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Dancing Bees, Singing Whales. The Impact of Idiosyncratic Information on Children's Attitudes Toward and Moral Reasoning About Animals

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by

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ABSTRACT

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Research in conservation psychology suggests that the tendency to engage in conservation behaviors develops from the interplay of both knowledge of and affinity toward nature (Schmitz & Rocha, 2018; Berenguer, 2007). The present study explores this connection between knowledge and attitudes by investigating the impact of information on individuals' attitudes and care toward animals. This study focuses on knowledge in the form of idiosyncratic information, due to considerations of potential cognitive strengths as well as the pervasiveness of "fun facts" in everyday life. Idiosyncratic information about natural items is not likely to be found in science textbooks at grade-school level, but a quick Google search will quickly produce a vast array of pages listing facts that will amaze you, surprise you, and "change the way you view the animal kingdom" (Crow, 2020).

In the present study, 70 children (ages 4-10) and 45 adults participated in a virtual interview. Their knowledge of and attitudes toward four target animals were assessed before they were provided with taxonomic or idiosyncratic information for each of the target animals. Participants' attitudes were then measured again to assess whether they had changed as a result of the information provided. Finally. participants were presented with an environmental moral dilemma which involved harm to the target animals. To assess whether the information received

impacted care for the target item, participants were asked whether they thought that the harmful actions were permissible or not, and why.

The present study tested two major predictions: First, that idiosyncratic facts would enhance participants' positive attitudes toward animals more than taxonomic facts. Results indicate that, overall, positive attitudes toward a target animal increase after receiving information about it, and that this effect is more pronounced upon learning idiosyncratic than taxonomic facts. Second, we expected idiosyncratic facts to impact participants' moral reasoning toward animals differently from taxonomic facts. Specifically, we predicted that participants would display higher levels of biocentric reasoning when exposed to idiosyncratic than to taxonomic information. Results do not support this hypothesis; however, they indicate that overall participants made a large use of biocentric justifications. Furthermore, participants who held positive attitudes upon being exposed to idiosyncratic information manifested higher rates of biocentric justifications, suggesting a relationship between attitudes and moral reasoning.

To Karla.

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CHAPTER ONE: INTRODUCTION

The present time is right to engage in research on conservationism that aims to inform practice: In the past decade, individuals have become generally more aware of environmental challenges (Revkin, 2019), thanks to the increasingly extensive media coverage facilitated by social media. Recently, environmental concern spiked during the 2020-2021 Covid-19 pandemic (Rousseau & Deschacht, 2020; *The Pandemic Is Heightening Environmental Awareness*, 2020). As people worked remotely, street traffic and activity significantly slowed down: This in turn led to naturally occurring phenomena such as bird songs becoming significantly more complex (Arnold, 2020; Fortin, 2020). However, as awareness of environmental issues has increased, so too have the threats to biodiversity, ranging from naturally occurring events such as the increasing severity of the Australian bush wildfires (Kramer, 2020), to the ones created or accelerated by humans, such as loss of wildlife habitat, deforestation, and climate change (*Causes of Climate Change*, 2016).

What type of individuals care for the environment? Intuitively, we all should: Engaging in conservation behaviors has at least three different benefits. First, it is essential to counteract human-provoked disturbances in the environment to allow plants and nature to follow the necessary order of their life events: biodiversity is in fact maintained by the perpetual recurrence of certain seasonal phenomena (e.g., migration of birds; hibernation of mammals; blooming of plants and flowers). However, uncontrolled human activities such as deforestation and pollution disrupt the timing of these natural occurrences: Due to the rising global temperatures, for instance, plants bloom earlier, and migratory birds return progressively earlier in the spring (Harvey, 2019). In other words, we need to do something if we want to keep living in a beautifully biodiverse world.

Second, engaging in conservation action on a large scale can positively impact individuals' access to natural resources. Humans are consuming natural resources at a much higher rate than these can be replaced, due to overpopulation and overconsumption. Depletion of natural resources has serious consequences not only in terms of loss of biodiversity and disruption of natural ecosystems, but also for humankind. For instance, practices such as deforestation and pollution, the two leading causes of water exhaustion, lead to approximately one billion people lacking access to clean water (*Causes, Effects and Solution of Depletion of Natural Resources*, n.d.). The issue of conservation is deeply related to the survival and health of humankind.

Third, from a more individualistic perspective, time spent in nature benefits the overall quality of individuals' lives. Physiological health benefits include reduced chances of developing cardiovascular diseases, obesity, and diabetes (White et al., 2019); and self-reported overall good health (Mitchell & Popham, 2007). From a mental wellbeing standpoint, spending time in nature is associated with a decrease in cortisol, the "stress hormone," and in negative rumination (White et al., 2019). Moreover, spending time outdoors has been shown to promote a subjective feeling of *vitality*, defined as a physical and mental state of vigor and enthusiasm, which in turn has been empirically associated with benefits such as more positive stress and coping response mechanisms (Ryan et al., 2010). Finally, from a perhaps more poetic but not less important standpoint, nature fosters that sense of joy and wonder and discovery that is present in literature and the arts (Chawla, 2002). It is important to act to preserve natural spaces that we can enjoy and benefit from.

These are just three reasons why protecting nature benefits us all: But do we all do our part? Unfortunately, no. Awareness of environmental threats is enough to prompt conservation

behaviors in some individuals: It is just the right thing to do. For others, however, being aware of natural disasters is not enough, and while they are emotionally moved by images of barren fields and sad-looking chimpanzees, their temporary pro-conservation intentions might not translate into behavior changes.

Since the 1980s, the field of conservation psychology has taken an interest in several aspects of the relationship between humans and nature, including the ways in which humans care about and behave toward nature; the development of knowledge and beliefs about nature; and the relationships between humans and institutions that are relevant to conservation (Clayton & Myers, 2009a). Conservation is in fact the behavioral component of a multidimensional concept – conservationism. While conservation refers specifically to the actions undertaken by individuals to foster a mutually healthy relationship with the natural environment (whether on a smaller or larger scale), conservationism goes beyond behaviors, and encompasses individuals' cognitive and emotional processes. As mentioned, research in the field of conservationism has examined conservation behaviors, as well as the psychological underpinnings of people's inclinations to protect the environment, and the variables that influence this tendency. However, to my knowledge, there is no individual definition of conservationism as a psychological construct. Since the present study aims to highlight the impact of cognitive factors on emotional processes and, to a small extent, on behaviors relative to environmental issues, I suggest the following definition: *Conservationism is the set of cognitive, affective, and behavioral dynamics that govern individuals' tendencies to care for and act on behalf of nature and wildlife with the intent of maintaining a mutually healthy relationship between nature and humankind.*

Research in the field of conservation psychology suggests that the tendency to engage in conservation behaviors develops as the result of the interplay of both knowledge of and affinity

toward nature (Berenguer, 2007; Clayton & Myers, 2009a; Schmitz & Rocha, 2018). Consider for example the endangerment of dolphins. We might know that habitat destruction and ocean pollution are causing more and more species of dolphins to become endangered, but if we do not like dolphins or care for oceans, we are not likely to engage in conservation behaviors to protect them, such as reducing our plastic consumption. Similarly, we might love dolphins and the ocean, but if we do not know how pollution and habit loss affect the overall well-being of these mammals, we are not going to take any action to use less plastic. The real issue, then, involves drawing a connection between *knowledge* and *attitudes*: If we love dolphins and we learn that they are under the threat of habitat loss, we should be more likely to engage in conservation behaviors that promote dolphins' wellbeing.

Humans acquire knowledge in a number of different ways and different domains. For example, we can learn that dolphins are mammals in school through the direct instruction provided in a biology class, or because we live near a marine mammal sanctuary and are therefore exposed to this type of information. Similarly, our attitudes may be shaped by the context that we live in or by personal factors: We may hold negative attitudes toward bees because we are allergic to them, or on the other hand we may love bees because we have been told about their important role as pollinators.

The present study explores the impact of different types of information on attitudes and care as they relate to conservation issues. Attitudes, on one hand, are foundational to conservationism, as they often influence behavior (Clayton & Myers, 2009): Attitudes represent evaluations of an object based on one's beliefs about the object itself, and they help us make sense of our values and beliefs in a coherent manner (Clayton & Myers, 2009). There are nine basic attitudes that humans can hold toward the natural world, according to Kellert (1984;

1985;1996): These attitudes, and the values that they are rooted in, are strongly influenced by experiences, culture, and learning (Lumsden & Wilson, 1983). With the end goal to foster a more conservationist generation of individuals, it is important to understand what factors can foster positive attitudes.

The other construct of interest in the present study is care for nature. It is important to note that a prolific line of research on affect and care toward nature comes from studies conducted within zoos and other conservation-oriented institutions, which operationalize the constructs of *care for nature* in terms of intention to protect it and foster conservation behaviors (e.g., Dierking et al., 2004; Hughes, 2013; Mann et al., 2018; Pearson et al., 2013; Wagner et al., 2009). These studies usually assess participants' knowledge, attitudes, and behaviors before and after a visit to a zoo or other institution through surveys and interviews. However, while individuals may be prompted and motivated to engage in conservation behaviors by visiting a particularly enticing zoo exhibit, or by participating in an engaging educational program, research suggests that positive intentions are not always reflective of long-term behavioral changes (Hughes, 2013; Stern et al., 2008). Rather than relying on conservation behaviors to operationalize care, the present study conceptualizes care for nature in terms of moral reasoning, drawing from the work of Kahn (2006). The tendency to care for and desire to protect nature, in fact, can be examined by looking at individuals' reasoning about environmental dilemmas (Kahn, 2002), whose developmental trajectory progresses from infancy, and eventually reaches stability through adolescence (Kahn, 2002).

The present study investigates whether different types of information impact attitudes and care differently. In particular, the main research questions explore whether learning novel and unique facts (i.e., idiosyncratic information) about animals will foster individuals' positive

attitudes toward animals more than learning taxonomic information; and whether learning idiosyncratic information will promote a more nature-centered form of moral reasoning compared to learning taxonomic information. Furthermore, the secondary goal of the present study is to explore developmental differences, in particular to test whether the effects of idiosyncratic information will be more pronounced on young children's positive attitudes toward and care for animals than on those of older children and adults.

