# Chapter 2
# Mental State Attribution to Nonhuman Primates and Other Animals by Rural Inhabitants of the Community of Conhuas Near the Calakmul Biosphere Reserve in the Yucatan Peninsula, Mexico

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## 2.1 Introduction

Throughout the human evolutionary history until today, people have been surrounded by other animal species. They compete with them or establish a range of relationships, from mutually cooperative to exploitative. Today, understanding the complexities of our relationships to other species is more important than ever, given the high rate of biodiversity loss. Positive attitudes about animal welfare and feelings of empathic concern toward them seem to reflect their inclusion in people's moral realm; such attitudes have been at the core of those human–animal relations, which yield positive outcomes for the animals (Ellingsen et al. 2010; Taylor and Signal 2005; Furnham et al. 2003). The "moral realm" or "scope of justice" refers to boundaries within which individuals are deserving a fair treatment (Opotow and Weiss 2000). Therefore, they represent a key concept in affecting success in conservation and animal welfare efforts.

Numerous studies suggest that human attitudes and emotional responses to nonhuman animals are shaped by the interplay of inherited dispositions (Jacobs 2009;

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Kotrschal 2009; Barrett 2005), demographical and psychological characteristics (Swami et al. 2008; Signal and Taylor 2006; Knight et al. 2004; Furnham et al. 2003; Driscoll 1995; Broida et al. 1993; Rajecki et al. 1993; Kellert and Berry 1987), cultural beliefs (Dickman 2010; Serpell 2004), the animal's physical and behavioral characteristics (Batt 2009; Horowitz and Bekoff 2007; Simons and Meyers 2001; Kellert et al. 1996; Merckelbach et al. 1987; Lorenz 1950), and the kind of interaction and relationships between human societies and animals (Liu et al. 2011; Dickman 2010; Distefano 2005). Among all those factors, mind attribution seems a key variable for the readiness of people to grant rights to animals (Gray et al. 2012; Gray et al. 2007; Mameli and Bortolotti 2006; Knight et al. 2004; Hills 1995).

Mind attribution or mind perception reflects the degree to which people assign conspecifics and any other animals the capacity to experience a range of emotions and cognitive capacities (Waytz et al. 2010; Gray et al. 2007). While recognizing and attributing mental states to other humans is usually regarded as "empathy" or "theory of mind," the attribution of mental states to animals or any other living or nonhuman living entity is generally labeled as "anthropomorphism" which is defined as the attribution of "human characteristics or behavior to a god, animal, or object" (Soanes and Stevenson 2005). Two traits that have commonly defined humanness are the ability to think (reason, choose, deliberate, etc.) and the ability to feel (Waytz et al. 2010; Farah and Heberlein 2007; Gray et al. 2007). The attribution of mind and internal mental states to animals may be considered a human universal insofar as it represents a historical constant and has been therefore regarded an inevitable feature of human thinking about animals (Kennedy 1992). This inevitability might indeed be the result of a series of automatic and reflective cognitive processes occurring in the human brain, triggered by the perception of a living organism or animated nonliving agent (for review, see Urquiza-Haas and Kotrschal 2015).

Why do people attribute mental states to nonhumans? Studies have pointed at a diverse set of factors that play a key role in mind perception. Among these are motivational factors, personal traits, nonhuman agent characteristics, and nonhuman agent behavior. Waytz et al. (2010) proposed two motivational precursors of mind perception: the first one refers to the motivation of people to understand and predict behavior of others and the second to the motivation to establish social bonds. Personal traits are also relevant for the attribution of mind to nonhuman agents. Males are less likely than females to believe that animals experience emotional states like depression, anxiety, love, and grief (Walker et al. 2014). In line with the former, women are generally more emphatic toward animal suffering than males (Angantyr et al. 2011). Independently of gender, more empathic individuals exhibit higher subjective empathy ratings and corrugator EMG activity in response to film stimuli depicting different animal species in negative circumstances (Westbury and Newman 2008). Hills (1995) showed a positive relation between empathy toward animals and belief in the mental experiences of animals, while Paul (2000) found a positive relationship between empathy toward humans and toward other animals.

It has been shown that the nature of the human–animal association also affects mind attribution to animals. For example, animal ownership increases emotion attribution to animals (Wilkins et al. 2015), and people in habitual contact with animals tend to attribute the capacity to experience secondary emotions (Morris et al. 2008) to these animals. Primary emotions such as anger, disgust, fear, happiness, sadness, and surprise (Ekman 1999) are shared at least within the mammals, as are the basic emotional systems of seeking, rage, fear, lust, care, panic/grief, and play (Panksepp 2005). Secondary emotions, on the other hand, are defined as "products of social construction through the attachment of social definitions, labels, and meanings to differentiated conditions of interactions and social organization" (Kemper 1987:276). Morris et al. (2012), for example, found that participants who have not experienced regular contact with animals attribute far fewer emotions to them than participants that have habitual contact; also, keepers of a particular species always report more emotions for that species than non-keepers. In addition, owning a companion animal increased the likelihood of attributing some animals the capacity to experience grief, as compared with respondents who did not own a companion animal (Walker et al. 2014).

The characteristics of animals play a crucial role in the perception of animal mind as well. Perceived similarity and phylogenetic relatedness of animals have been consistently found to be positively associated with the attribution of higher mental processes and complex thinking (Herzog and Galvin 1997; Rasmussen et al. 1993), intelligence (Nakajima et al. 2002), cognitive abilities like self-recognition, intention recognition and ability to deceive (Eddy et al. 1993), and the attribution of empathic and communicative abilities to nonhuman animals (Harrison and Hall 2010). Moreover, human–animal similarity is involved not only in the deliberate attribution of mental states but also in more automatic processes, such as empathic responses to animal ill-being or suffering. Plous (1993) found that college students watching videos of apparent abuse of a monkey showed greater than average and greater maximum skin conductance scores (a measure of arousal), as well as greater self-reported difficulty in watching the video as compared to watching the abuse of a bull frog. Westbury and Newman (2008) also showed that phasic skin conductance responses to watching videos of different species in negative circumstances increased with their phylogenetic closeness to humans.

In addition to perceived similarity, animal behavior per se is obviously recognized as an important trigger of attributing emotions and mind to other animals or to animated stimuli. For example, Mitchell and Hamm (1997) showed that people rely more on details of behavior and context than on morphological similarity or phylogenetic closeness when assessing emotions (jealousy) and intentions (deception) in nonhuman animals. Morris et al. (2000) assessed the consistency of peoples' anthropomorphic explanations of dog behavior and their behavioral triggers, as they observed short videos featuring human–pet dog interactions. The authors found a remarkable consistency in people's anthropomorphic accounts of the dog's behavior in describing the observed interactions. A similar result was reached by Morris et al. (2008) who asked 40 dog owners to report instances of jealousy in their dogs; participants consistently included four elements, namely, a certain context,

which almost always involved a social triad (the owner, the dog, and the "other"), a behavior that elicited the jealousy, and the type of behavior signaling jealousy. The "others" almost always consisted of other persons or other dog/animal, the eliciting behavior was paying close attention to the "other," and the behavioral expression of jealousy was the dog pushing itself between the owner and the other, the dog barking/growling/whining, as well as the dog showing aggressive behaviors. These studies indicate a common "syntax" and "semantics" in the folk interpretations of animal behavior. It has been suggested that in the case of animal behavior, people simply project their own experience/theories of mental states in certain situations to other animals: "In domestic settings people and their companion animals frequently face similar situations. To the extent that a companion animal's reaction to a situation has something in common with that of the human observer, the tendency would be to interpret the animal behavior in human subjective terms" (Rasmussen and Rajecki 1995:132). Such projections involve several underlying assumptions: For example, one can only assume that a particular mental state in oneself is the same mental state in others only if (a) it has the same or similar observable properties, i.e., your own expression of happiness is the same or similar to the expression of happiness of the other, and (b) that what causes one's own mental state is of a similar nature as what causes that of the other; this implies that (c) you and me do not differ in some fundamental way regarding the expected causal relation between the cause and the mental state experienced.

