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A Conceptual Framework for Empathy
and Its Application to Investigate Nonhuman Animals

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Abstract

Do nonhuman animals (hereafter "animals") possess empathy and if so to which degree? Can we develop a conceptual framework that allows us to characterize similarities and differences between implementations of empathy in humans and animals? We aim to answer these questions in two steps. First, we develop a new conceptual framework by distinguishing different levels of empathy starting with paradigmatic cases of human empathy developing in human ontogeny. Second, we describe in detail which of these levels of empathy can be found in other species based on animal studies. This approach allows a detailed characterization of the relation of empathy in humans and other animals.

Keywords: empathy; animal cognition; comparative cognition

1. Introduction

Until recently empathy has been thought of as a uniquely human ability. This has been the common ground of most researchers who still cling to the famous Bischof-Koehler hypothesis stating that the behavior of nonhuman animals is controlled only by their own current motivational states, and therefore nonhuman animals cannot anticipate future motivational states or act on the motivational and emotional states of others. But the last two decades of research have revealed increasing evidence for prosocial behavior in nonhuman animals, especially rodents (Bartal et al. 2011). Investigating the mechanisms underlying prosociality in rodents we observe an interesting overlap of flexibility in the behavior, similar behavioral dispositions as well as similar brain circuits compared to humans (Meyza et al. 2017). Some researchers have started a new perspective on animal empathy, especially Frans de Waal and his group. He argues that "being in tune with others, coordinating activities, and caring for those in need isn't restricted to our species. Human empathy has the backing of a long evolutionary history" (de Waal 2009). We think that this is exactly right although the challenge to make a convincing argument for sceptics still remains. We will suggest an argument in that direction in two steps: first, we develop a new conceptual framework by distinguishing different levels of empathy starting with paradigmatic cases of empathy during human ontogeny, and second, we describe in detail which of these levels of empathy can be found in other species based on empirical studies. This approach allows a detailed characterization of the relation of empathy in humans and other animals. The new framework will allow us to challenge a general denial of empathic abilities in nonhuman animals without falling prey to claiming that there are no differences in empathic abilities of humans and other animals. In the following we can only outline the core ideas.

2. Methodological Framework

To develop an adequate framework for a comparative perspective concerning empathy, we start with a standard example of our human life to characterize the typical features of full-blown empathy. We furthermore benefit from a conceptual suggestion used in developmental psychology (Hoffman 2000) to describe different levels of precursors of full-blown empathy. To do this in detail, we develop our own multi-component model of empathy. This is to be understood in the sense of a Wittgensteinian idea of family resemblance of characteristic features starting out with the most typical examples as core cases of empathy, rather than a description of necessary and sufficient condition of empathy. The resulting multi-component theory allows to account for a variety of phenomena within this framework. In this paper we focus only on a selection of ideal-typical cases to characterize different levels of empathy which are pre-cursors of full-blown empathy. Finally, our aim is to give an overview of the evidence for an implementation of these level in nonhuman animals.

3. Criteria of Adequacy for a Concept of Empathy Developed from a Typical Case

Tom lives with his old neighbor in Corona-times and she tells him that she suffers from isolation and that she is sad that she is no longer able to cook any complex meals but has to deal with simple cooking due to her diminishing abilities. Since Tom knows her quite well, he is aware of the fact that she does not want any fancy meals one could easily order from a restaurant but she prefers a special cuisine which has to be self-made. Tom feels sorry for her and decides to cook and bring her favorite meal for her upcoming birthday. She is delighted.