Three elements contribute to the novelty of the present study: First, its focus on idiosyncratic information. Several studies have examined the impact of different types of facts on environmental attitudes and behaviors (Frick et al., 2004; Ramsey & Rickson, 1976), but none have focused specifically on idiosyncratic facts. Second, past research on topics such as environmental moral reasoning has recruited participants from the age of 7 and above. Children younger than 7 make up a significant part of the audience of programs and exhibits offered by zoo and other conservation-oriented institutions, yet little is known about the impact of environmental information on their attitudes and care for animals. Third, the focus of the present study is on the impact of "bite-sized" information, delivered in the form of a short paragraph read to participant. The majority of the studies investigating the impact of direct instruction on individuals' attitudes toward and moral reasoning about the environment has been conducted in the context of educational programs that took place over comparatively long periods of time – for instance through short, repeated sessions (Thompson & Mintzes, 2002), or longer, recurring one-day sessions (Schmitz & Rocha, 2018). Furthermore, this study is relevant because understanding whether a certain type of information promotes more positive attitudes toward and care for nature might benefit the development of environmental education programs and curricula.

The structure of the present study is as follows: Chapter 2 will review the existing literature on pro-environmental attitudes, and on the relationship between attitudes toward nature and knowledge acquired in the context of educational programs. The chapter will also include an overview of the literature on environmental moral reasoning, with a focus on its developmental trajectory. The research design and methodology of this study is the focus of Chapter 3, which will define the study's goals and predictions, and its methods. A sample of 45 adults and 70 children between the ages of 4 and 10 participated in a virtual interview: Their pre-existing knowledge of and attitudes toward four target animals were assessed. Participants were then provided with taxonomic or idiosyncratic information about different target animals, and their attitudes were assessed again. The type of information provided ("facts") was manipulated within subjects, so that each participant received idiosyncratic information about two target animals, and taxonomic information about two other target animals. Participants were then presented with an environmental moral dilemma depicting a human character committing a harmful act against the target animal for their own benefit. The impact of the information received on participants' care for the target item was examined by asking them whether they thought that the harmful actions were permissible or not, and why (Howe et al., 1996; Kahn & Lourenço, 2002). Chapter 4 will describe the analysis procedure and present the study's results. In sum it appears that idiosyncratic information has a stronger impact on attitudes than taxonomic information, although it does not seem to directly impact moral reasoning. We observed, however, a relationship between positive attitudes and moral reasoning upon delivery of idiosyncratic (but not taxonomic) information. Finally, Chapter 5 will discuss the study's findings, implications and future research directions. The survey and additional materials I will be referring to are included in the Appendix section.

CHAPTER TWO: LITERATURE REVIEW

Positive attitudes toward and knowledge of nature and conservation issues are independently necessary, but not sufficient, to promote the motivation to engage in conservation action, as the dolphin example provided in the previous chapter highlighted. With this consideration in mind, I will begin the present chapter by defining and discussing attitudes, and provide an overview of the research exploring the relationship between individuals' knowledge of and their attitudes toward nature. A rich line of research comes from the field of environmental education, which has especially investigated the role of knowledge that is acquired through direct instruction (e.g., through environmental education programs). Therefore, I will review the research on educational programs' impact on and relationship with conservationism. The present chapter will also discuss research on environmental moral reasoning: I will argue that pro-environmental behaviors and environmental reasoning are moral issues, as framed by moral domain theory. Additionally, I will discuss the developmental trajectory of environmental moral reasoning, as examined through a series of five studies conducted by Kahn and colleagues between 1995-2002. Finally, I will introduce the present study, and provide a rationale for its goals.

Attitudes toward Nature

While some individuals are drawn to nature to the point of devoting their time, resources and careers to protecting it, others do not really care for nature, or even consider it negatively. With the end goal to foster a more conservationist generation of individuals, it is important to understand the psychological underpinnings of such a wide-ranging spectrum of attitudes. Attitudes are particularly relevant in examining conservationism because they often determine behavior: They are evaluations of an object, based on beliefs about the object itself (Clayton & Myers, 2009), and are strongly influenced by experiences, culture, and learning (Lumsden & Wilson, 1983). Traditionally, attitudes

have been ascribed a cognitive, affective and behavioral component (Cuff et al., 2014), and this holds true for attitudes toward the natural world. From an affective standpoint, *pro-environmental attitudes* are defined as concern for the environment and emphasize the affective dimension of liking and caring for nature which can be manifested, for instance, in the form of monetary donations to or volunteer work for pro-environmental organizations (Gifford & Sussman, 2012). From a cognitive standpoint, as research on folkbiology suggests, humans are particularly skilled at understanding and acquiring biological knowledge, and at recognizing natural beings from a very early age (Coley et al., 2002). Finally, the behavioral component of pro-environmental attitudes can be defined in terms of stewardship and responsibility toward nature (Ardoin, 2009).

Overall, individuals can hold a number of different attitudes toward nature, which sometimes may even conflict with one another: We may fear deep waters, and at the same time love smaller streams of running water, such as a torrent in the woods near our cabin. Much of the research on attitudes toward nature draws from the work of Stephen Kellert, who explored the distribution of different attitudes toward and knowledge of animals in the American population in a series of studies conducted between 1979-1985 (Kellert, 2012). Kellert's work examined five different topics: Public attitudes toward issues related to conservation of wildlife and natural habitats (Kellert, 1979); knowledge of animals and species preference (Kellert & Berry, 1981); historical trends in perceptions of animals (Kellert & Westervelt, 1982); characteristics of nature-centered groups such as hunters or pet owners (Kellert, 1980); and children's knowledge of and attitudes toward animals (Kellert, 1985). Alongside exploring Americans' attitudes towards wildlife, Kellert's research examined the development of values that individuals hold toward nature, as it is often suggested that the two constructs are related (Poortinga et al., 2004). Values, in fact, are evaluations of abstract ideas that act as criteria for the development of attitudes and the choice of actions and behaviors (Rokeach, 1968, in

Stern & Dietz, 2010; Schultz et al., 2005). A highly regarded value will likely foster a positive attitude toward objects, events or policies that reflect that value, which in turn will influence one's intention to act to protect those objects, events or policies. For example, someone who highly values the spiritual relationship between humans and nature will likely have a positive attitude toward events such as candlelit meditation in a neighborhood park, and thus will be more likely to support a fundraising to clean the park.

Data from interviews with over 3.ooo participants from the 48 contiguous States and Alaska allowed Kellert to identify nine basic values that individuals hold in regard to the natural world (Kellert, 1984) and that shape an equal number of attitudes. These values, and the corresponding attitudes, are: naturalistic, symbolic, humanistic, moralistic, scientific, aesthetic, utilitarian, dominionistic, and negativistic. The characteristics of each value are described below; a short summary of these nine basic values is also provided in in Table 2.1.

The *naturalistic* value echoes the desire for proximity with and experiences in nature, for example through consumptive activities such as hunting and fishing. This attitude reflects an inclination for exploration, curiosity and adaptability.

The *symbolic* value emphasizes the role of nature in shaping human communication and thought, such as for instance through metaphors and in literature; adaptive benefits stemming from this value are the enhanced communication through symbols and images, and skills at resolution of developmental conflicts through storytelling.

The *humanistic* value encompasses feelings of affection and attachment for nature, as displayed for example by pet owners. Through such bonds with nature, individuals develop interpersonal relationship skills.

The *moralistic* value reflects a spiritual affinity and ethical concern for the right and wellbeing of animals and nature; it is associated with the inclination to protect nature and treat it with respect, for instance by joining wildlife protection organizations.

The *scientific* value emphasizes the systematic study and understanding of nature and provides benefits such as critical thinking, problem-solving skills, and intellectual competence.

The *aesthetic* value focuses on the physical appeal of nature and is manifested for instance through collection of natural items (e.g., seashells); adaptive benefits originating from this attitude include the capacity for perceiving and recognizing symmetry and organization.

The *utilitarian* value highlights the material and tangible value of nature as commodity, attraction, or entertainment; it is beneficial for the acquisition of material and physical security, self-confidence and self-esteem.

The *dominionistic* value involves a concern with exerting power and mastery over nature; like the utilitarian attitude, is associated with benefits such as safety and protection, and the confidence to explore and be resourceful.

Finally, the *negativistic* value reflects feelings of fear, dislike or indifference that involve the tendency to avoid nature altogether; functional benefits of this attitude are avoiding harm and risk.

Table 2.1

Values of Nature (Adapted from Kahn & Kellert, 2012).

Value	Description
Naturalistic	Expresses the desire for contact with nature; interest in the wildlife and the outdoors
Symbolic	Reflects an ethical and spiritual relationship to nature and nature's role in assisting and shaping human communication
Humanistic	Emphasizes affection for and emotional connection to nature, and especially individual animals (e.g., pets)
Moralistic	Reflects a spiritual and ethical affinity for nature and a strong opposition to exploitation of and cruelty toward animals
Scientific	Emphasizes the importance of knowledge, systematic study and understanding of nature
Aesthetic	Reflects the physical attraction and appeal of natural settings and creature
Utilitarian	Reflects an interest in nature as a source of material and physical reward, a commodity
Dominionistic	Reflects the desire to master and control animals and nature
Negativistic	Expresses fear, rejection and avoidance of nature

Seeking to understand the origins and developmental trajectories of children's environmental attitudes, Kellert (1985) conducted an examination on 267 children aged 7, 11, 13 and 16, and compared their knowledge of and attitudes toward animals to those of adults. His research suggested a developmental trajectory wherein values and attitudes display the following characteristics (Kellert, 2002):

1. They move from being highly personal and self-centered to increasingly more socially oriented;
2. Their geographical focus broadens from local and familiar settings to more global;
3. Emotion- and affect based values and attitudes tend to emerge earlier than ones that rely on logic and abstract thinking.

The age differences in values and attitudes were accompanied by cognitive, affective, and ethical developmental changes (Kellert, 2002), and three main stages emerged. Each of the three

stages, which will be described below, is characterized by specific values: This does not indicate the absence of other values, but rather that some are more predominant or developed than the others.