## 2.2 The Present Study

The aim of the present study was to identify the structure of folk psychological explanations mediating mind attribution to primates and other animals. More specifically, we wanted to identify if there is a specific set of behaviors and circumstances that prompt the attribution of emotions and cognitive abilities to other species. To achieve this, we interviewed a group of people living in the vicinity of the Calakmul Biosphere Reserve with respect to their beliefs about the ability of domestic and wild animals to think and to experience mental states like anger, fear, pain, and joy and the capacity to deceive. We refer to both emotions and cognitions as mental states because both are mental phenomena taking place in the brain (Oosterwijk et al. 2012; Panksepp 2005; LeDoux 2000).

The study group consisted of a convenience sample comprised of 9 women and 14 men (23 total), between 18 and 82 years of age, with different cultural, educational, and occupational backgrounds (Appendix 1). Most of the participants (17) were living in the community of Conhuas by the time of the interview, while the rest (6) came from other rural communities within the state of Campeche. The reason for selecting this community to do our interviews was twofold. First, we had to look for participants who were potentially acquainted with a diversity of wild and domestic animals to capture their subjective experiences and ideas about their cognitive and

emotional abilities. Most importantly, we had to select a group of participants who were somehow exposed to spider monkeys and preferably howler monkeys as well. The second reason was that one of the authors had a long-standing working relation with some members of this community, thereby facilitating access to participants.

Conhuas is a small community of 503 inhabitants (238 women and 265 men) from different cultural backgrounds situated in the vicinity of the Calakmul Biosphere Reserve (Fig. 2.1; INEGI 2015). Participants had multiple linguistic backgrounds: Tzeltal and Chol (3 individuals), Maya (3), Totonac (3), Zoque (1), and Spanish (12). The Calakmul Biosphere Reserve is a natural reserve located (17° 09′ -19° 12’ N and 89° 09′ -90° 08’ O) within the state of Campeche, Mexico. It includes an area of 723,185 hectares covered by short-to-medium-stature forests with significant dry season leaf loss, tall humid forest, and seasonally inundated, short-stature forest (SEMARNAP 2000). The reserve hosts a large biodiversity including 18 species of fish, 16 of amphibians, 50 of reptiles, close to 300 of birds, and 94 of mammals (Carabias-Lillo et al. 2000). Included among these are two primate species: the spider monkey (*Ateles geoffroyi*) and the howler monkeys (*Alouatta pigra*). Even though the community of Conhuas lies outside the reserve polygon, a portion of the *ejidal* lands of the community, used for agricultural purposes, is situated within the reserve. The main economic activity of the community is semi-subsistence farming, some still practice subsistence hunting (although prohibited within the reserve), and in

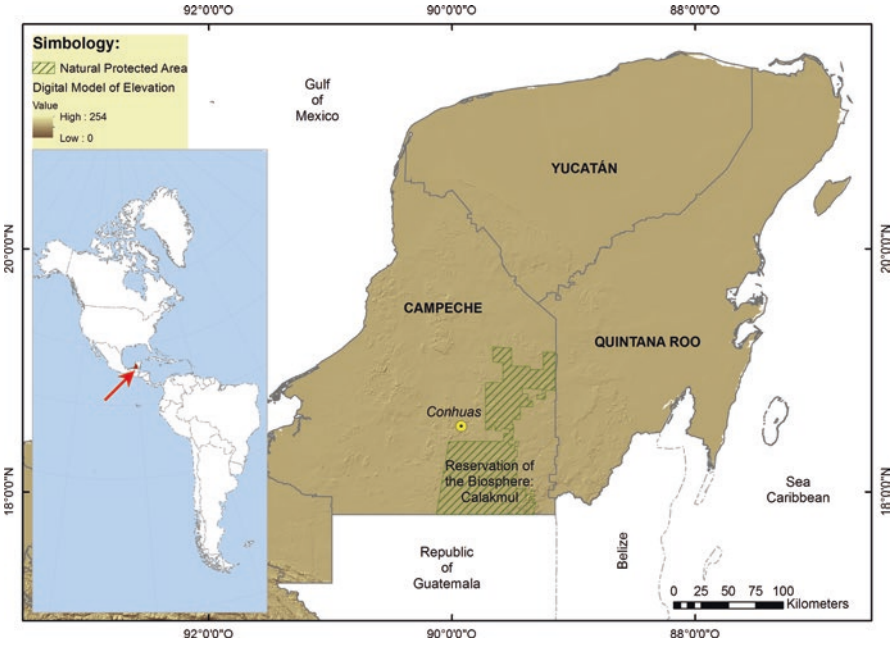


**Fig. 2.1** Location of the study site

recent times, there is an increased economic dependency on the provision of a wide range of touristic services (INEGI 2015).

Data was obtained through semi-structured interviews. During the first part of the interview, we explored how people represent two closely related mental state concepts, thinking and intelligence, and how these are attributed to certain animal species including the spider and howler monkey, jaguar, peccary, dog, birds, snake, ant, and fly. The second part of the interview consisted of a series of questions aimed to understand the triggers of mental state attribution. Among the mental states included were four basic emotions (anger, pain, fear, joy) and one complex mental state (ability to deceive). For this section of the interview, a set of cards with the pictures of 21 animal species belonging to 12 orders (Appendix 2) were shown to participants who were asked to sort out the ones capable of experiencing the mental state in question. Participants were then encouraged to elaborate on how they could recognize these subjective experiences of animals.

All interviews were carried out in Spanish and were audio and video recorded with explicit permission of the participants. The recorded interviews were then transcribed and analyzed via a qualitative content analysis which is described by Mayring (2000) as a mixed method approach for the analysis of textual data. The central instrument for the analysis relies on the specification of categories, indexes, or codes. According to Elo and Kyngäs (2008), the definition of categories for the analysis of the verbal content of interviews can be established through an inductive or deductive approach. The deductive approximation involves the use of theoretical-derived concepts to formulate the categories or codes representing the base of the analysis. The inductive approach is recommended in cases when there is insufficient knowledge about the phenomenon. In this case, the coding derives directly from the data. The first step in the inductive data analysis is to organize the data through categories or codes. The creation of categories is an interpretative exercise in which the researcher decides which elements of the text are lumped together in the same category. The unit of analysis can be either a word, sentence, number of participants, etc. (Elo and Kyngäs 2008). We used the answer to each question as our unit of analysis.

After grouping the answers of all participants, we defined the existence of four overarching themes present in the participants' thoughts about the mental states assessed. The first general category was labeled "animals" and referred to the set of animal species toward which each specific mental state was attributed. The second category was labeled "expression" as it included a set of behaviors or actions associated to specific mental states. The third category included a set of specific circumstances or causes that elicited certain mental states and was labeled "causality." The fourth and last general category referred to a set of characteristics that rendered animals more susceptible to experiencing specific mental states or were closely associated with these; we labeled this category "agent characteristics." With the aid of these categories and their respective contents, we describe the folk psychological models that guided the attribution of mental states to animals among this group of participants.