This story involves the characteristic components of full-blown empathy. The core intuition is that empathy typically involves the registration of the other's relevant mental states or processes ('state' for short in the following) including the affective state. This is combined with the attitude to take care of the other and the selection of a supporting action that accounts for the mental states and the situation of the person. More precisely: We think that we can cluster relevant elements into three main components, namely (1) registration, (2) attitude and (3) behavioral response. In this example, you (1) *register and/or activate* the old ladies' (1a) *affective state* of being sad, (1b) *the relevant situation* she is in, namely of not being able to adequately cook and (1c) *her relevant mindset*, namely the desire for her favorite meals. Furthermore, Tom acts based on (2) *an attitude of care for the other*. [This needs a short explication: to avoid over-intellectualizing this component, we allow for non-conceptual attitudes of caring. Although the attitude of caring is normally understood as positive, it may also be understood as negative here, i.e. 'caring' for the other by aiming to harm.] And (3) Tom decides to act such that he fulfills *her* desires (or needs), i.e. his action is typically other-directed. Thus, we want to exclude behavior of a cognitive system which lacks a relevant self-other distinction as a candidate of empathic response behavior. But this still allows for self-directed behavior although this is not typical for full-blown empathy, e.g. if Tom would feel sorry for her but avoid any contact not to be reminded of her situation.

We take these to be the paradigmatic criteria of full-blown empathy understood as three typical components which can be realized with typical sub-features in a case of empathy. A Wittgensteinian understanding of the concept of empathy allows us to exclude cases of non-empathy and to describe borderline cases: if we have three characteristic components of empathy then a phenomenon that does not realize at least one of those is not a case of empathy. If from three components, only one is realized, we have a borderline case. If two of three components are realized, we enter the area of fruitful descriptions of family resemblance cases.

How can we make use of this framework? First, we can use it to illustrate deficits of two main alternative conceptual frameworks and second, we will apply it to characterize different types of empathy in nonhuman animals in a way that is nicely in line with a fruitful theory of types of empathy in developmental psychology (Hoffman 2000).

4. Criticizing Two Central Conceptual Frameworks

The two most promising approaches on empathy and its related phenomena are the so-called Russian doll model by de Waal & Preston (2017) and the combination model by Yamamoto (2017).

The basic pillar of the Russian doll model (de Waal & Preston 2017) follows a developmental strategy: empathy needs a mechanism of a perception-action coupling as a necessary basis and important applications of this mechanism are the abilities of motor mimicry and emotional contagion.
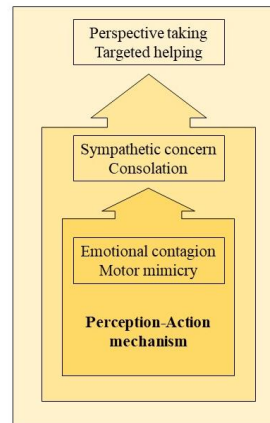

Figure 1: The Russian Doll Model; adopted from: de Waal & Preston, 2017.

According to the authors, all other empathic abilities are built on this core element. This application of basic forms of empathy is widened with the additional abilities of sympathetic concern and consolation. Furthermore, the most complex forms of empathy additionally involve higher-cognitive empathic abilities like perspective taking and targeted helping. From a developmental view, this model might look appealing at first sight and we appreciate the ontogenetic perspective. Still, this conceptual framework is inadequate since the doll model implies (i) that the relevant cognitive abilities are unfolded one on top of the other and (ii) that they contribute to a case of full-blown empathy in the same way. (Ad i): Psychopathy is a counterexample to the presupposition of a sequential unfolding of these abilities: psychopaths typically lack sympathetic concern, but they are experts in perspective taking and in principle also in targeted helping although they might misuse this ability for achieving their own goals (Anderson & Kiehl 2014). (Ad ii): Furthermore, these abilities do not belong to the same functional level: sympathetic concern is an attitude that is activated in typical cases of empathy while perspective taking is a specific cognitive ability that normally supports targeted helping. It enables an advanced self-other distinction, which is helpful for both the registration of the mental state of the observed person and for the response behavior directed at this person. We are better off with a framework that allows for relevant cognitive abilities that are not necessarily grounded on each other and we should aim for a characterization which distinguishes different functional roles for cases of empathy.