Stage I (3-6yo)

The predominant values and corresponding attitudes at this stage are Utilitarian; Dominionistic; and Negativistic. Children in the stage are preoccupied with their own material needs and safety: Thus, nature is seen as subordinate to egocentric and personal motives. From a socioemotional standpoint, children tend to be cautious of nature unless it is familiar (e.g., backyard or domestic pet): For instance, 76% of second graders in Kellert's (1985) study reported liking pets more than wildlife, and only 16% reported liking camping in the woods. From a cognitive perspective, indirect experiences with nature (e.g., through storybooks, alphabet cards, etc.) provide the opportunity for language acquisition, meaning making, and categorization, but factual knowledge is overall lacking or incorrect (e.g., only 23.8% of the 7-year-olds answered correctly to the question of whether *all* birds fly South in winter; Kellert, 1985).

The concrete thinking of children at this stage is also evident in children's tendency to anthropocentrism, or to reason about animals and plants on the basis of their similarity to humans (Carey, 1985). Carey (1985) argued that that children's early understanding of biological properties is based on their knowledge of humans, supporting the claim that anthropocentrism is the first step in reasoning about nature. Inagaki (1990) strengthens the argument for the overall tendency of children to think about nature in relation to something they are familiar with, by examining the effect of raising a pet (i.e., a goldfish) on children's biological knowledge. Her experimental study conducted with 36 5-year-olds supports the hypothesis that raising an animal will increase children's factual and conceptual knowledge of the animal raised, as well as the likelihood that children will use the animal raised as a model to make predictions about other animals (Inagaki, 1990). Another example of the

concrete nature of children's thinking about nature at this stage is provided by children's interactions with domestic animals, which are often named in ways that bear close relationships with the animal's specific attributes or actions (e.g., Nibbles, Mittens, Whiskers) (Myers, 2007).

However, the anthropocentric pattern identified by Carey (1985) is generic on several grounds: For instance, it may not be a universal developmental feature, but rather influenced by cultural factors (Coley, 1995). Second, Carey did not consistently test for differences between children understanding of psychological v. biological properties: Most of the properties examined in her studies are biological, as opposed to one psychological property, *thinking* (Coley, 1995). Furthermore, the anthropocentric pattern Carey found may reflect a lack of knowledge about the biological world, rather than being indicative of deep conceptual commitments - that is, Carey's population might be made of folkbiology novices (Coley et al., 2002). Finally, Carey's anthropocentric pattern may reflect cultural assumptions about the relationship between humans and nature: her Western, urban sample tended to see humans as separated from nature.

While Carey's findings have been replicated with other urban populations, studies conducted with rural and indigenous communities have shown a different pattern (Ruckert, 2016). Ross et al. (2003) looked at the Menominee tribe in Wisconsin to address the role of culture on anthropocentric reasoning in a study that centered around a property projection task. In the study, children were taught novel properties about humans, several non-human animals, and other natural items; the researcher then assessed whether they would project these new properties to other animals, plants, and nonliving object. The study's results did not show that human function as a referent group, but rather Menominee children tended to project properties based on similarities between living things and some causal and ecological relations (Ross et al., 2003; see also Medin et al., 2010) Similarly, Herrmann et al. (2012) show that anthropocentric perspective may be culturally acquired, and emerge

between the ages of 3 and 5 predominantly in children raised in urban environments, rather than as a universal first step in the development of folkbiology (Herrmann et al., 2010). Taken together, these studies support an extremely interesting proposition: If anthropocentrism is learned, it can be unlearned – that is, children can become less anthropocentric in their reasoning. This is a fundamental assumption for the present study, as one of the goals is to explore whether providing different types of information can foster less anthropocentric and more biocentric reasoning. In other words, one of the hypotheses of the present study is that individuals who learn idiosyncratic information about a given animal, when presented with an environmental moral dilemma regarding that animal will support their reasoning by appealing to nature-oriented (i.e., biocentric) rather than human-oriented (i.e., anthropocentric) reasons.

Stage II (6-12yo)

The predominant values and corresponding attitudes at this stage are Humanistic; Symbolic; Aesthetic; and Scientistic (in its factual knowledge components). Children tend to be more adventurous, although, they still display a preference for familiar nature. From a socioemotional standpoint, the natural environment often portrayed in narratives that children encounter at this stage becomes a symbol for something else: Children at this stage experience a strong fascination with fairy tales and myths that involve characters drawn from the natural world which often revolve around issues dealing with finding one's identity and sense of self (i.e., breaking free from tyrannical relatives; doing what is right as opposed to what is easy). Similarly, anthropomorphized animal characters help to render more tolerable the challenging developmental dilemmas of conflict, control, need and desire, and are often portrayed as skilled characters that help the protagonist solve the problem (Shepard, 1996, in Kellert, 2002).

Furthermore, easily accessible natural settings, such as neighborhood parks or woods, offer two important opportunities that may foster children's autonomy and confidence: First, these natural spaces may prove somewhat challenging to navigate and explore, as they are usually at the margins of a child's world. At the same time, they also offer an abundance of resources for the child to create secretive places such as forts and dens. Experiences in nature at this stage of childhood are specifically relevant because they offer opportunities for acquiring autonomy, self-sufficiency and confidence, which are necessary as children strive to acquire the competency which represents Erikson's fourth stage of identity development (in Jensen, 2015). However, it is important to mention that experiences in nature are relevant at any point throughout the lifespan and play a role in the overall development of individual's environmental identity: Chawla's work with adult environmentalists (1999) reports that most participants described childhood as the foundation of their relationship with the environment and highlights the relevance of positive experiences with nature and family members who acted as role models for respecting nature. Similar findings were reported by Kals et al. (1999), who looked at *emotional affinity toward nature*, a construct which encompasses different positive inclinations toward nature, both cognitive and affective. Childhood experiences in nature with significant others accounted for 39% of the variance in emotional affinity toward nature in adult participants, and emotional affinity in turn predicts behavior (Kals et al., 1999).

Cognitively, there is an increasing awareness and understanding that nature and wildlife are "other" from humans, independent beings with feelings, needs and rights, although they are still subordinated to humans: For instance, 58% of the 11-year-olds and 46.3% of the 13-year-olds agreed that "It's ok to hunt whales for food as long as there are a lot of them left in the world" (Kellert, 1985, p.82). Moreover, Kellert's (1985) findings also suggest that children at this stage display a broader set

of interests and capacity to assimilate knowledge: While 16- year-olds have more factual knowledge than any other group of children, the highest increase in knowledge gains was found in children between ages 11 and 13. Experiences in natural settings can foster cognitive and intellectual processes, such as creative thinking and problem solving.

Stage III (12-17yo)

The predominant values and corresponding attitudes at this stage are Moralistic, Naturalistic, and Scientific. In terms of socioemotional development, engaging in progressively challenging activities in nature provide youth with opportunities to test their skills to cope with the challenges of the natural world, and thus to strengthen their confidence, self-esteem and overall sense of identity: Almost 60% of the older children said that they would prefer to camp near wild animals rather than near people (Kellert, 1985), and 35% indicated a preference for wildlife over domestic animals or pets (Kellert, 1985). From a cognitive perspective, adolescents at this stage develop an increasingly complex understanding of the relationships within nature and of the human ethics and responsibility toward nature: Only 8% of Kellert's sample of 16- year-olds approved of recreational hunting and fishing (Kellert, 1985).Overall, Kellert noted that children's emotional concern for animals spikes between the ages of 7 and 12, as children move from fearing nature and being primarily focused on personal safety to developing an affection for nature. Interestingly, as I will discuss more in depth in the next section, this is also the age at which children begin reasoning about the environment in a way that integrates its beauty and balance (Kahn & Lourenço, 2002). Moreover, the study's findings suggest that, between the ages of 10-13, children make significant strides in these domains. While Kellert's results pointed to an overall lack of factual knowledge about animals (e.g., only 55% of the sample understood that a whale is not a large fish; 21% understood that lambs do not produce veal), they also suggested that children were more knowledgeable than adults in regard to invertebrates and

basic animal biology (e.g., 78% of the children know that spiders do not have 10 legs, as opposed to 50% of the adult sample). Finally, Kellert noted the development of an ethical and ecological appreciation of nature between the ages 13-16, as children begin to fully grasp abstract concepts such as ecosystem (Kellert, 1985).

In sum, pro-environmental attitudes are affectively charged evaluation of natural items that can influence individuals' behaviors in regard to those items. Individuals can hold nine basic attitudes toward nature, which are rooted in and shaped by individuals' values, or evaluation of abstract ideas in terms of their importance as guiding principles in one's life. From a developmental standpoint, research suggests that values generally shift from highly egocentric and personal to more social; geographically, the focus tends to move from local settings to more regional to global; and emotional and affective values tend to emerge earlier than abstract and logically deduced perspectives (Kellert, 2002). This trajectory reflects the one charted by Piaget (2007), which argues that individuals construct knowledge and values from childhood through their own experiences and interactions with the environment. As children's worlds expand, providing increasingly complex and diverse experiences, their mental structures develop and progressively encompass the previous ones, to integrate them into a larger conceptual and evaluative organization (Kahn, 2002). According to Piaget's constructivist account, children move through four stages of cognitive development from birth to adolescence; each stage is increasingly more complex and abstract than the previous one (Piaget, 2007). Similar to Piaget's theory, Kellert (2002) postulates that children move through three stages of environmental evaluative development from approximately 3 to 17 years of age, and that in each stage children also develop certain affective and/or cognitive processes.