## 2.3 Results

### *2.3.1 The Folk Psychology of Basic Emotions*

#### 2.3.1.1 Anger

The Oxford Dictionary (Soanes and Stevenson 2005) defines anger as an unpleasant emotion caused by the threat of danger, pain, or harm. From an emic perspective, anger was defined as an internal state that arises as a response to fear and to a motivation to defend oneself/a territory/a mate/a relative, which is expressed through aggressive behavior, specific vocalizations, and piloerection. According to participants, most animals can feel anger. As can be appreciated in Table 2.1, the most common ways in which animals express anger are through a series of aggressive behaviors that include biting, stinging, attacking, and chasing. Anger is also recognized by certain body signals that include erected hair or feathers, screaming, and growling (Table 2.1). Different species have their own behavioral repertoire to express anger. Spider monkeys are well known to throw objects at people, usually branches but also pieces of bark, excrement, or whatever they find. Dogs and snakes bite, scorpions and bees sting, chickens and wild turkeys peck and chase, while peccaries, pigs, and cows chase people when angry. Participants believed there are many causes that trigger anger in animals. For example, instances of intraspecies interaction that result in aggressive outbursts include males fighting with other males for a territory, a prey, or a mate. Animals in heat, in reproductive period, or with litter are recognized as animals prone to anger. Especially females (chickens and cows) with litter are prone to show aggressive behavior when approached. Aggressive behavior (signaling anger) is also recognized as a defense mechanism to being bothered, having their space invaded, and trying to grab or corner them. The mere presence of humans might trigger an aggressive response resulting from feeling threatened (Table 2.1). Anger seems to be an emotional response of which almost all animals are capable of, from primates to arthropods, as well as wild and domestic animals. Nevertheless, some species received a higher frequency of mentions which included the dog, snake, jaguar, peccaries, cow, scorpion, pig, spider monkey, and chicken (Fig. 2.2).

**Table 2.1** Content of the categories for the capacity of animals to experience anger

| Expression | Causality | Agent characteristics |
|---|---|---|
| Bite<br>Attack<br>Sting<br>Throw objects<br>Hurl at you<br>Follow you<br>Confront you<br>Scream<br>Growl<br>Show erected hair or feathers | Fight for a mate, a territory, or a prey<br>Fight with other males to show who is the best<br>Female attacks to protect their litter<br>As a reaction to fear<br>As a defense mechanism when the animal is attacked or bothered, when its territory is invaded, when cornered, and when people try to grab or handle them<br>As a reaction to the mere presence of humans | Females with litter<br>Animals in heat or reproductive period<br>Males |

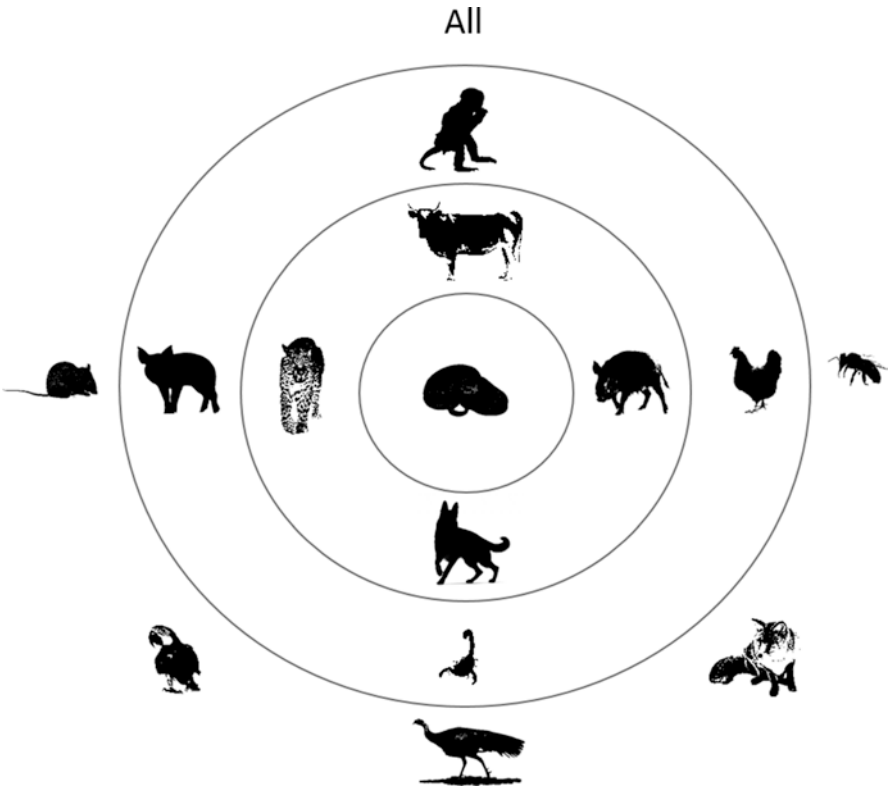


**Fig. 2.2** Animals most frequently mentioned as capable of feeling anger. Note: Inner circle (animals mentioned by more than ten participants), first concentric circle (>7<9), second concentric circle (>4<6), outside (>1<3)

#### 2.3.1.2 Fear

Fear is defined by the Oxford Dictionary (Soanes and Stevenson 2005) as an unpleasant emotion caused by the threat of danger, pain, or harm. From an emic perspective, fear can be described as an internal state that arises as a response to threat or danger infringed by either humans or predators and that is expressed through evasive, aggressive, or passive behavior. Almost all animals are entitled with the capacity to feel fear but especially forest-dwelling animals and among them prey animals even more so (Fig. 2.3). Monkeys were not perceived as fearful animals since they do not hide nor seem to avoid encounters with humans (unless they are hunted as M. Lizarralde has observed among the Barí people in Venezuela, pers. comm. in 14 March 2018). To the contrary, spider monkeys were perceived as bold by chasing people while throwing branches at them. Deer, jaguars, and

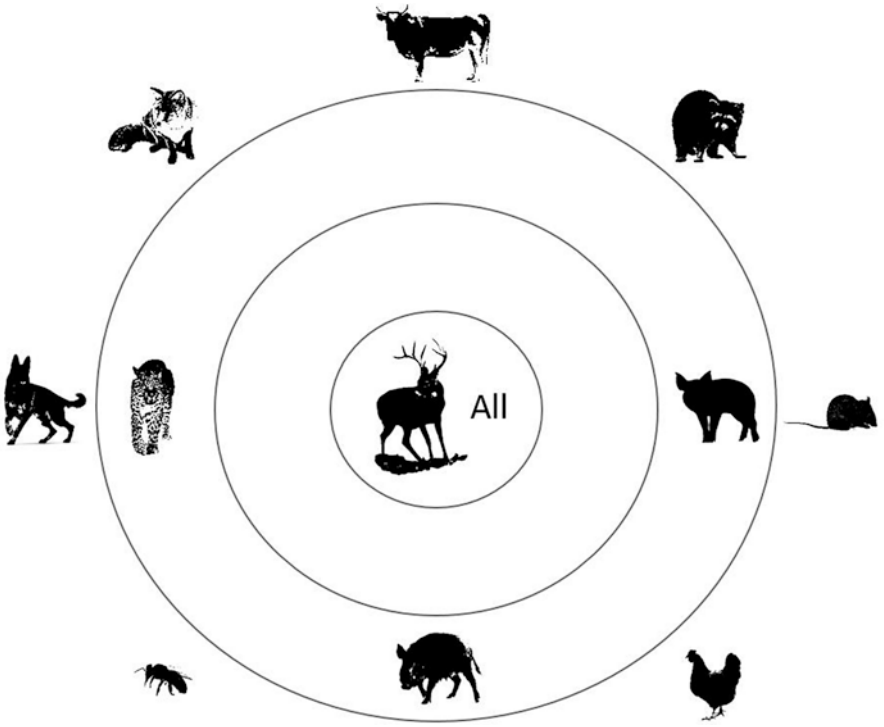


**Fig. 2.3** Animals most frequently mentioned as capable of feeling fear. Note: Inner circle (animals mentioned by more than ten participants), first concentric circle (>7<9), second concentric circle (>4<6), outside (>1<3)

**Table 2.2** Content of the categories for the capacity of animals to experience fear

| Expression | Causality | Agent characteristics |
|---|---|---|
| Run | Sight of humans | Wild animals |
| Flee | Approached by humans | Prey animals |
| Hide | Approached by a predator | |
| Attack | If threatened | |
| Paralyze | Facing danger | |
| Tremble | | |

peccaries were the most commonly mentioned animals with the ability to feel fear. Encountering humans or predators triggers fear, which is easily recognized by animals running away, hiding, fleeing, being paralyzed, or trembling (Table 2.2). Wild animals more likely than domesticated animals respond with fear to the mere sight of a person; others react with fear to an evident threat, like cornering or trying to grab the animal. Attacking is recognized by some as a sign of fear, but others interpret it as the opposite, that is, a sign of lack of fear.

