narwhal "for fun" in a variety of ways, like drowning, ramming, and mutilating them, and then "playing soccer" with their body parts (Ferguson et al., 2012, pp. 7, 11). Bottlenose dolphins have also been observed to harass harbor porpoises, only to brutally kill them and abandon their bodies (Cotter et al., 2012). Depending on the behavioral flexibility manifested in these interactions, the social context surrounding them, and the amount of premeditation involved, emotions like cruelty, envy, resentment, schadenfreude, or blood lust could be driving the behavior. Perhaps these emotions are exclusively human, but this should not be established from the armchair. Not even considering the possibility that animals may also possess these negative moral emotions could amount to a distorted or partial account of animal morality.

Before we conclude, we would like to mention how touch can also illuminate a final, very important branch of the animal morality debate: the study of the normative capacities of animals. Although animals' ability to follow and enforce normative standards of behavior has only begun to be systematically studied in the lab (e.g., by measuring chimpanzees' spontaneous reactions to videos of infanticide [Rudolf von Rohr et al., 2015]), normativity figures prominently in many accounts of morality, and much of the work done on the evolution of human morality has focused on the emergence of our normative capacities (e.g., Joyce, 2007; Kitcher, 2014; Tomasello, 2016). In addition, Kristin Andrews, one of the most prominent philosophers in the animal morality debate, has also focused a great deal of her work on animal normativity (e.g., Andrews, 2009, 2013, 2020). Thus, it is worth considering to what extent the study of touch can be illuminating here too.[19] Although discriminative and affiliative touch could possibly have a role to play in the enforcement of animal social norms (for instance, discriminative touch could be used to determine when an animal is not playing "fairly," and affiliative touch could perhaps be used to reinforce norm-appropriate behavior), we believe that the vigilance function of touch is likely the most relevant when it comes to considering how touch can inform the study of animal normativity.

Following Andrews (2020), we assume that an animal social norm occurs when "(a) there is a pattern of behavior demonstrated by community members; (b) individuals choose to conform to the pattern of behavior; (c) individuals expect that community members will also conform, and will sanction those who do not conform." We believe that a fruitful area of study

for uncovering animal social norms thus understood concerns how animals navigate each other's bodily vulnerability. Looking at how animals touch each other, when they refrain from touching each other, how they react to others' touch, or when they decide to intervene to stop others from touching could illuminate what animals consider to be appropriate patterns of behavior, as well as to what extent they expect others to conform to these patterns and are motivated to sanction nonconformity. Thus, investigating the touch patterns involved in social play, mating, co-feeding, grooming, infant handling and alloparenting, vulnerable contact behavior, reconciliation, and consolation could all be promising ways of establishing whether the animal societies in question countenance and enforce social norms.

6. Conclusion

We have argued that scientists and philosophers have been operating with a somewhat narrow view of the set of moral practices that animals could engage in, and that bringing the issue of touch to the discussion has the potential to uncover further moral practices, while also revealing unnoticed nuances in the ones that are under discussion. Our defense of the need to pay more attention to touch has been structured as an analysis of the discriminative, affiliative, and vigilance functions of touch. However, it is important to remember that this division is an artificial one: in reality, these three functions are intertwined, and purposeful touch as an expression of moral capacities cannot be studied without taking the role of all three in a specific context into consideration. Moreover, as also emphasized by Botero, touch as a social medium and its role in animal morality cannot be properly analyzed without incorporating field studies. We need to study animals' spontaneous interactions and consider their social bonds and social history in order to assess their moral capacities and their use of touch, for example, in order to distinguish resentment from mistrust. Lastly, lab conditions, like many other instances of the human–animal relationship, deprive animals of some of the conditions they might need to develop moral capacities, like parental care or lasting relationships, and thus, on their own, they cannot provide us with a fair assessment of the prevalence and scope of animal morality.