A different approach is the combination model (Yamamoto 2017). They emphasize three organizing factors as typical *cognitive or behavioral goals* of empathy: matching with others, understanding others, and prosociality. The abilities often discussed in the context of empathy can be mapped onto these three factors. Matching with others includes synchrony, mimicry, and emotional contagion. Understanding of others

involves perspective taking, Machiavellian intelligence, and also Schadenfreude. Prosociality can be realized by food sharing or prosocial choice. In this model more complex cases of empathy can be assigned to specific overlaps of factors, e.g. targeted helping consists of understanding others and prosociality. Finally, for sympathy, consolation,
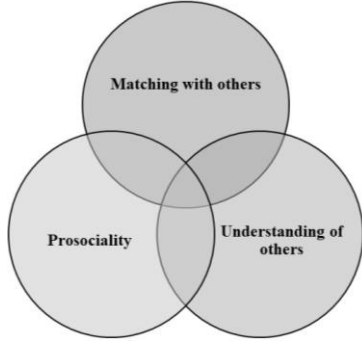

Figure 2: Combination Model; adopted from: Yamamoto, 2017.

calculated reciprocity, and advantageous inequity aversion, all three factors are necessary. This approach avoids the problems of the Russian doll model since the factors need not be sequentially based on each other and the three factors characterize different functional roles for sub-features involved in empathy.

However, the model involves the claim that cases realizing only one factor can be categorized as clear cases of empathy even if those are basic ones. This is not convincing as can be illustrated with two examples: If prosocial behavior is an inborn reaction pattern or – more importantly – it is just understood as a certain type of beneficial behavior independent from the *registration* of the mental state of the other and independent from the typical caring *attitude* towards the other, then this is not a case of empathy: The latter is e.g. realized if Tom is accidentally cooking the old ladies favorite meal just because he aims at becoming a specialized cook. He does not care for the old lady and forgot about her sadness. But after his cooking event he brings a portion to every neighbor waiting for the evaluation of his cooking abilities and this involves bringing the old lady her favorite meal just at her birthday. This case is not a case of empathy because the behavior is neither a response to registering the old lady's sadness about her vanishing cooking abilities nor acting with an attitude of caring for her. This example cannot be handled within this conceptual framework because the relevant factors alone are not sufficient and e.g. prosociality as well as matching with others only describes the *behavioral response* in typical cases of empathy. But this approach is too inclusive. We need to involve the registration of the other's mental state as well as an attitude of caring for the other as relevant factors in some way. A second example which should be excluded from cases of empathy is motor mimicry despite this being a typical case of matching with others: In these cases, the motor behavior

of another agent is copied, probably based on the activation of mirror neurons: This is an interesting behavior but not a case of empathy since motor mimicry does not involve the registration of the other's affective state (or any mental state), nor any attitude directed towards the other. Furthermore, the behavioral response does not involve any relevant self-other distinction. Instead, it is only an automatically triggered motor reaction of the observing agent. Thus, just matching with others is also not sufficient for empathy. Here again we lack the registration of any mental state of the other as well as an attitude of caring.

5. A Multi-Component Model of Empathy

To develop a systematic overview of different forms of empathy, we need to clarify which kinds of phenomena we should account for. There are several sources describing phenomena involving empathy and related phenomena (e.g. Adriaense et al. 2020) but they remain unsystematic in their selection. We can observe basic agreement in diverse approaches that we need to offer a justified characterization of motor mimicry: we already excluded it as a case of empathy since it does not realize any of the three typical components of full-blown empathy which we took as our starting point. Which other phenomena should we account for as precursors of full-blown empathy? One central source of inspiration to systematically highlight relevant phenomena comes from developmental psychology, especially the ontogenetic model of Hoffman (2000). He defines five levels of empathy in child development: (1) Emotional Contagion, (2) Egocentric Empathic Distress, (3) Quasi-Egocentric Empathic Distress, (4) Veridical Empathic Distress, and (5) Empathic Distress Beyond the Concrete Situation. Number (4) in his model is what we call full-blown empathy. Given our focus on animal cognition here, we concentrate on the stages (1) to (4). Furthermore, we benefit from a rough characterization of the phenomena in the ontogenetic stage model which we include below. But our component model is a new account primarily because it systematically distinguishes the core functional roles of registration, attitude and behavioral response. And by spelling these out we develop a new account of empathy which enables us to precisely characterize the similarities and differences of the relevant phenomena and types of empathy.