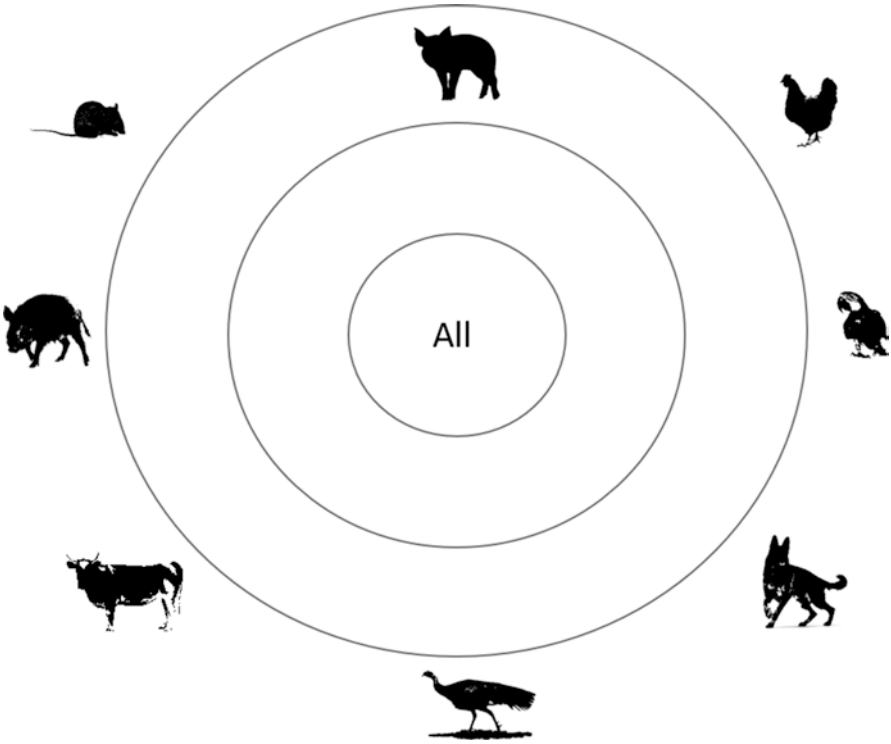


**Fig. 2.4** Animals most frequently mentioned as capable of feeling pain. Note: Inner circle (animals mentioned by more than ten participants), first concentric circle (>7<9), second concentric circle (>4<6), outside (>1<3)

#### 2.3.1.3 Pain

Oxford Dictionary (Soanes and Stevenson 2005) defines pain as a highly unpleasant physical sensation caused by illness or injury. From a local perspective, pain can be defined as an internal state that is caused by illness or injury and is expressed through passive or abnormal behavior and specific vocalizations. According to almost all participants, the ability to feel pain is a mental state that all living beings are capable of, as they are all made from the same materials as human beings, flesh and blood. Therefore, being alive is basically the only prerequisite to experience pain. Participants who listed a set of species included almost exclusively animals found within human communities like the dog; animals consumed as food like the cow, pig, and chicken; wild prey animals like the peccary and wild turkey; as well as animals like the mouse, possibly considered vermin (Fig. 2.4). Therefore, these animals are the most common targets of pain infliction by humans. Expressions of pain include a change in behavior (e.g., from lively and active to secluded and

**Table 2.3** Content of the categories for the capacity of animals to experience pain

| Expression | Causality | Agent characteristics |
|---|---|---|
| Lay down | If hurt | All beings that are alive |
| Limp | If sick | All beings that are made of flesh and blood |
| Tremble | | Prey animals |
| Scream | | Pet animals |
| Moan | | Animals used as food |
| Abnormal behavior | | Animals considered vermin |

**Table 2.4** Content of the categories for the capacity of animals to experience joy

| Expressions | Causality | Agent characteristics |
|---|---|---|
| Play | Finding food | Birds |
| Shake their tail | Mating | Pet animals |
| Wallow | Being free and safe | |
| Run around | Dogs when seeing their owners | |
| Jump | | |
| Sing | | |
| Scream | | |

apathetic), a specific kind of vocalization (e.g., scream, moan), and certain bodily expressions (e.g., trembling, inability to walk, limping; Table 2.3). Causes of pain were also well recognized and include getting hurt or being sick.

#### 2.3.1.4 Joy

The Oxford Dictionary defines joy as a feeling of great pleasure and happiness (Soanes and Stevenson 2005). On the other hand, the emic definition of joy can be expressed as an internal state that originates by having one's basic needs met (i.e., food, mating, safety, and freedom) and is conveyed through energetic movement, specific vocalizations, and playful behavior. In contrast to the experience of pain, not all animals are believed to feel joy. The experience of joy seemed to be attributed in two different ways. Some participants believed that most animals were able to feel joy as a result of finding food and mates and being free and safe, while others considered that some joy is manifested through behaviors like playing, running, and jumping around and screaming (Table 2.4). Monkeys were said to express their joy through vocalizations, jumping, scratching their belly, and playful behavior. Even howler monkeys were thought to express their joy through their characteristic "howl." Dogs express their joy through jumping, wallowing, and wagging their tails, which is generally associated with encountering the owner or other family member. Dogs and parrots were mentioned most frequently for their ability to feel joy, followed by the wild turkey and the monkey (Fig. 2.5). It is notable that of all animals these are closest to people, not only because of their continuous presence within human communities in the Yucatan Peninsula but also given their behavioral similarity (i.e., their capacity to learn) and close emotional bonds (i.e., as house pets).

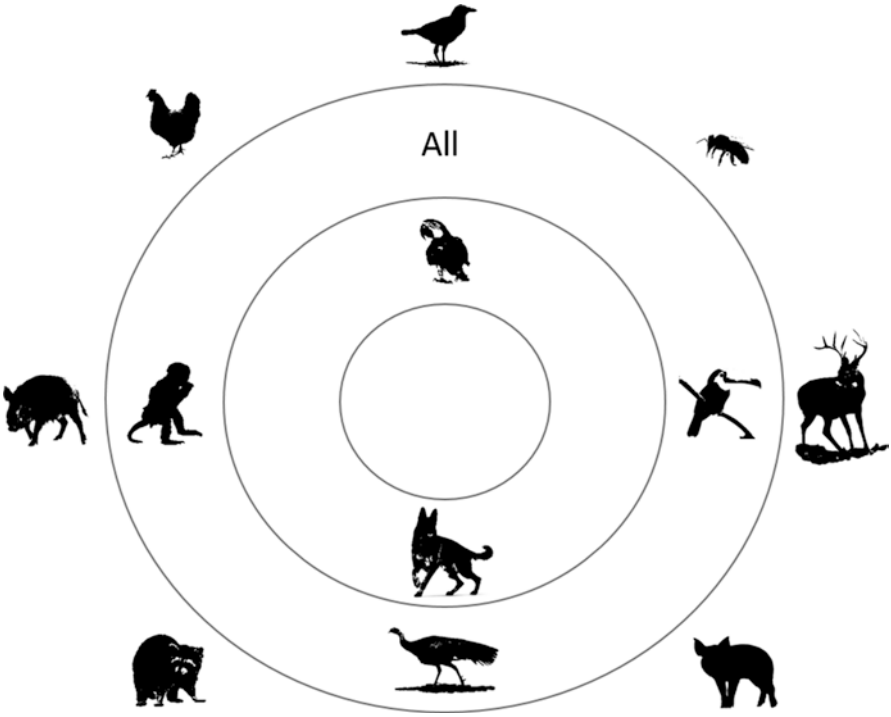


**Fig. 2.5** Animals most frequently mentioned as capable of feeling joy. Note: Inner circle (animals mentioned by more than ten participants), first concentric circle (>7<9), second concentric circle (>4<6), outside (>1<3)