Notes

1. Botero's argument applies to both human and nonhuman primates, but in referring to her work, we shall focus on the case of nonhuman primates. Accordingly, we use the terms 'primate' and 'ape' to refer to nonhuman ones.
2. Throughout the paper, we will refer to many empirical studies to substantiate our claims. A lot of this research can be seen as ethically problematic, and we would like to

note that our reference to any particular study does not imply an endorsement of its methodology.

3. Though we will often use the term 'animals' as a shorthand, our analysis throughout the paper mostly focuses on nonhuman social mammals. This is due to space constraints and to the present bias in the relevant behavioral and physiological literature. It should not be taken as an a priori exclusion of the possibility of moral practices in non-mammalian species.
4. This is an artificial classification, and not all studies will fall neatly into one category or another. For instance, some of the evidence of animal empathy comes from anecdotal accounts of altruistic helping (e.g., Bates et al., 2008), and the animals in the altruism experiments may be motivated to help others by empathic mechanisms. In addition, it should be noted that in classifying the studies this way, we take inspiration from the three clusters of animal moral behaviors that Bekoff and Pierce (2009) describe. However, our distinction does not map on exactly to theirs. While we talk of the altruism cluster, the fairness cluster, and the empathy cluster, they talk of the cooperation cluster, the empathy cluster, and the justice cluster. The change is not fortuitous. We are not trying to reproduce Bekoff and Pierce's ideas, but rather capture the main research foci of contemporary empirical approaches to animal morality. Bekoff and Pierce have a very broad understanding of animal morality, and their three clusters encompass a wide range of behaviors, since they use them to illustrate the different forms that animal morality could take. Under 'cooperation', they include "altruism, reciprocity, honesty, and trust;" under empathy, "sympathy, compassion, grief, and consolation;" under justice, "sharing, equity, fair play, and forgiveness" (Bekoff & Pierce, 2009, p. xiv). While we think that their open-mindedness is commendable, it is an exception and not the rule in the animal morality debate. This broad understanding of morality does not correspond to how animal morality is being systematically studied. There are, for instance, barely any studies on honesty, trust, or forgiveness in animals. We are therefore using these three clusters in a narrower sense, as explained below.
5. Positive results in the 'active helping' sub-group have been obtained with rodents (e.g., Bartal et al., 2011; Ueno et al., 2019), pigeons (Watanabe & Ono, 1986), and primates (e.g., Masserman et al., 1964; Warneken & Tomasello, 2006).
6. Positive results using this paradigm have been obtained with chimpanzees (Horner et al., 2011), capuchin monkeys (Lakshminarayanan & Santos, 2008), common marmosets (Burkart et al., 2007), cotton-top tamarins (Cronin et al., 2010), rats (e.g., Hernandez-Lallement et al., 2015) and parrots (Brucks & von Bayern, forthcoming).
7. Apparent "inequity aversion" has been found in chimpanzees (e.g., Brosnan et al., 2010), capuchin monkeys (Brosnan & de Waal, 2003), cotton-top tamarins (Cronin & Snowdon, 2008), long-tailed macaques (Massen et al., 2012), dogs (e.g., Range et al., 2009), rats (Oberliessen et al., 2016), crows, and ravens (Wascher & Bugnyar, 2013).
8. The available evidence suggests that emotional contagion is an ability possessed, at the very least, by chimpanzees (Parr, 2001), graylag geese (Wascher et al., 2008), dogs (e.g., Huber et al., 2017), mice (e.g., Langford et al., 2006), rats (e.g., Atsak et al., 2011), prairie voles (Burkett et al., 2016), chickens (Edgar et al., 2011), pigs (e.g., Goumon & Marek, 2016), cockatiels (Liévin-Bazin et al., 2018), and kea (Schwing et al., 2017).
9. Scientists clearly expect consolation to be comforting because they often either define consolation as a behavior that produces a calming effect, or they look for evidence of a stress reduction in the consoled individual. However, to the best of our knowledge, none of the scientists working on consolation have explained why they expect the behaviors that they deem indicative of consolation to be comforting.