We suggest the following three components and sub-criteria as motivated above:

Table 1: Components of Empathy

		1	2	3	4
registration	(i) affective state	×	×	×	×
	(ii) situation			×	×
	(iii) mindset				×
attitude	care for others	n	n	y	y
behavioral response	(a) no relevant self-other distinction	×			
	(b) self-directed		×		
	(c) other-directed			×	×

We can *register* the affective state, the relevant situation and the mindset of the other. We can activate the *attitude* of caring for the other in a positive or negative way; and we realize a *behavioral response* which typically is other-directed but can also be self-directed or may not involve a relevant self-other distinction.

Most empathy researchers including Hoffman (2000) suggest that *emotional contagion (level 1)*, i.e. laughing when someone else is laughing, should be evaluated as a case of empathy. In our model it is at best a borderline case since it fulfills only one out of three criteria. It involves the registration of the affective states of the other (in contrast to motor mimicry) and it then transfers this state onto the observer, thereby leading to an affective response matching that of the other. But this response is a fully automatic reaction to registering the affective state, thereby lacking the other two components, namely an attitude of caring and a relevant self-other distinction as being involved in the response behavior. Emotional contagion is demonstrated in quite a variety of species, e.g. rodents (Langford et al., 2006), dogs (Yong & Ruffman, 2014) and kea parrots (Schwing et al., 2017). From an evolutionary perspective it is more demanding than just motor mimicry, but it may also be realized on the basis of mirror neurons since there is evidence for mirror neurons active in the case of expressions of pain and disgust.

Level 2 of the empathic phenomena is *egocentric empathy* (Hoffman, 2000). Typical phenomena include aversive behavior or what may be called an "as-if-it-was-me behavior". In the case of registering that another child is very sad and needs help the child may just seek shelter with her mother to move away from the stressful challenge. Children (Hoffman, 2000), apes (de Waal, 2009), and rodents (Meyza et al., 2017) demonstrate this kind of aversive behaviors towards distressed conspecifics. In our model, egocentric empathy involves two of three components, namely first, the registration of the affective state of the other and of the relevant situation; and second, the behavioral response. It involves a relevant self-other distinction but it remains still self-directed, i.e. the agent tries to deal with the affective challenge by moving away from it (changing it for oneself) but not by changing it for the other. What is lacking is the attitude of caring for the other.

Level 3, which we call *intermediate empathy*, involves active helping behavior observed in children as a typical phenomenon: if a child observes the sadness of the other person since he cannot get to his favorite toy without her help, then this often leads to direct helping, roughly starting when children are two years of age. In our model, this involves now all three components, namely the registration of the affective state and the relevant situation (sadness because of not getting the toy), and there is an attitude of caring for the other involved, as well as a response-behavior which is other-directed (supporting him to get the toy). Can we observe this in animals? Chimps help a human experimenter to obtain an

out-of-reach object, irrespective of whether or not they are offered a reward for doing so (Warneken et al., 2007). Capuchin monkeys do so in low-cost situations only (Barnes et al., 2008). Further evidence for level 3 type of empathy in animals comes from studies in which one animal observes a conspecific in distress and has the option to help by opening a cage or reducing negative effects. This helping behavior is shown at least for primates (Yamamoto et al., 2012) and rodents (Sato et al., 2015). The animals demonstrate a motivation to help others instead of receiving a reward. Consolation behavior is a type of response that is more under discussion. Since it not only directly reduces the other's, but also the observer's distress, it is not settled, whether it is indeed an other-oriented response rather than a self-oriented one. There is evidence for consolation behavior in apes (Romero et al., 2010; Clay & de Waal, 2013), other primates (Palagi et al., 2014), as well as in dogs (Cools et al., 2008), wolves (Zimen, 2003), elephants (Plotnik & de Waal, 2014) and corvids (Seed et al., 2007), which would have to be examined in more detail to prove that it is other-oriented in nature. Interestingly, as in humans, mostly the losers of a conflict are soothed in this way, supporting the hypothesis of empathic consolation as a case of intermediate empathy rather than gathering rank specific advantages or own comfort only.