The literature reviewed above suggests a relationship between children's experiences in and knowledge of nature, and their attitudes. In terms of knowledge of nature and processing information about it, we are innately at an advantage (Coley et al., 2002): Humans, in fact, have an intuitive understanding of some aspects of nature, composed of informal, spontaneous ways that humans adopt to explain the world around them. This innate understanding is referred to as folkbiology, a construct that encompasses the set of cognitive processes that individuals utilize to understand, categorize, reason about and explain the natural world (Coley et al., 2002). At the broadest level, humans are very skilled at recognizing natural beings: One explanation for this ability has been provided by the *biophilia hypothesis* (Kellert & Wilson, 1993), which argues that humans have an innate tendency to affiliate with nature. Research looking at the developmental origins of biophilia suggests that children are particularly attuned to natural beings: from as early as 6 years of age, children spontaneously categorize natural v. human made stimuli (Wohlwill, 1983). Lovelock (1991) suggests that this ability, which we share with primates and other nonhuman animals, is immediate and automatic, and has developed in our evolutionary history as a survival mechanism. Research on folkbiology also suggests that humans are innately knowledgeable about several other aspects of the natural world: Preschoolers systematically categorize animals as living beings, and artifacts as non-living (Coley et al., 2002). Furthermore, young children have a solid grasp of the concepts of the laws of inheritance that govern, for example, the resemblance between parents and offspring (Gelman & Wellman, 1991). Finally, by the age of three children have an established model of biological growth: Inagaki and Hatano (1996) found that 4- and 5-year-olds believe that animals and plants (not artifacts) spontaneously change over time. Similarly, Rosengren et al. (1991) find that 3- and 4-year-olds understand that animals grow over time.

In sum, folk biological knowledge is essential in fostering a number of children's cognitive tasks, such as understanding what is alive and what is not (Coley et al., 2002; Richards & Siegler, 1984); and biological processes such as inheritance (Gelman & Wellman, 1991; Hatano & Inagaki, 1994; Kalish, 1997), illness (Coley et al., 2002), and growth (Inagaki & Hatano, 1996; Rosengren et al., 1991). However, the broad folkbiological intuitions that humans have about the natural world are not our only source of knowledge: As we grow, we encounter different experiences which provide us with different types of opportunities to learn about nature - from informal ones such as watching the ducks at a neighborhood park, to more formal ones such as learning about ecosystems at school, or participating in environmental education programs. In the following section, I will discuss research examining the relationship between attitudes and knowledge that it is acquired as a result of exposure to information. In particular, I will focus on direct instruction as a means to convey information, as most of the research on the topic has been conducted in the context of environmental education programs.

Environmental Education

Everyday individual experiences in nature offer important opportunities to acquire knowledge about the natural environment: To examine the relationship between knowledge of and attitudes toward nature, one line of inquiry has focused on knowledge gained as a result of exposure to nature. Silva and Minor (2017) reported that participants who engaged in outdoor bee-related activities, such as gardening, displayed more knowledge of bees as well as more positive attitudes toward them. Additionally, the authors showed a significant correlation between knowledge of bees (i.e., visual identification of bees, and factual understanding of bee biology and functioning) and positive attitudes toward them in a sample of 794 8th grade science students (Silva & Minor, 2017).

However, much of the research on the relationship between knowledge of and attitudes toward nature has traditionally been conducted in the context of environmental education programs. Every year, in fact, conservation-oriented institutions such as zoos and aquaria provide extremely popular and accessible informal opportunities to learn about the topic to over 700 million individuals (*WAZA | World Association of Zoos and Aquariums*, n.d.). Such learning opportunities take different forms - from mere exposure to conservation messages (e.g., through exhibit signage), to specific conservation-focused exhibits and educational programs. Studies conducted with adults within zoos or other conservation institutions have identified a positive link between knowledge and attitudes resulting from mere exposure to conservation messages, and often include measures to assess participants' intentions to engage in conservation behaviors. This is not surprising, as promoting conservation is a goal shared by many conservation-oriented organizations accredited by the World Association of Zoos & Aquaria ("About WAZA - WAZA," n.d.). Skibins and Powell (2013), for example, developed a Conservation Caring scale (CC) to measure the zoo visitors' connection to an animal, based on the lack of empirical evidence that an emotional connection with animals may foster pro-conservation behaviors. Furthermore, the authors examined the relationship between Conservation Caring and visitors' willingness to engage in conservation behavior after a zoo visit. Aside from validating the CC scale, the study showed that connection to wildlife is a strong predictor of CC, although not of pro-conservation behavioral intent: This suggests that while zoo audiences might be predisposed to conservation messages, this predisposition does not necessarily lead to action (Skibins & Powell, 2013). Moreover, studies examining the role of knowledge acquired through exposure to conservation messages support the relation between knowledge and behavioral intentions, if not behaviors per se: Hughes (2013), for instance, suggests that reflecting upon new knowledge

about animals and their habitats is associated with pro-conservation behavioral intention. She conducted three surveys framing participants' visit to an Australian conservation park renowned for the scientific study of turtles. The "pre-visit" questionnaire was administered prior to entry to measure baseline conservation knowledge, attitudes and behavior; the second one was administered immediately after the visit; and the last one three months later to explore the visit's long-term impact. The "post-visit" questionnaire, which participants completed after their visit, included a self-reported measure that asked participants to rate their intention to engage in 13 conservation behaviors (e.g., composting, volunteering with a pro-environmental organization; recycling) on a five-point scale. In the follow-up questionnaire, administered three months after the visit, participants were asked to indicate the extent to which they engaged in those conservation behaviors. Overall, however, Hughes results indicated that emotional reactions to and new knowledge about animals strongly promoted positive behavioral intentions, although those intentions did not always translate into long-terms behaviors (Hughes, 2019).

Wagner et al. (2009) also examined individuals' intention to protect and care for nature as a result to mere exposure to conservation information. Specifically, the authors assessed the impacts of programs, exhibits and outreach efforts at the Philadelphia Zoo on visitors' conservation behaviors. Participants completed a questionnaire which included items designed to measure the outcomes of a single visit to the Philadelphia Zoo (e.g., "Before your visit to the zoo today, how much did you know about the threats of extinction for some plants and animals?"; p.476). The questionnaire also included items asking about the visitors' experience at the Philadelphia Zoo the day of the questionnaire (e.g., [How often today did you] "read information on conservation issues posted throughout the Zoo?"; p.477). Results suggest that one visit to the zoo increased participants' perceived knowledge about conservation as well as their attitudes and

beliefs regarding the importance of conservation (e.g., supporting protective efforts toward wild animals even though it could hinder people's ability to make a living). The visit also increased participants' motivation to take conservation action (e.g., volunteering to help clean up a natural habitat, recycling, donating money, and talking to family and friends about undertaking conservation behaviors) (Wagner et al., 2009).

Finally, a study conducted with Australian zoo visitors investigated, among other constructs, the relationship between the knowledge that visitors had gained from visiting the zoos' orangutan exhibits and their intentions for future conservation behaviors (Pearson et al., 2013). Results indicate that individuals with higher knowledge of orangutans had significantly more positive attitudes toward them, as assessed through self-reported agreement ratings with statements such as "the extinction of orangutans would be an ecological and moral disaster" (p. 830). These positive attitudes, in turn, were associated with higher likelihood of reporting intentions of future conservation behavior.

Research on adults has focused on the relationship between knowledge, attitudes and behaviors as a result of being merely exposed to new information. On the other hand, a second line of inquiry investigates the relationship between imparted knowledge and attitudes. Environmental education programs offer a great opportunity to conduct research on the topic, as they provide direct instruction about nature and conservation behaviors. It is not surprising then that studies in this area have been conducted with children and teenagers, who are the target audience of many of those programs. Schmitz and Rocha (2018) examined the impact of a year-long environmental education intervention on knowledge and attitudes of 82 children between the ages of 12-14 in Brazil. The authors focused on broad pro-environmental practices, such as recycling and reducing waste, and the promotion of these and other sustainable practices.

Students who participated in the program showed increased environmental knowledge and more positive attitudes (e.g., positive feelings were elicited by witnessing others engaging in recycling practices) compared to students who did not participate (Schmitz & Rocha, 2018).

Stern et al. (2008) examined the impact of 3- and 5-day residential environmental education programs for children between 9-12 years of age on several outcomes, including *Environmental Stewardship*, which is a measure indicating participants' attitudes about conservation issues and assessed through self-reported agreement ratings to statements such as "I feel it's important to take good care of the environment" (p.37). Results showed a significant positive change in each of the outcomes immediately after the program, and a follow-up survey conducted three months later revealed that the significant positive change in levels of Environmental Stewardship persisted (Stern et al., 2008).

Bexell et al. (2013) also examined the impact of a 5-day education program for children between the ages of 8 and 12 on outcomes including children's care about animals and propensity for environmental and wildlife stewardship. Using a mixed-methods approach, the authors found significant increases in participants' knowledge of and care for nature, as well as in propensity for environmental stewardship (Bexell et al., 2013).

To examine the impact of environmental education programs on students' environmental attitudes, knowledge and behaviors, Braun et al. (2018) conducted a cross-cultural study with 645 students between the ages of 7-18 from Bangladesh, Malaysia, Singapore and Germany who participated in an outdoor one-day educational program about conservation in the forest. Findings highlighted that difference in rural or urban background is an important factor linking the three constructs of interest: Participants from rural backgrounds exhibited the most positive environmental attitudes, higher knowledge levels and demonstrated more environmentally

friendly behaviors. The authors suggest that this may be due to exposure to nature, which may foster positive attitudes and increase individuals' awareness of conservation issues (Braun et al., 2018). Finally, Thompson and Mintzes (2002) examined the relation between domain-specific knowledge of and attitudes toward sharks. The authors draw an explicit link to Kellert's work, as they refer to his categorization of attitudes. The authors recruited children of ages 10, 13, and 16 approximately, as well as undergraduate college students from a cognitive psychology course and a marine biology course, and retired citizens. While the college students enrolled in the marine biology course has received three 50-minutes lectures in shark biology, the other groups did not receive shark-specific information. All participants were given directions on how to build a concept map and were asked to create one for shark, starting with the category of "food." The concepts maps were reviewed and critiqued, and participants had time to incorporate other categories (e.g., habitat, size…). Subsequently, participants completed an attitudinal inventory that included items related to four of Kellert's attitudes: utilitarian/negative, naturalistic, scientific, and moralistic. The study's results showed that even the youngest participants had well-defined ideas about sharks, and that these ideas become increasingly more complex with age. More importantly, the study suggests a positive relationship between knowledge and scientific and naturalistic attitudes: Students in the marine biology course, in fact, who had received direct instruction about sharks and produced more complex conceptual maps, had higher scored in these attitudes than all other participants. Additionally, marine biology students also displayed lower utilitarian/negative attitudes (Thompson & Mintzes, 2002).