## *2.3.2 The Folk Psychology of Complex Mental States*

### 2.3.2.1 Thinking, Intelligence, and Deceit

The concepts of thinking and intelligence were sometimes used as interchangeable terms. When participants were asked about the ability of animals to think, they frequently included the term intelligence in their responses. The ability to think was awarded to almost all animals except for insects. There were several different exceptions related to the term. Thinking was equated to a basic surviving skill that allowed animals to face everyday challenges of all living beings like acquiring food and avoiding becoming the food of others. It is frequently mentioned that prey animals must think how to avoid being killed and predators must think how to get their prey (Table 2.5.a). Thinking was also related to taking an appropriate or expected action when faced with certain circumstances, especially dangerous encounters with people. For example, participants reasoned that animals running away from humans were acting as a person would, that is, correctly assessing the dangerous situation and getting away from it (Table 2.5.b). Animals with the ability to learn and

**Table 2.5** Participant quotes: intelligence and thinking

| | |
|---|---|
| (a) | "Every living being has a degree of intelligence or thinking capacity...." Female, 35, housewife<br>"I think all living beings have a degree of thinking." Male, 37, farmer, *Totonac*<br>"I think that all living beings have to think how to spend their time." Female, 30, housewife and beekeeper, *Tzeltal* |
| (b) | "Many animals are smart, because they all have to defend themselves, some have, and others don't…. The wild Turkey has to take care of himself if not they are going to eat him, the same happens with the deer…they are all clever because they have to be able to get their food and take be aware of their enemies." male, 45, employee, *Maya*<br>"I think they (jaguars) do (think) because if they wouldn't, how would they hunt?" male, 37, farmer, *Totonac*<br>"I think they think like us trying to cover their needs." male, 23, museum worker |
| (c) | "Deer are intelligent, when they see people they run away, they know that people will try to kill them." female, 36, housewife<br>"I think all animals are intelligent because when they see you they run… (are they as intelligent as us?) ... Yes, because they do the same as us, we would also run if confronted with a dangerous animal." male, 31, farmer<br>"I don't think they do, because if they could, they wouldn't let themselves get killed so easy." male, 66, farmer, *Totonac*<br>"The deer is intelligent. We used to see them at the *milpa*, we could not grab them, they would see us and ran away… the jaguar too…once we saw one by the river and fled…that means they are intelligent." male, 34, farmer<br>"This animal (deer) is the first one to flee when it sees you, even if you are just sitting, if they see you they escape, and they are very agile, they are very clever." male, 31, farmer<br>"I guess that deer do (think), because if they wouldn't think because when you get to see them or try to approach them they run away. So, I think that they either have a presentiment or they think, one of the two things, because if they did neither they would just stay there." male, 37, farmer, *Totonac* |
| (d) | "Well, the parrot is clever because they learn to speak…." male, 35, farmer<br>"We had one here (a monkey) ...And we taught him, and (he learned) like a person, he did not talk but he understood…." male, 82, farmer, *Maya*<br>"One could say that some animals are more intelligent than others...For example, parrots can learn to say some words with training." male, 45, gardener<br>"I think dogs do think because there are very intelligent dogs who you can teach almost anything…." male, 37, farmer, *Totonac*<br>"I believe they (dogs) think because when they are talked to them understand, and that is why I think they think…when you call hem they come and when you tell them not to do something they don't." female, 22, *Tzeltal and Chol* |
| (e) | "Howler monkeys are more like us, they are bigger and have a beard, when I see them I believe that they may think as a human being." male, 82, farmer, *Maya*<br>"Monkeys are the most intelligent, they use tools." male, 28, *Totonac*<br>"Monkeys are one the most intelligent species of all animals…in fact they have the same behavior as us." male, 23, museum worker<br>"Monkeys are the most intelligent, if they see you and feel threatened they start throwing branches at you, and if you dare to (come close) they'll piss on you (laughs)." male, 34, farmer<br>"…in one occasion I saw a spider monkey couple…the husband left and the female stayed behind…when he saw that she wasn't following him he returned and put his arm around her, and I saw like he whispered something after which she went with him…I always tell that story, everybody finds it very amusing, they are very intelligent, he must have preached her or said something…." male, 45, employee, *Maya* |
| (f) | "The bee is very intelligent, but in its world, in its own way, not like us." male, 33, farmer<br>"I think all living beings have a degree of thinking." male, 35, farmer<br>"All animals are intelligent maybe not to the degree of humans." female, 35, housewife |

**Table 2.6** Content of the categories for the capacity of animals to think

| Expression | Agent characteristics |
|---|---|
| Learn | Prey animals |
| Respond appropriately | Predators |
| Trick others | Primates |
| Understand human communication | Pet animals |
| Infer the intentions of others | |
| Successful in acquiring food and avoiding danger | |

understand human intentional communication were also considered to have the capacity to think. In line with the former, mostly pet animals such as dogs and parrots were accredited with the ability to learn (Table 2.5.c). Perceived human–animal similarity, either physical or behavioral, appeared also to increase people's perception about the ability of animals to think (Table 2.5.d). Monkeys were considered to look and behave like humans, and dogs think because of their capacity to understand and respond to human communicative actions and parrots for their ability to learn to talk. In fact, spider monkeys and dogs were the animals with the most frequent mentions for their capacity of thinking. Nevertheless, the quality of thinking and intelligence attributed to animals was not necessarily analogous to the quality of human thinking. Many participants stated that animals do possess their "own kind of thinking," which was either expressed as a different kind or a "thinking to a certain degree" (Table 2.5.e). Also, even though most participants of both genders agreed that animals were capable of thinking, a higher proportion of men (six of 14) denied animals this ability when compared to women (1 of 9). However, even though these participants didn't believe that animals were capable to think, they nevertheless awarded some species like the jaguar, snake, and *ocellated* wild turkey the ability to deceive. It must be noted that this mental state was also considered a marker of thinking insofar as it was conceived as a surviving skill that allowed animals to get a prey or avoid being predated (see below).

The behavioral expressions of thinking and intelligence were not as straightforward, immediate, or evident as the expressions of emotions. Instead the attribution of thinking and intelligence appeared to be exclusively triggered by inferential processes. Participants reasoned that to survive, learn, and trick others, animals must be able to think or be intelligent. Therefore, instead of a list of overt expressions directly reflecting inner subjective phenomena as in the case of emotions, thinking generated a list of events or outcomes which allowed to infer the ability to think (Table 2.6).

To dwell a little deeper into the folk attribution of intelligence, we asked people if they considered the spider or howler monkey to be more intelligent. Most participants considered the spider monkey more intelligent than the howler monkey; only a few is said to be unable to express an opinion. Diverse reasons were given for this choice, and only two types of arguments were repeatedly expressed: (1) because spider monkeys move faster than howlers and are more agile and restless and (2) because they throw objects at people. In addition, some participants reported that they had spider monkeys as pets or have seen spider monkeys dressed as people.