Level 4 is *full-blown empathy* which is typical for our everyday life. Here we can remind you of our starting example of the old lady. The important difference to level 3-type of empathy is that the registration not only involves the affective state of the other and the relevant situation but in addition the registration of the other's mindset (as different form one's own). Thus, it presupposes the ability of cognitive perspective taking, which is usually tested by the false-belief task, in addition to visual perspective taking. With the attitude to care for the other, the spontaneous response behavior can only result in cooking the old lady's favorite meal if you are aware of her preferences and account for them. If this is not yet developed, children may bring their own favorite toy as a birthday present for the mother, ignoring the different preferences. Is there evidence of full-blown empathy in animals? Yes, there is some direct and some indirect evidence. Apes pass the false belief task in the variant called the anticipatory looking paradigm (Krupenye et al., 2016), There is further evidence that this is not an over-interpretation since Buttelmann et al. (2017) demonstrate that apes are able to pass an active helping paradigm which also involves an implicit false belief understanding, i.e. this helping behavior presupposes that the apes are sensitive to the conspecific's being misinformed. Taken together we may expect to find even more evidence for full-blown empathy in apes and maybe in some other species if they pass the implicit false belief tasks. Interesting candidates at least for the latter are corvids.

6. Advantages

The proposed multi-component model of empathy enables us to connect a systematic theory of empathy with recent findings from developmental psychology and to apply it to animal cognition. Furthermore, the variety of components characterizing types of empathy can also be used to describe borderline and outlier cases: we evaluate them with a detailed description of family resemblance to the idealized types of empathy based on the characterization of each component and special context conditions. Many special cases can be described as realizing only one of the main components. For example, prosocial behavior, an empathy-related phenomenon, does not classify as a case of empathy, because it describes only the response dimension. It need not involve any realization of the registration: if the prosocial behavior is a rigid reaction triggered by a key stimulus of a situation or it is a reaction to a behavior of the other which does not express the affective state, then this prosocial behavior is not a response to registering the affective state of the other, which is the only necessary condition of empathy. If a phenomenon lacks the registration of the affective state of the other and it furthermore is not based on an attitude of care for others, then this should be excluded as being too far away from the case of full-blown empathy. Another borderline case is *knowing another person's mental states* which may include knowing the affective state and the mindset: such an extensive knowledge of the others' affective state and her mindset is an important component of empathy but not a case of empathy: if the attitude of care for others is lacking and no disposition for a behavioral response is activated, then this is a purely observational stance. Two main components of empathy, namely the attitude of care for others and minimal behavioral response are lacking. Thus, knowing another person's mental state is not a case of empathy but our framework captures this phenomenon as implementing the registration component of empathy.

With our proposal we suggest a new framework of a systematic, component- and feature-based approach to empathy. It enables us to outline an integrative theory suitable for a combined investigation of empathy in humans and nonhuman animals.

7. Summary and Conclusion

Our multi-component account allows us to characterize a variety of levels of empathy from an evolutionary perspective: we exclude motor mimicry and characterize emotional contagion as a borderline case while there are three cases of empathy: egocentric, intermediate, and full-blown empathy. The demands for implementation are systematically increased such that we find that less animals satisfy them. Our account is open not only for being read as a systematic cumulation of abilities but can also describe cases where just some features are lacking. Let us only highlight pure cognitive empathy as it is e.g. realized in psychopathy. In comparison to full-blown empathy a basic feature is missing, namely the attitude of care for the other. Because of this specific lack, a psychopath can use the registration of the affective state, the situation, and the mindset of the other for egoistic manipulation. This example also indicates that human empathy contains many more special cases, but we conclude with the focus on the comparison: For all levels of empathy-related phenomena (level 1 to 4) we discussed we can find some species implementing them; of course, the more complex versions are only implemented in some nonhuman species.

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