In sum, research suggests that being exposed to information about the environment and conservation-related issues is associated with an increase in positive affect for, and emotional concern with, nature. Furthermore, knowledge of conservation issues and positive feelings

toward nature each correlate, to some extent, with conservation behaviors (or at least the intention to engage in them). The question remains, however, of just how much exposure is enough to support the development or upholding of positive attitudes toward nature. The research reviewed in this section, in fact, employs very different scales: Some studies (i.e., Hughes, 2013; Mann et al., 2018; Pearson et al., 2013; Wagner et al., 2009) focus on knowledge gained as a result to mere exposure to information during a varying amount of time (e.g., a visit to the zoo can last two hours, four hours, one day. Furthermore, within that timeframe, attention and information processing resources can be deployed in different ways). Other studies examine the outcomes of educational programs that involve either shorter, repeated encounters (Thompson & Mintzes, 2002), or longer sessions, ranging from one day (Braun et al., 2018) to several days (Bexell et al., 2013; Stern et al., 2008), to one year (Schmitz & Rocha, 2018).

Drawing on these considerations, the present study investigates the impact of a minimal piece of information necessary to impact individuals' attitudes. We will present participants with short passages depicting different types of facts about four different animals, and we will measure the extent to which their attitudes have changed upon hearing the different information. Additionally, the present study investigates the impact of attitudes on individuals' moral reasoning about animals. Environmental action requires individuals to become morally aroused and activated for a cause that might not directly affect them (as the ones with the higher stakes are future generations). The next section will therefore review research on environmental moral reasoning, which tends to manifest in two overarching forms, anthropocentric and biocentric (Kahn, 2006): Of these two, the former emerges earlier and it emphasizes the impact of the environment (and changes to it) on humans. The latter, on the other hand, highlights the moral standing of nature in its own rights, regardless of its impact on humans (Kahn, 2002). The

development of environmental moral reasoning will also be discussed, and it will become apparent that attitudes and moral reasoning share a similar outward developmental trajectory: In both cases, early, self-centered constructs and processes are progressively integrated in a broader, more global perspective.

Moral Reasoning about Environmental Dilemmas

Caring about nature to the point of engaging in conservation behaviors requires moving beyond self-defined interests for the benefit of the natural environment, which is a characteristic of prosocial moral actions (Jensen, 2020a): Such behaviors include sharing, helping, donating money or volunteering one's time (Carlo, 2012). In the case of conservationism, nature elicits both prescriptive and proscriptive norms: While the former refer to actions that are forbidden, the latter refers to an action that is perceived as a duty or obligation. Actions such as refraining from littering, recycling, volunteering with environmental organizations, are considered moral because they are usually justified or explained in terms of justice or human/natural welfare (Clayton & Myers, 2009b).

One of the most influential theories concerned with the developmental trajectory of moral reasoning is Kohlberg's (1969) justice model. Drawing from Piaget's constructivist two-stage approach (Lapsley, 2006), Kohlberg developed a theoretical framework that poses at the core of morality the universal issues of justice and individual rights (Jensen, 2020b). Kohlberg's model consists of three levels, each further divisible into two stages, the second more articulated than the previous one. According to Kohlberg, children at the *preconventional level* begin by displaying an egocentric and heteronomous moral perspective, and progress toward the pursuit of self-interest; children and adolescents at the *conventional level* conceptualize morality as an integration of concern towards others and rules to follow; finally, at the *postconventional level*,

individuals reason about morality based on personal standards or universal principles of justice, equality and respect for human life (Lapsley, 2006). The Kohlbergian approach involves presenting participants with scenarios depicting moral dilemmas intrinsically embedded with conflicts and multiple considerations (e.g., the same scenario can be considered from the perspective of the different characters involved). Participants' responses are then coded and analyzed (Nucci et al., 2017).

Kohlberg's theory has played a fundamental role in establishing the field of moral psychology, but it has been criticized for neglecting the influence of context on moral reasoning (Turiel, 2006), among other shortcomings. One of the most relevant theoretical approaches to morality, which attempts to give context the credit it deserves, is the social-cognitive domain approach to morality developed by Turiel (2006). Social-cognitive domain theory conceptualizes morality as a set of norms based on concepts of welfare, fairness and rights that guide social interactions (Smetana, 2006), and it proposes that morality is a distinct domain from other forms of social knowledge (i.e., social conventions, and personal issues). These different domains of social knowledge follow independent developmental trajectories, and are constructed through reciprocal environment-individual relationships (Smetana, 2006). While Turiel's domain theory and the Kohlbergian model share the premise that justice is at the core of morality, research suggests that moral competences emerge earlier than observed by Kohlbergian approaches (Jensen, 2020b). Social domain theory posits that moral obligations can be assessed, at least in part, along three criteria: Prescriptivity, rule contingency, and generalizability. In other words, an action is considered moral if it can be viewed in terms of right or wrong; if it is not conditional to local habits, norms, and laws; and if it can be generalized across cultures and populations with different habits, norms, and laws (Kahn, 1997a, 2006)

Social-cognitive domain theory does not address, per se, the development of environmental moral reasoning, but it is the theoretical framework of a notable series of studies led by Kahn and colleagues between 1995 and 2002, which constitute the foundations of the research conducted on the topic (Matsuba et al., 2020). Overall, the different studies examined the environmental conceptions and values of children and young adults from different communities and even countries, with the broader goal of tracing the developmental trajectory of environmental moral reasoning. An early study on this topic (Kahn & Friedman, 1995), known as the *Houston Child Study*, examined environmental views and values of children in three different age groups (mean ages 7.5, 9.6 and 11.4, respectively) in Houston, Texas. The authors asked questions that aimed to assess participants' views and values about animals and natural environment, such as "Are animals an important part of your life?" (Khan & Friedman, 1995, p.1406); and their knowledge of environmental problems such as pollution. Children were presented with the *Case of the Polluted Bayou:* A hypothetical scenario that involved polluting a waterway close to the children's school. The researchers asked children whether it was all right at all to throw trash in the bayou, and whether it was all right across different conditions (i.e., if most people in the community did it; if everyone else in the community did it on a regular basis; if the waterway was in a different area where it is not considered permissible, or in one where it is considered an accepted social practice; and whether it was all right for people from other neighborhoods to throw garbage in the bayou near the participants' school). For each of these conditions, participants were asked to justify their answers. Results indicated overall that children appreciate nature and animals, and that they are concerned about the natural environment and conservation issues associated with it: For instance, 20% of the children reported thinking about different types of environmental pollution, and 20% reported thinking

about garbage. Results from the questions based on the *Case of the Polluted Bayou* also revealed that 87% of the children considered polluting the bayou was not all right in any of the six conditions. The majority of the justifications involved *anthropocentric* considerations that emphasized the impact that environmental harm causes on humans (e.g., polluting the waterway is wrong because the people living nearby do not want to drink polluted water). Within this overall pattern, younger children were more likely to appeal to anthropocentric justifications, whereas older children justified their answers with *biocentric* considerations about the inherent value of animals (e.g., it is wrong to pollute the bayou because fish live there, and they have the right to live in a non-polluted environment).

In a subsequent study, Kahn and Friedman (1998) interviewed 24 parents from the same Houston inner-city community. Unlike the children, adults were not presented with a fictitious scenario, but were asked questions aiming to assess the importance they placed on animals and natural environments, as well as their awareness and knowledge of environmental issues, both broad ones and ones that affected them directly. Questions also investigated whether participants discussed environmental issues with their families, and if so, how. Furthermore, participants were asked to rate on a scale of 1-10 the importance of drug education and environmental education. Finally, they were asked to explain their ratings, and asked for suggestions about the implementation of an environmental education curriculum in their children's school. Most of the parents (86%) reported that animals and nature play an important part in their lives and those of their children, and all of them were aware of environmental issues such as pollution and their negative impact on humans. In discussing environmental concerns and environmental education, parents drew more on anthropocentric considerations than biocentric ones, meaning that they

focused more on personal interest and the welfare of humans than on the moral standing on nature itself.

The environmental values and understanding of children was also the focus of the *Prince William Sound Study* (Kahn, 1997). Kahn examined the moral reasoning of 60 children aged 7, 10 and 13 about the Exxon Valdez oil spill that took place in 1990 in Prince William Sound, Alaska. The author's questions were designed to investigate four main topics: First, children's understanding of the harmful effects that the oil spill could have had on the shoreline and marine life, as well as on the people involved. The second area of interest was children's reasoning on moral obligations: Like the children in the Houston study, children in this study were asked whether that thought it was all right that "beaches and shoreline got covered in oil in the Alaskan oil spill" (Kahn, 1997, p. 1092). Third, children were asked for their justifications to the previous questions; and fourth, the author assessed what it meant, for children, to live in harmony with nature. Results of this study were consistent with the Houston Child Study: 96 and 98% of the children agreed that it is not all right that the oil spill caused harm to the marine life and the shoreline, respectively. Children's justifications as to why that is not all right appealed to moral considerations of justice and welfare, as well as the intrinsic value of nature.

With the goal to draw cross-cultural comparisons in children's environmental moral reasoning and values, Howe et al. (1996) interviewed over 40 ten-year-old Brazilian children in urban and rural areas of the Amazon. The structure of what is known as the *Amazonia Study* (Howe et al., 1996) replicated that of the Houston Child Study, including the presentation of the hypothetical Case of the Polluted Waterway, which in this case was the nearby Rio Negro. Children in this study manifested awareness of environmental problems and agreed that throwing garbage in the Rio Negro is not all right, even when in actuality it is a conventionally accepted

practice for the many communities. Brazilian children, compared to their Houston counterpart, offered more anthropocentric justifications: for instance, their reasoning as to why it is not all right to pollute the river appeal to motives such as "…it causes pollution that is dangerous for us. Because now we have cholera, a very dangerous disease (…)" (Howe et al., 1996, p.985). This finding might appear counterintuitive, as we would expect children who grow up so close to nature to place a higher value on nature's moral standing and the rights associated with it. However, this anthropocentric pattern might be dictated by motives of personal security, as children in rural areas of the Amazon basin depend more directly on nature for survival than children in the continental United States.