**Table 2.7** Content of the categories for the capacity of animals to deceive

| Expression | Causality | Agent characteristics |
|---|---|---|
| They hide and come out after you are gone<br>Plays dead but is not<br>Make sounds that are heard as if they came from different directions<br>Distracts others<br>They camouflage<br>Hide to attack<br>Hide to protect themselves<br>Hide their food | To defend themselves from anyone trying to harm them or their litter<br>To get a prey<br>To avoid getting preyed | Predators<br>Preys |

#### 2.3.2.2 Deceit

The Oxford Dictionary (Soanes and Stevenson 2005) defines deceit as the action of deliberately causing someone to believe something that is not true, especially for personal gain. From a local perspective, deceit can be defined as intentional behavior aimed at misrepresenting or concealing truth motivated by the need to preserve oneself as well as one's biological relatives. Deceit was mostly attributed when animals manage to "gain the upper hand" either by hiding, by surprising others, by doing something unexpected, or by distracting others to get what they want or to get out of a dangerous situation (Table 2.7). Deception is an ability that some animals use to escape predation or to enhance their predatory capacities. For this reason, the jaguar, the fox, and the wild turkey were the most commonly mentioned animals to possess the ability to deceive (Fig. 2.6). The jaguar's ability to deceive manifests in his sneaky way to approach his prey. In the case of the wild turkey, the most commonly mentioned behavior reflecting the ability of this animal to deceive is through the production of a special kind of vocalization referred to as *pujidos* which is translated as moans and which the animal produces to generate confusion regarding its location. Participants refer that ocellated wild turkey produces vocalizations which are sometimes heard in one location and then in another even opposite direction, thereby misleading hunters.

## 2.4 Discussion

The results of the interviews indicate that, from a folk psychological point of view, mental states are not exclusive of human beings, but that most animals, from insects to primates, possess them to some degree. Mental states are seemingly considered part of the makeup of an organism, as they aid to navigate the world and to master the basics to survive. For our participants, emotions are also shared with a wide range of animal species, which is also a common finding in previous studies

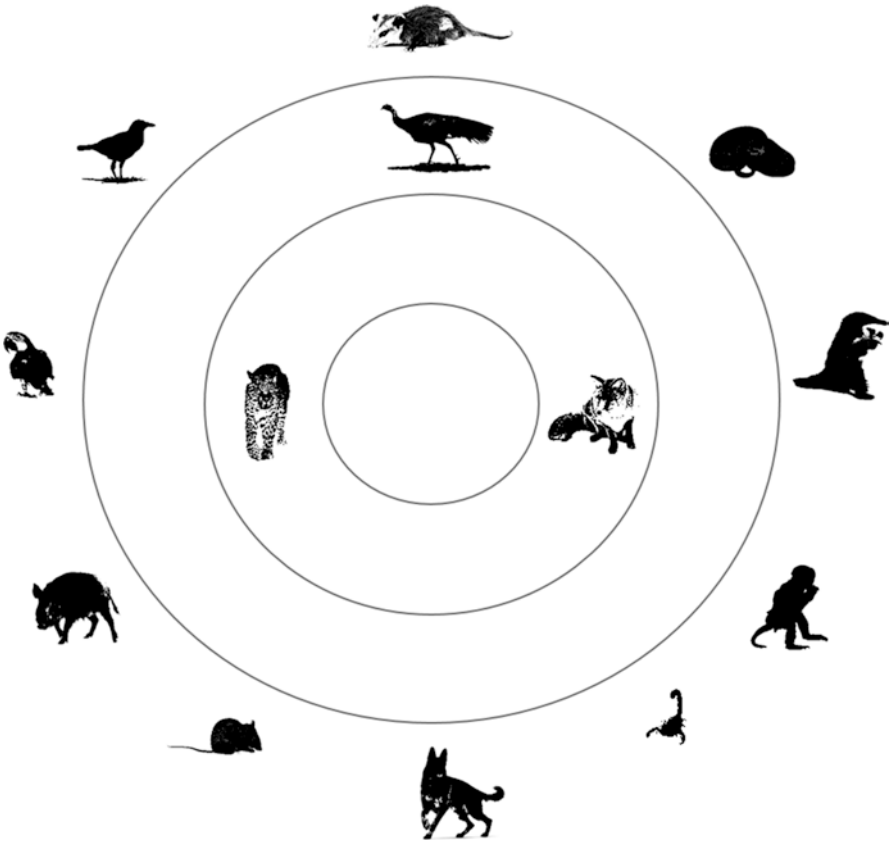

**Fig. 2.6** Animals most frequently mentioned as capable of deceiving. Note: Inner circle (animals mentioned by more than ten participants), first concentric circle (>7<9), second concentric circle (>4<6), outside (>1<3)

(Martens et al. 2016; Konok et al. 2015; Morris et al. 2012; Rasmussen et al. 1993). Despite this, some animals received more mentions for certain emotions than others. That is, we found that animals that were mentioned for their ability to feel fear, for example, are not mentioned in the same frequency for their ability to feel joy. This may indicate that those animals mentioned with a higher frequency for some emotion may either be considered more prone to experience the mental state in question or alternatively, in which this mental state has its clearest or most frequent behavioral expression. Fear, for example, was more pervasive among wild animals, especially frequently preyed species like the dear, peccary, and wild turkey, or among animals that face or used to face an important hunting pressure, like the jaguar. Although pain is attributed to all animals, those used as food (pigs, cows, wild turkey, chicken), pets (dog and parrot), and vermin animals (mice and fox) were specifically mentioned. These are probably the animals more frequently subjected

to harm by humans and are therefore those providing evidence through different behavioral expressions of their capacity to feel pain, which is probably mediated by the activation of reflexive mechanisms of empathy in humans (Westbury and Newman 2008). Joy is apparently more commonly attributed to pet animals and to birds whose singing is considered an expression of joy.

Mental states, specifically primary emotions, are associated with specific and largely behavioral expressions. Take, for example, the bodily and behavioral expressions of anger and fear described by Charles Darwin in *The Expression of the Emotions in Man and Animals* (1872): with respect to anger, "erection of the dermal appendages, hairs, feathers… (p.83) … scream (p.98) … rush at each other (p.99) ... inflate themselves (p.105) … roaring… growling (p.85) … prepared to spring (p.116)," and fear, "… efforts to hide or escape… (p. 9) … trembling… (p. 67) … sweating (p.73) … helpless prostration… attempts to escape (p.81) … bristling of the hair (p.96) … remaining motionless (p.144)" (Darwin 1872). Adolphs (2013) includes as behavioral expressions of fear in humans the following: attacking, running, freezing, screaming, hiding, and risk assessment (i.e., vigilance). Rats, when confronted to stress, avoid places where a potential threat was detected (Vazdarjanova and McGaugh 1998) but show defensive aggression in face of an imminent and inevitable threat (Reynolds and Berridge 2008). With regard to pain, there are clear guidelines for its recognition among laboratory animals: abnormal behavior (Morton and Griffiths 1985), change in body weight, external physical appearance, changes in behavior (Morton and Griffiths 1985), and altered posture and gait (i.e., limp) (Tabo et al. 1999), among others (see review in Carstens and Moberg 2000). In sum, folk and scientific accounts of the expression of emotions show remarkable similarities which are unsurprising, given that humans share with animals the basic neurological and physiological structures involved in coping with environmental, ecological, and social challenges (Julius et al. 2012). The hypothalamus–pituitary–adrenal axis (HPA), involved in the response to stress through the fight–flight–freeze response, is an ancient physiological system present in vertebrates (Denver 2009), and the subcortical circuits supporting basic emotional systems (seeking, rage, fear, lust, care, panic/grief, and play) are shared at least within the mammals (Panksepp 2005).