10. A single study on prairie voles (Burkett et al., 2016) mentions the role of oxytocin, a mammalian hormone associated with social touch (Uvnäs-Moberg et al., 2005) and attachment (Feldman, 2011, p. 380), in consolation behavior.
11. We are using the term 'moral' not in its normative but in its descriptive sense.
12. We understand 'normative capacities' as the ability to make normative evaluations about others' behavior, as well as the ability to comply with and enforce normative standards of behavior. See Section 5.
13. An interesting question posed by a reviewer is whether there are studies that employ the frame of touch to explore morality in humans. Studies on human moral psychology mostly focus on gaze (e.g., showing clips of antagonistic interactions and just or unjust punishment to pre-linguistic children and tracking their gaze to infer their understanding of norms and fairness), visual- or auditory-mediated emotional contagion (e.g., babies crying in response to hearing another baby cry as an indicator of the innateness of empathy), and, as soon as developmentally possible, language (e.g., to inquire about moral judgments). Since humans have linguistic abilities, studies of our moral capacities may not benefit as much from a focus on touch as the study of animal morality. However, some studies do document the role of touch in humans' moral interactions, broadly construed. For instance, affective touch has been found to affect our impression of others (e.g., Fisher et al., 1976) and to have a positive effect on compliance and cooperation in mundane situations (e.g., Goldman et al., 1985), which may affect moral decision-making, for example, in the context of helping. Affective touch is also a prominent criterion in the studies of consolation in pre-linguistic infants or infants in early linguistic development. Consolation in these infants is operationalized, like in animals, as hugging the distressed other or offering some other form of comfort contact (e.g., Zahn-Waxler et al., 1992). Researchers have also found an analgesic effect of partner touch, which increases when a more empathic partner provides the touch (Goldstein et al., 2016, 2018). Lastly, touch may also play a role in the experiencing of moral disgust, though it should be noted that the link between physical revulsion as a protective mechanism and moral disgust is controversial (Oaten et al., 2018).
14. This, of course, connects to theory of mind, and sometimes it may be useful (perhaps even necessary) for an animal to first determine that another is in a particular mental state before exercising a moral capacity. However, we do not want to circumscribe our claims to animals who possess a theory of mind. Instead, we follow Andrews (2018) in considering that many socio-cognitive practices don't require mindreading but rather trait attribution, understanding of past history, relationship status, and so on, and, following Monsó (2015), we consider it quite likely that this pluralistic set of capacities for predicting and understanding others is sufficient for the exercise of many moral capacities.
15. We use the terms 'parent' and 'parental' to refer to any primary caregiver.
16. Feldman (2011, p. 373) notes, "maternal touch patterns are among the most evolutionarily conserved behaviors and, as such, there is marked consistency in the genetic, neuroendocrine, and brain circuitry between humans and other mammals. … Such consistency in the role of maternal touch between humans and other mammals renders research in animal models particularly useful for understanding the biological underpinnings of early touch and contact and their effect on shaping the infant's capacity for social affiliation and stress modulation throughout life."
17. Although, in this section, we emphasize prosocial behaviors, given that the focus is on affiliation, the link between morality and sociality doesn't circumscribe solely the positive side of morality. Cruelty, for example, is an attitude that has the other's (negative) welfare as its goal, and, in that sense, it also requires abandoning a purely

self-centered stance. In addition, our view regarding the importance of sociality for morality should not be taken to imply that egoism or callousness are not moral attitudes. Our point is that one can only make sense of the morality of an animal's attitudes if one assumes the animal has the capacity to abandon a self-centered stance. This applies also to callous and egoistic attitudes. Animals who naturally lead solitary lives and lack all capacity to engage with others could not be said to be egoistic or callous, at least not in the moral sense of these terms.

18. The prolonged transportation and nurturing of an infant's corpse have been witnessed in mothers from a wide range of mammalian species (Reggente et al., 2016).
19. We are grateful to an anonymous reviewer for encouraging us to take on this point.

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