Finally, the *Lisboa Study* (Kahn & Lourenço, 2002) extended the cross-cultural inquiry to 120 participants aged 10, 13, 16 and 19 from Lisbon, Portugal. Once again, the methods of this study replicated the ones from the Houston Child Study, but the authors added three similar scenarios in addition to the Case of the Polluted Waterway (which, as mentioned, involved questions aiming to assess moral reasoning on an issue of water pollution). These fictitious scenarios were the *Case of the Driven Automobile*, with questions assessing moral reasoning on an issue of air pollution; the *Case of the Forest Fire*, which drew on recent events involving forest fires in various regions of Portugal and examined participants' conception of what does it mean to say that something is natural (e.g., if a forest fire is caused by a lightning, is that natural? What if the fire is caused accidentally by a person?). Finally, the *Case of the Cut-Down Trees* dealt with tree cutting and deforestation, and allowed for an examination of participants' conception of harmony with nature. Once again, the environmental profile of participants showed that the majority of them valued animals, plants, and natural environments. Participants also manifested awareness of environmental issues. Data from the Case of the Polluted

Waterway extend the findings from the Houston Child and the Amazonia studies: Participants agree that it is not all right to throw garbage in the waterway, as that could harm wildlife, nature, and humans. While the authors expected an increase in biocentric justifications along with age, the results were mixed: Whereas there was no statistically significant increasing trend for biocentric reasoning, there was a decrease in the usage of anthropocentric justifications from younger to older participants (Kahn & Lourenço, 2002).

Taken together, Kahn's work supports two main conclusions: First, the majority of children in Kahn's studies reasoned about environmental moral dilemmas in ways that are consistent with domain theory. In particular, children were shown to apply three criteria that characterize moral concepts: Prescriptivity of behavior; rule-contingency; and universality. In other words, As mentioned earlier, a behavior is considered moral if it results from a prescription, rather than a personal preference; if it is does not depend on an explicit rule; and if it is universally binding even if it is not common in a given cultural context (Jensen, 2020b). Second, all of Kahn's studies pointed to two predominant forms of reasoning for why children believe nature should be valued. On one hand, anthropocentric reasoning focuses on the effects that environmental issues will have on human wellbeing; on the other hand, biocentric reasoning focuses on the idea that the natural environment has a moral standing of its own, regardless of its utility to humans. Overall, the majority of the children in Kahn's studies made a significantly larger use of anthropocentric rather than biocentric reasoning (95% v. 5%). However, the use of biocentric reasoning increased with age: For instance, in the Houston study, 56% of the 11year-old displayed biocentric reasoning, compared to 37% of the 9 year-olds and 7% of the 7 year-olds (Kahn, 1997a). This pattern also held with participants who grew up in an inaccessible village in the middle of Amazon rainforest and who, one would assume, would be more inclined

to biocentric reasoning. Only the Lisboa Study, which included adolescents and college-age individuals, showed that some questions elicited a more biocentric reasoning than others: For example, when asked why wild animals are important, 73% of participants provided biocentric responses. Yet, the number dropped to 34% in the responses as to why people should care if birds are harmed by pollution (Kahn & Lourenço, 2002). Despite the lack of data that could corroborate his developmental hypothesis, Kahn argues that these results, interpreted through a constructivist lens, may indicate that a child's early, unelaborate concerns give way to both anthropocentric and early biocentric considerations organized in separate structures, resulting in young children's inflexible, dogmatic reasoning. Kahn calls this *isomorphic biocentric reasoning*: Children establish a similarity between humans and nature, each of which deserves the same moral considerations. Isomorphism can be *direct* or *conditional*: It is direct if the correspondence between humans and nature is symmetrical (e.g., animals have rights just like humans). Conditional isomorphism, on the other hand, establishes a correspondence between humans and nature through similarity (e.g., if we as humans do not like to live in trash, animals don't either) (Kahn, 2002). However, as a child develops, a more advanced form of organization emerges, which encompasses both structures which can be drawn upon separately: *Transmorphic reasoning* involves taking the perspective of nature, and it integrates similarities and differences between humans and nature (this is referred to as *compensatory* transmorphism: Animals eat like we do, but they are also different in many ways). This type of reasoning allows for more selective considerations (Kahn, 2002). This development does not happen in a vacuum: Significant others and experiences in nature contribute to refine children's reasoning about the value of nature, as Chawla's (2007, 2009) work suggests.

Despite studies that show that children value nature (Kellert, 2002), are concerned about the welfare of animals (Myers, 2007) and attempt to reconcile human and natural needs (Kahn, 2002), there is little evidence about the role of children's cognitive understanding of nature in supporting those moral judgments about nature and conservation. Ruckert (2016) examined the impact of children's developing folkbiology on their moral reasoning about conservation issues; and assessed whether they resort to psychology or anthropocentric patterns to justify their moral considerations. The study involved the qualitative and quantitative analyses of interviews conducted on 52 children of 7 and 10 years of age: These ages are traditionally important in the realm of folkbiology development, as this transition marks the shift from a human-centric orientation toward a biological one (Ross et al., 2003; Waxman et al., 2007). Ruckert identified the same three constructs underlying children's moral reasoning as Kahn (2005): distinct human construals (anthropocentrism), distinct ecological construals (biocentrism or ecocentrism), and construals that compared and contrasted human and ecological constructs (anthromorphic biocentrism). Furthermore, Ruckert's (2016) study revealed age differences, suggesting that older children employ less anthropocentric and more anthromorphic biocentric reasoning to construct the concerns. According to Ruckert, this is a result of the conceptual integration of discrete constructs, whereby children consider animals' capacities and needs as different from humans', but equivalent in moral standing (e.g., humans and wolves both have rights, but while wolves have the right to be free and hunt for survival, humans have the right to vote. These rights are certainly different, but they should be equally respected). The conceptual integration of distinct constructs described above is easily explained by a constructivist approach: Children rely on the human framework for moral reasoning to construct progressively more complex moral judgments that move away from anthropocentrism and toward biocentrism.

In sum, environmental concerns are a moral affair, as conservation actions are prescriptive, non-contingent and generalizable across cultures. Moreover, the developmental trajectory of environmental moral reasoning seems to reflect the one described by Kellert (2002) in regard to attitudes: In both cases, individuals progress from a human-centered perspective to a more nature-oriented one through experiences which foster their learning, reasoning, and understanding. Specifically, younger children tended to prefer anthropocentric motives to justify their reasoning about environmental moral dilemmas, whereas older participants progressively integrated more biocentric concerns.

The Present Study

The literature reviewed above informed the present study in a number of ways: It examined a developmental progression of environmental attitudes that occurs through three stages, each broader, richer and more abstract than the next. It highlighted the role that individuals' knowledge of nature plays in the development of these richer attitudes, which in turn can influence one's behaviors. It suggested that reasoning about harm to nature is a moral affair, and described the developmental trajectory of environmental moral reasoning. It appears that the development of attitudes toward and moral reasoning about nature follow a very similar, progressively broadening trajectory: Individuals' initial evaluations and reasoning about nature both are impacted by self-concern and reflect a human-centered perspective. As young children (ages 3-6), our attitudes toward nature are influenced by the primary need of keeping ourselves safe and away from harm; as we reason about potential harm to nature, we consider it under an anthropocentric lens, in relation to benefits and harm to us humans. As we learn about and experience nature (ages 7-12), our perspective widens: Our attitudes toward nature are still self-centered, but they are not influenced by the need for safety as much as by our need to develop an

identity and discover ourselves. As we consider a moral transgression toward nature, we are shifting away from a solely anthropocentric perspective, and begin to integrate similarities and differences between humans and nature. Finally, as adolescents and then adults, we gain an understanding of the complexity of nature and of its moral standing: We become aware of the responsibilities that we have toward it and consider biocentric arguments as we reflect on environmental moral dilemmas.

The goal of the present study is to examine the impact of different types of information on children's attitudes toward and moral reasoning about animals. Aside from the focus on the relationship between knowledge of and attitudes toward nature, we can highlight two characteristics shared by the studies conducted within the context of environmental education programs and interventions. First, all the studies discussed focused on children from the age of 9 and above (with the exception of the 7 year-olds included by Braun et al., 2018), while in fact many conservation-oriented institutions offer educational programs for children as young as 3 (*Early Childhood and Family Programs*, 2016; *Education - Zoological Society of Milwaukee*, n.d.). The impact of different information about animals on younger children is an especially interesting topic considering that children show a keen understanding of nature and the capacity to process information about and from nature at a very early age. Therefore, the present study recruited children between the ages of 4-10, in the hope to gain a broader understanding on the impact of different types of information on younger children who have not traditionally been included in research studies on the topic. Drawing on the research addressing developmental differences in attitudes and moral reason, I examined the impact of idiosyncratic information on children in two age groups; 4-7.5 years (Younger Children) and 7.5-10 years (Older Children). These age ranges do not map exactly to the ones described by Kellert (2002) and Kahn (2002),

due to recruitment constraints caused by the Covid-19 pandemic which will be addressed later in this paper. However, I expected this grouping to be sufficient to highlight developmental differences between the children. In particular, I expected a stronger increase in positive attitudes in younger children upon delivery of idiosyncratic information. According to Kellert (2002) children in the first stage of evaluative development manifest predominantly values and attitudes that are rooted in affect, mainly negative ones that related to feelings of safety and security. It is likely, then, that the engaging nature of positively valanced idiosyncratic information will have a stronger impact on individuals whose attitudes are already receptive to those types of motives. Similar, in terms of moral reasoning, research highlight the importance of experience on development: Kahn (2002) frames the developmental trajectory from anthropocentric to biocentric moral reasoning through a constructivist lens, supporting the value of experiences and learning in fostering the progressive integration of different schema in children's reasoning process. While Kahn's work does not per se discuss the relation between positive emotions and moral development, research highlights the importance of emotional affinity with nature as one of the strongest predictors of pro-environmental behaviors (Kals et al., 1999; Matsuba et al., 2020), which are rooted in morality, as discussed (Carlo & Pierotti, 2020; Jensen, 2020a).