Another finding of the present study is the apparent reliance of mental state attribution on different cognitive processes: (1) observation of a behavior associated with a mental state (e.g., attack–anger, flee–fear) potentially involving implicit cognitive processes like motor matching mechanisms and evolved mental representations (Franklin et al. 2013; Barrett 2005; Barrett et al. 2005; Buccino et al. 2004; Blythe et al. 1999) and (2) inference of mental states via causal reasoning (e.g., finding food or mates provokes joy, getting hurt causes pain) (Carey 1995), category- and similarity-based induction (Miser and Sloutsky 2013), and conditional reasoning (Evans 2002). The different cognitive processes involved in the attribution of emotions and other complex mental states have been discussed previously (Urquiza-Haas and Kotrschal 2015; Barrett 2005; Person et al. 2000). Even though causal explanations were expressed for all emotions, participants made explicit allu-

sions to an ontological similarity between animals and humans in the case of joy and pain. Being alive and having a body made of "flesh and blood" seemed to be the most important ontological similarity or condition to experience pain, while having the same physiological needs or drives seemed to be the condition for the ability to experience joy. The attribution of so-called "higher" or "complex" mental states or abilities like thinking, intelligence, and the ability to deceive seems to rely almost exclusively on inferential processes. Mental abilities like thinking and intelligence seem to be derived from two different processes, similarity-based induction and conditional reasoning. In similarity-based induction, the presence of an unobserved property (i.e., intelligence) is inferred in a novel object or subject based on the similarity that these have with the familiar objects/subjects for which the property is known (i.e., humans) (Sloutsky et al. 2007; Sloutsky and Fisher 2004; Welder and Graham 2001). Monkeys were the species most commonly mentioned for their capacity to think. In contrast with those arguments employed by participants to account for thinking processes in other species, those used for monkeys were mostly based on their physical and behavioral similarity to humans, which might indicate that similarity-based induction mediates the attribution of the referred capacity to this animal. Take, for example, the following: "(Do monkeys think?) …Monkeys are one of the most intelligent of all animals…In fact, monkeys behave like us" (Male, 23, museum worker), or "Monkeys act like a human being, but they don't talk, they just act, they throw sticks and follow you" (Male, 66, farmer, Totonac); "I believe that monkeys are one of the ones that think a bit more…because they dwell on top of the threes and are the ones that can spot where they can move" (Male, 30, gardener). Only one participant referred to the use of tools by monkeys as evidence of their thinking capacity. In contrast, other animals were credited with the capacity to think by using a series of "intelligence" or "thinking" markers. Dogs and parrots are credited with the ability to think for their capacity to understand and learn: "Dogs do think, there are very intelligent dogs to which you can teach anything, people teach them to jump, I saw that on TV…" (Male, 37, farmer, Totonac); "An animal that is so smart as humans? I wouldn't know…the only one that I have seen like that is the parrot…he is the only one that talks, sings, whistles and asks for food…he has some degree of intelligence" (Male, 34, farmer). On the other hand, wild animals were accredited with the capacity to think given their ability to survive by being clever enough to get food and avoid getting preyed. The former examples point to the use of a conditional reasoning as a base for these attributions (if p then q; Evans 2002).

Spider monkeys were considered more intelligent than howlers. Among the most common arguments given by participants to justify this judgment were that spider monkeys were more energetic and lively and they throw objects at people: "Spider monkeys are more intelligent because they are more playful. When they are raised by people they even play with the children and make their pranks … (the monkey) grabs you with both arms and walks on his two small feet" (Male, 37, farmer, Totonac); "The spider monkey is more agile, he is quicker" (Male, 31, farmer);

"The spider monkey moves faster" (Male, 28, unemployed, Totonac); "Well, the spider monkey is more intelligent because of his behavior…when he sees you he starts throwing branches at you, Ramon fruits, Zapote fruits, he is more restless and nimble. *Zaraguatos* (howler monkeys) are more peaceful, they see you and do nothing, they have another way of life, so to say" (Male, 45, farmer, Maya). Spider monkeys, more than howlers, seemingly possess a larger number of humanlike traits: they are curious, agile, and not fearful of humans, they get angry and show it through humanlike behavior (i.e., by throwing objects), and they are playful and care for their own like humans would do. The Barí of Venezuela show a similar contrasting view about the howlers and spider monkeys, in which the first are perceived as slow and less intelligent (Lizarralde 2002, cited in Urbani and Cormier 2015). Morewedge et al. (2007) found a timescale bias in the attribution of mind, that is, individuals tend to assume that agents (animals, robots, and animations) had intentions, consciousness, thought, and intelligence when they moved at a similar pace as humans when compared to agents that moved at a quicker or slower pace. In addition to the speed of movement, the characteristic behavior of throwing branches or other objects of spider monkeys might also increase their perceived similarity through the potential recruitment of motor matching mechanisms (di Pellegrino et al. 1992). Buccino et al. (2004) showed that motor matching processes, involving of their own motor areas in the brain, when people observed motor actions performed by humans (talking, reading, and biting), monkeys (lip-smacking and biting), or dogs (barking and biting), depended not on the species but on the actions shown. Hence, the motor cortex in peoples' brains is involved only when the actions performed by another agent are familiar to them. Spider monkeys are frequently taken from the wild to be used as pets. Duarte-Quiroga and Estrada (2003) found in a survey among 179 primate pet keepers in Mexico City that 67% and 15% of the 12 primate species reported were spider and howler monkeys, respectively. Among the participants in our study, no one owned howler monkeys as pets, in contrast to spider monkeys. Urbani and Cormier (2015) did an extensive review of the available ethnographic records about the ecological and cultural relation of howler monkeys with indigenous societies in Central and South America and found but a few references about their keeping as pets. In contrast, spider monkeys are found to be commonly held pets among the Guaymi of Costa Rica, the Barí of Venezuela, and Matsigenka of Peru, among others (see review in Cormier and Urbani 2008). Both Duarte-Quiroga and Estrada (2003) and Urbani and Cormier (2015) attribute this bias to the difficulty of keeping howler monkeys as pets given their highly specific diet.

In sum, we found that the attribution of mental states to animals relies on a series of observable and unobservable (inferred) properties that manifest in the anatomy and behavior of animals. As mentioned before, these attributions are not necessarily merely "anthropomorphic," especially in the case of primary emotions. Even though the accuracy of mental state attribution remains uncertain, there is sufficient evidence that mental state attribution to a wide range of species may be

regarded a human universal. What remains to be explored is how mind attribution relates to the personification of animals and how humans negotiate the use of animals in the face of animal personhood. This is particularly intriguing in the case of primates. Urbani (2005) reviewed the available information related to predation of primates by human and nonhuman predators and found that humans are nowadays their main predator in the Neotropics. Large-bodied primates from the genera *Alouatta* (howler monkeys), *Ateles* (spider monkeys), and *Lagothrix* (woolly monkeys) tend to be the preferred prey (Urbani 2005). This certainly contradicts the hypothesis that animals perceived more humanlike are considered more minded and, therefore, would be worthy of moral concern. As part of our interviews, we asked participants if they consider monkeys (both howler and spider monkeys) as an acceptable food source. Just a couple of participants stated that they would be willing to try it. Most of them argued that they would not taste monkey meat. They gave three types of arguments to justify why people in their community do not eat primates: (1) cultural reasons as people in this community were not accustomed to or not taught to eat them; (2) aversion caused by their physical appearance, smell, or taste; and (3) aversion because they are humanlike. Some participants stated that monkeys are humanlike because of their close phylogenetical relationship or because they look and behave like people. The Parintintin of Brazil avoid eating them due to the same reason, while the Kalapalo and the Guajá ethnic groups also from Brazil eat them exactly because of this (Cormier 2003; Kracke 1978; Basso 1973, cited in Cormier 2006).