The second characteristic common to the studies reviewed above is that all the environmental education programs described took place over relatively long periods of time – ranging from three repeated sessions of 50 minutes each (Thompson & Mintzes, 2002), to a one-day weekly session over the course of a school year (Schmitz & Rocha, 2018). The present study, on the other hand, explores the impact of "bite-sized" information, condensed in a short paragraph read to participants. The reason behind the choice of such a small intervention is twofold: On one hand, there is no baseline, to my knowledge, to determine the lowest amount of

information needed to elicit an impact on attitudes. On the other hand, there is a more practical consideration: much the information conveyed in conservation-oriented settings such as zoos and aquaria is conveyed through short signage, designed to engage the visitor without requiring significant amounts of reading and cognitive effort (Ardoin, 2009; Hughes, 2013).

One final consideration has influenced the scope of the present study. Given the evidence that individuals are impacted by the knowledge they acquire through experience in nature as well as environmental education programs, it is important to consider whether different types of knowledge will yield different effects. For example, Ramsey and Rickson (1976) maintain that not all knowledge has the same positive impact on attitudes. They examine the issue of water and air pollution, and consider two types of knowledge. The first, referred to as ecological knowledge, reflects information about the causes and extents of different types of pollution (e.g., the increase in cases of leukemia brought upon the disposal of atomic waste in waters near a plant). The second, which the authors call trade-off knowledge, focuses on the trade-off costs of pollution (e.g., the loss of jobs deriving from closing a polluting factory). Their results highlight a pattern in which both types of knowledge impact individuals' opinions, leading to moderate rather than extreme positions on the issues at hand. Specifically, ecological knowledge correlates with a more moderate position on pollution abatement, while trade-off knowledge correlates to acceptance of pollution much more than to extreme opinions against pollution abatement (Ramsey & Rickson, 1976). Furthermore, a study conducted on 2,736 Swiss adults allowed Frick and colleagues (2004) to empirically identify three types of environmental knowledge: System knowledge, or the understanding of ecosystems and natural states; action-related knowledge, or the understanding of what can be done about environmental issues; and effectiveness knowledge, or the understanding of the benefits derived from performing pro-environmental actions. Results

suggest that while system knowledge does not directly impact behaviors, it strongly influences action-related and effectiveness knowledge. Knowing about ecosystems seems necessary to motivate individuals to learn about behavioral options and their relative benefits.

Research suggests that the type of information acquired matters when examining the relation between knowledge and attitudes. The present study examines the impact of a specific type of information that, to my knowledge, has not been discussed before: Idiosyncratic information. Facts of this kind range from the behavioral domain (e.g., puffins use tools such as twigs to scratch themselves; Crow, 2020), to biological properties (e.g., crabs use teeth in their stomachs to growl to their enemies; Crow, 2020), to historical curiosities (e.g., cats have been domesticated for over 9,500 years; Crow, 2020). In the context of this study, however, idiosyncratic information refers to novel information about the way different animals interact with members of the same species. The relevance of idiosyncratic knowledge is two-fold: First, unique facts about natural items are more likely than taxonomic information to enhance children's recognition of animals as social others. Myers and Saunders (2002) argue that part of our fascination with animals is their responsivity, which warrants real social interactions starting in infancy. As shown by Stern (1985, as cited in Myers & Saunders, 2002) by three months of age, we recognize people as "animate social others" (p.156), and the same is true for animals. Myers (2007) pinpoints four characteristics shared by humans and non-human animals that are shown to encourage our connection with others and indirectly elicit empathy by entering into children's interpretation of animals' feelings. These core traits are agency, or the other's ability to move and act independently; affectivity, or the other's display of emotions or emotional qualities; coherence, or the perception of the animal as an organized entity; and finally, continuity, or the acquired familiarity that comes with exposure (Myers, 2007). As children grow

and learn that language is part of a communicative matrix, however, they also learn that animals do not communicate in the same way as humans do. Teaching children peculiar information about how different animals interact with each other might accelerate the integration of these targets within the communicative matrix that connects us to others. In turn, this is likely to result in a more positive attitude toward targets that might have otherwise been considered neutrally, if not negatively. Thus, idiosyncratic knowledge might foster or reinforce the understanding that the targets are sentient beings, which is foundational to establishing human obligations to animals (Kahn, 2006). This is likely to promote more positive attitudes, more biocentric considerations in reasoning about environmental dilemmas, and more engagement with conservation behaviors (or intentions). Secondly, research examining the difference in processing schema-congruent (i.e., typical) and schema-incongruent (i.e., atypical) information suggests that the latter is processed at a deeper level than the former, and is thus more memorable (Hunt et al., 1992). While memorability is not a focus of our study, if idiosyncratic information is cognitively processed at a deeper level than usual information, it seems likely that its effect would carry over to socioemotional processes. Specifically, idiosyncratic knowledge might distinguish a subcategory of natural items (e.g., bees) from other categories (e.g., insects), making it more cognitively salient, and more liked by virtue of the mere exposure effect (Zajonc, 2001).

Along with idiosyncratic knowledge, the present study will consider information regarding the physical or biological characteristic of a given target (which we refer to as Taxonomic Information). Knowledge of taxonomic facts does impact children's reasoning about nature and processes of generalization and inference-making: Research suggests that living things have a stronger inductive potential than nonliving things (Coley et al., 2002), providing

support for the biophilia hypothesis. Taxonomic information plays a fundamental role in children's understanding of the natural world. Furthermore, in virtue of the mere exposure effect (Zajonc, 2001) mentioned above, it is reasonable to think that this type of information should have *some* impact on attitudes and feelings – but not as significant as that of idiosyncratic facts. Knowing that an item belongs to a given category allows individuals to draw inferences about it even if they know nothing about the item per se: We may know nothing about the binturong, but once we learn that it is a small mammal who lives in the forest, we will likely assume that it has four legs, or fur. Upon learning that it has a symbiotic relation with a specific type of fig tree, we may infer its role in the ecosystem it lives in, and its relation to other animals and plants. Yet, our attitudes for the binturong are not going to become considerably more positive, that is, we are not going to like it that much more than we did before learning those facts. Once we learn that the binturong smells like buttered popcorn (*What Is a Binturong*? 2016), however, our attitudes toward this unusual critter are likely to become significantly more positive.

CHAPTER THREE: METHODOLOGY

The goal of the present study was to examine the impact of different types of information on children's attitudes toward and care for natural items. A within-subject experimental study was conducted to test two hypotheses:

1. *Idiosyncratic Information (II) will enhance positive attitudes toward animals more than Taxonomic Information (TI).*
2. *Idiosyncratic Information (II) will enhance moral reasoning about animals more than Taxonomic Information (TI).*

Developmental differences were also examined for both hypotheses across age groups (Adults, Older Children, Younger Children). Specifically, I hypothesized a stronger impact of idiosyncratic information on the attitudes and moral reasoning of younger children as opposed to older participants: I expected this due to the fact that younger children possess less knowledge of the target animals to start with and are therefore more likely to be impacted by information that is, by its own nature, novel and unique. Furthermore, as suggested by the literature reviewed in chapter 2, younger children have a developmentally more anthropocentric way of reasoning about environmental moral dilemmas (Kahn, 2002), as well as more concrete values and attitudes (Kellert, 2022). At the same time, however, these attitudes are rooted in affect (Kellert, 2002): I expected the impact of idiosyncratic facts, which are emotionally engaging, to be stronger on a baseline that is developmentally less advanced and provides more opportunity for growth.

Each participant took part in a structured virtual interview, which was conducted either by an undergraduate research assistant or by myself. We began the interview by assessing participants' knowledge about and attitudes toward four target animals: bees, whales, penguins,

and rhinoceros. Participants were then provided with taxonomic or idiosyncratic information about these animals. The animals were chosen because they all represent conservation issues, meaning that within each genus there are individual species who are endangered or at risk of extinction, such as the rusty patched bumblebee; the blue whale; the African penguin; the black rhino (*The IUCN Red List of Threatened Species*, n.d.). Each participant was exposed to two conditions, created by manipulating the information ("facts") provided. In the Taxonomic Information (TI) condition, participants were read a paragraph containing information regarding the physical or biological characteristic of two of the target animals. In the Idiosyncratic Information (II) condition, participants were read a paragraph containing novel and unique factual information about the other two target animals. It is important to mention that the idiosyncratic facts chosen for this study were positive, meaning that they referred to overall prosocial behaviors of the target animals. Overall, each participant received idiosyncratic information relative to two of the animals and taxonomic information relative to the other two. Each target item was paired with a type of information in a controlled randomized assignment procedure, to ensure an approximately equal number of combinations distributed among participants. The order of presentation of the animals was also randomized.

For each target animal, we began by assessing participants' pre-existing knowledge of and their attitudes toward the target animal. While we did record and transcribe participants' answers, this step was mostly to ensure that all participants were somewhat familiar with the target animals. Following these preliminary questions, we provided information about the target animal, either taxonomic or idiosyncratic. At this point, we probed participants again, asking them whether their attitudes toward the target animal had changed, and why. We then presented participants with an environmental moral dilemma in which a human character committed a

harmful act against the target animal for their own benefit. Finally, we assessed whether the information received impacted participants' care for the target animal by asking them whether they thought that the harmful actions were permissible or not, and why (Howe et al., 1996; Kahn & Lourenço, 2002).

In relation to the hypotheses of this study, I expected idiosyncratic facts to enhance children's positive feelings (i.e., attitudes) toward animals more than taxonomic facts (Hyp.1). Additionally, I predicted that idiosyncratic facts would impact children's moral reasoning about animals differently from other types of knowledge. In particular, I hypothesized that children would display higher levels of care and biocentric attitudes when exposed to idiosyncratic than to taxonomic information (Hyp.2). Additionally, both hypotheses are accompanied by a developmental prediction, as I expected the impact of idiosyncratic information to be stronger on younger children than older ones and adults. On one hand, I expected idiosyncratic facts to influence more younger children' attitudes because younger children possess less knowledge of the target animals to start with and are therefore more likely to be impacted by information that is, by its own nature, novel and unique. In terms of moral reasoning, on the other hand, as suggested by the literature reviewed in chapter 2, younger children have a developmentally more anthropocentric way of reasoning about environmental moral dilemma, as well as more concrete values and attitudes: I expected the impact of idiosyncratic facts to be stronger on a baseline that is developmentally less advanced and provides more opportunity for growth.