An alternative hypothesis is that people engage in a series of strategies to reduce the potential cognitive discomfort (i.e., cognitive dissonance) caused by holding two conflicting beliefs, values, or behaviors (Festinger 1957). Bastian et al. (2011) suggest that people deny mind to animals that are consumed as food; others argue that the mere categorization of animals as food minimizes the moral rights attributed to animals (Bratanova et al. 2011). In the present study, the capacity to think or being intelligent seemed unrelated to the categorization of animals as acceptable food sources. In fact, most of the species considered "clever" or "intelligent" by our participants were pets and predators, as well as prey animals commonly used as food. It is known that hunting societies from the Arctic, subarctic, and Amazonia attribute a certain personhood status to prey animals or animals that are considered dangerous, powerful, or similar to humans (Helander-Renvall 2010; Fausto 2007; Willerslev 2007; Viveiros de Castro 1998; Brightman 1993; Hallowell 1960); in some respect, these are considered ontologically similar to humans (Hill 2011). Fausto (2007:498) expresses this potential ontological conflict of killing "others" that are perceived as similar in simple terms: "If the predation of animals is equivalent to killing people, would hunting not immediately merge into warfare? And if both these phenomena are inscribed within a field of social relations between subjects imbued with intentionality, would not food consumption necessarily slip into cannibalism?" It has been proposed that in Artic and subarctic societies, the act of hunting is not violent or aggressive, but rather as a pre-established

social exchange of favors between the hunter and the prey in which both parties benefit in some way (Nadasdy 2007; Ingold 1994; Bird-David 1990; but see Knight 2012, for a critique). The Sami of Norway believe the reindeer give themselves to humans in exchange of shelter (Helander-Renvall 2010); hunters from the Rock Cree in northern Manitoba believe that animals give themselves to hunters (Brightman 1993), as do Kluane people of the Southwest Yukon (Nadasdy 2007). In exchange of the self-sacrifice of the prey, hunters must comply with a series of obligations they have toward them: proper treatment of the animal's remains, enabling the parting and journey of the spirit of the animals, and observing a series of taboos (Brightman 1993; Sabo and Sabo 1985; Nelson 1983). The *Guajá* from Brazil and the *Barí* from Venezuela, who consume spider and howler monkeys, respectively, believe that their divine creator instructed them to eat them (Cormier 2003; Lizarralde 2002, cited in Cormier 2006). Perceiving animals as minded but "others/aliens/outgroups" (Willerslev 2007) as enemies (Fausto 1999) and objects (Epstein 2004) or holding the belief that an almighty god created animals for the use of humans could also be counted among these strategies to reduce the inherent guilt associated with the inevitable antagonistic engagement resulting from the use of animals and the sometimes automatic or unreflecting self-identification of humans with them.

In conclusion, attribution of emotions and other mental states to animals seem to be a common phenomenon triggered by behaviors expressed by them in response to certain circumstances. Some mental states were ascribed in a straightforward fashion by our participants based on an observed behavior; attacking, for example, is an incontrovertible sign of anger and sometimes fear. Other mental abilities, like intelligence, are not "observed directly" and are rather inferred based on a given context and outcome. If the possession of mental states does indeed define the inclusion of living or nonliving entities in the social sphere of humans, then monkeys, along with a plethora of domestic and wild animals, can be indeed understood as "other-than-human persons," not only from a symbolic but also from a cognitive point of view.

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## Appendix 1: Sociodemographic Information of Participants

| Folio | Sex | Age | Occupation | State of origin | Actual place of residence[a] | Did one of your parents spoke an indigenous language? (indigenous language) | Do you speak an indigenous language? | Last study grade |
|---|---|---|---|---|---|---|---|---|
| 1 | Male | 18 | Farmer | Campeche | Conhuas | No | No | Secondary education |
| 2 | Female | 26 | Museum worker | Campeche | Conhuas | Yes (Chol and Tzeltal) | Yes | Secondary education |
| 3 | Male | 35 | Farmer | Chiapas | Concepcion | No | No | Secondary education |
| 4 | Male | 28 | Unemployed | Campeche | Conhuas | Yes (Totonac) | No | Secondary education |
| 5 | Female | 21 | Student | Campeche | Xpujil | No | No | None |
| 6 | Male | 30 | Gardener | Chiapas | Becam | No | No | Primary education |
| 7 | Female | 54 | Housewife | Tabasco | Conhuas | Yes | No | Primary education |
| 8 | Female | 36 | Housewife | Chiapas | Conhuas | No | No | Secondary education |
| 9 | Male | 33 | Farmer | Campeche | Conhuas | No | No | Secondary education |
| 10 | Male | 31 | Farmer | Veracruz | Conhuas | No | No | High school |
| 11 | Female | 58 | Housewife | Veracruz | Conhuas | No | No | Primary education |
| 12 | Male | 37 | Farmer | Veracruz | Conhuas | Yes (Totonac) | No | Secondary education |
| 13 | Male | 82 | Farmer | Campeche | Conhuas | Yes (Maya) | Yes | None |
| 14 | Female | 22 | Unemployed | Campeche | Conhuas | Yes (Tzeltal and Chol) | Yes | Secondary education |
| 15 | Male | 40 | Farmer | Chiapas | Conhuas | Yes (Zoque) | Yes | Primary education |
| 16 | Male | 34 | Farmer | Veracruz | Conhuas | No | No | Primary education |
| 17 | Male | 23 | Museum worker | Chiapas | Huehuejuez | No | No | None |
| 18 | Male | 66 | Farmer | Veracruz | Conhuas | Yes (Totonac) | No | Primary education |
| 19 | Female | 36 | Housewife | Campeche | Conhuas | Yes (Maya) | No | Secondary education |

(continued)

## Appendix 1 (continued)

| Folio | Sex | Age | Occupation | State of origin | Actual place of residence[a] | Did one of your parents spoke an indigenous language? (indigenous language) | Do you speak an indigenous language? | Last study grade |
|---|---|---|---|---|---|---|---|---|
| 20 | Female | 35 | Housewife | Veracruz | Conhuas | No | No | Primary education |
| 21 | Male | 45 | Gardener | Campeche | Santa Lucía | No | No | Secondary education |
| 22 | Female | 30 | Housewife, beekeeper | Campeche | Conhuas | Yes (Tzeltal) | Yes | Secondary education |
| 23 | Male | 45 | Employee | Campeche | Timun | Yes (Maya) | Yes | High school |

[a]All participants had their actual residence in the state of Campeche, Mexico

## Appendix 2: List of Animal Cards Shown to Participants

| Order | Common name | Taxonomic name |
|---|---|---|
| Primate | Howler monkey | *Alouatta pigra* |
| | Spider monkey | *Ateles geoffroyi yucatanensis* |
| Carnivora | Dog | *Canis lupus familiaris* |
| | Gray fox | *Urocyon cinereoargenteus* |
| | Jaguar | *Panthera onca* |
| | Raccoon | *Procyon lotor* |
| Artiodactyla | Cow | *Bos taurus* |
| | Deer | *Odocoileus virginianus* |
| | Pig | *Sus scrofa ssp. domesticus* |
| | White collared peccary | *Pecari tajacu* |
| Pilosa | Anteater | *Tamandua mexicana* |
| Galliformes | Chicken | *Gallus gallus domesticus* |
| | Ocellated Turkey | *Meleagris ocellata* |
| Piciformes | Toucan | *Ramphastos sulfuratus* |
| Psittaciformes | Yellow-lored amazon | *Amazona xantholora* |
| Passeriformes | Yucatan magpie | *Cyanocorax yucatanicus* |
| Rodentia | Yucatec mouse | *Peromyscus yucatanicus* |
| Squamata | Snake | *Bothrops asper* |
| Hymenoptera | Ant | *Atta cephalotes* |
| | Bee | *Apis mellifera* |
| Scorpiones | Scorpion | *Centruroides gracilis* |

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