Participants

The current study was approved by University of Wisconsin – Milwaukee's Institutional Review Board committee (IRB #22.242; approval letter included in the Appendix section, Appendix A). The sample included seventy children from 4-10 years of age (M_{age}=7.52,).

Children were separated in two through a median split (7.5yo): The Older Children group included 37 children (21 females, 16 males; M_{age}=9.3); the Younger Children group included 33 children (21 females, 12 males; M_{age}=5.71). The choice to separate children in two groups was dictated by one of the goals of this study, which was to examine developmental differences in the impact of different types of information on attitudes and moral reasoning. The choice to split the groups with a media split rather than according to developmental stages (e.g., the stage described by Kellert, 1985) was due to the fact that the present study was designed and conducted during the uncertain times of the Covid-19 pandemic, and it was not possible to recruit children across different grade levels. Children were recruited through the distribution of flyers at local schools, via social media, and through solicitation at educational programs such as UWM's *College for Kids & Teens*. Parents or guardians reached out to us directly to schedule an online interview, and received a consent form (Appendix B) providing information about the study and requiring their signature as well as demographic information about their child(ren). Children participated in the interview through a virtual conference software (i.e., Zoom), and underwent an assent procedure at the beginning of the study. At this time, they were also informed that participation was voluntary, and that they could withdraw at any point without consequences (Appendix C).

While the study focused on the impact of idiosyncratic knowledge on children's attitudes, it is important to also examine its developmental endpoint, which we know very little of, due to the lack of research on the topic. Thus, we recruited 45 adult participants (26 females and 19 males; m_{age} =31.71) through the distribution of flyers in community spaces (e.g., UWM Union, libraries, gyms, etc.) and via social media. As with children, interested participants reached out to us directly and received a consent form upon scheduling. The study's IRB granted a waiver of documentation of informed consent, so we did not ask for adult participants' signatures.

Table 3.1 illustrates the proportional breakdown of race and ethnicity across all participants according to age group.

Table 3.1

Demographic Breakdown of Participants by Race and Ethnicity Across Age Groups

Adults	N	%
White	29	64.4%
African American	11	24.4%
Asian	3	6.7%
Hispanic	0	0%
Multiracial	1	2.2%
Other	1	2.2%
Older Children	N	%
White	31	83.8%
African American	0	0%
Asian	0	0%
Hispanic	2	5.4%
Multiracial	4	10.8%
Other	0	0%
Younger Children	N	%
White	27	81.8%
African American	0	0%
Asian	1	3%
Hispanic	3	9.1%
Multiracial	2	6.1%
Other	0	0%

Design

The present study adopted a within-subjects experimental design, in which the type of information was manipulated so that participants would be exposed to both types of facts, Idiosyncratic Information (II) and Taxonomic Information (TI). Each interview included four short assessments, one for each target animal: Participants received information relative to each animal, and information was manipulated so that each participant would receive II for two of the animals, and TI for the other two. The order of presentation and the pairing of information and animals was conducted through a controlled randomized assignment procedure.

Materials and procedure

Participants were presented with four items, each representing one of these following animals: bees, whales, penguins, rhinos (see Appendix G for a list of all items).

We began each interview by greeting participants, reminding them that participation was voluntary and that they could withdraw at any point without consequences. Both adults and children were then asked for their verbal consent to participate (Appendix C, part I).

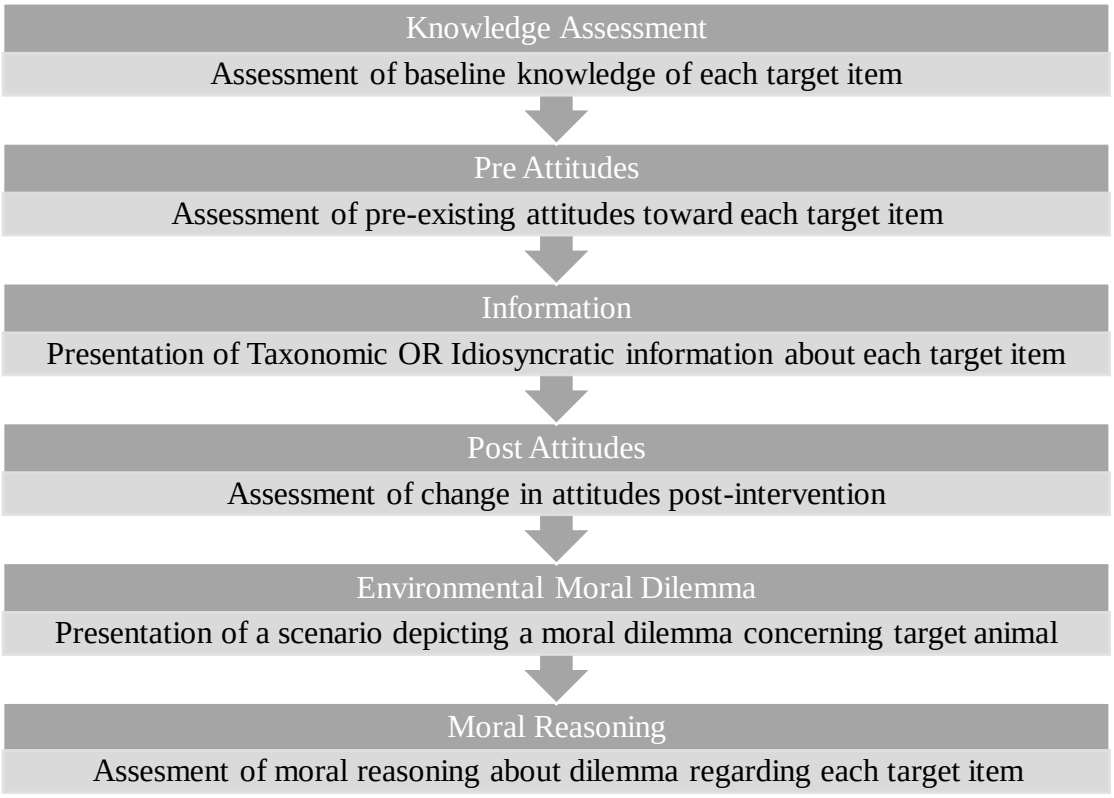
The diagram in Figure 3.1 presents an overview of the study procedures.

Upon completing the sequence for the four target animals, we thanked participants and offered a $10 gift card as a token of our appreciation. To assess participants' behavioral intentions, we asked whether they wanted to keep all or part of the money, and/or donate all or part of it to an organization protecting one of the four target animals. We finally asked them which animal they chose (or would have chosen, if they decided to keep the money), and why. A debriefing statement was provided upon request (Appendix D).

Following is the sequence of questions that were asked for each of the four items, with sample questions for the *Penguin* item.

Fig. 3.1

Sequence of the Study's Procedures for Each Target Animal



1. <u>Knowledge assessment</u>

With the introduction of each item the interviewer presented a visual representation of the animal (i.e., photo, Appendix E), and assessed pre-existing knowledge by asking participants what they knew about it, if anything (e.g., "*This is a penguin. Tell me what you know about penguins. If you don't know anything, that's ok too!*"). The researcher recorded any responses and solicited additional information (e.g., "*That's great! Can you think of anything else?"*).

2. <u>Pre-Attitudes</u>

Next, we assessed attitudes by asking participants to rate their liking of the target animal on a 1–5-point Likert scale, where *1= Dislike a Lot, 2= Dislike a Little, 3= Don't Like or*

Dislike, 4= Like, and *5= Like a Lot* (Appendix F), and why they felt that way (e.g., "*Ok, so you like penguins. Why do you think you like penguins?*").

3. Information

Participants were then provided with an informational paragraph designed specifically to highlight one of the two types of information, idiosyncratic or taxonomic. The idiosyncratic facts provided were positively valanced, and described intraspecies communication strategies or behaviors. An example of each is provided in Table 3.2.

Table 3.2

Example of Taxonomic Information and Idiosyncratic Information for the Target Item "Penguins"

Taxonomic (TI)	Idiosyncratic (II)
Penguins are aquatic flightless birds, which means that, while they can't fly, their stiff flippers, webbed feet, and sleek shape make them excellent at swimming. In fact, they spend most of their lives in the ocean and do nearly all of their hunting for food such as squid and crabs underwater. There are between 17 and 20 living species of penguins.	Some penguins, like the emperor penguins, live in Antarctica, where it is super cold. Because it is so cold, penguins huddle really tight to one another in groups called huddles or waddles. Every 30 to 60 seconds, these penguins that are packed super tightly shuffle around and reorder themselves: They do that because that allows every penguin to spend some time in the center of huddle, which is the warmest part. That way, they take turns at the center of the huddles and every penguin can get warm for a bit.

The pairing of targets and information was partially counterbalanced to ensure that an equal number of participants received the same target-information combination (Table 3.3). The order of presentation was also randomized, to prevent order effects.

Table 3.3

Target-Information Combinations

Participant	Taxonomic (TI)	Idiosyncratic (II)	Taxonomic (TI)	Idiosyncratic (II)
1	Bees	Whales	Penguins	Rhinos
2	Whales	Penguins	Rhinos	Bees
3	Penguins	Rhinos	Bees	Whales
4	Rhinos	Bees	Whales	Penguins

4. Post-Attitudes

After presenting information about the animal, we asked participants whether their attitude toward the target animal had changed or not, and why they thought that their attitudes had (not) changed. Specifically, participants were asked whether, after learning what they had just learned, they liked the target animal more or less or just the same, on a 1–5-point Likert scale, where *1= Like a lot less, 2= Like a Little Less, 3= Like Just the Same, 4= Like a Little More,* and *5= Like a Lot More*. Participants were then asked why they thought their attitude toward the target animal had (not) changed (e.g., "*Why do you think you like penguins a little more after I told you those facts?"*).

5. Environmental Moral Dilemma

Participants were then presented with a scenario depicting a moral dilemma in which they were asked to imagine themselves as a worker who harms the target animal for their own economic benefit, such as in the following example:

> *Now I am going to tell you a story that involves penguins… Imagine that you own a fishing company in South Africa, where some penguins live and make their nests in colonies with other penguins. You decide to fish near the penguins' colonies because there is plenty of fish there: You can simply use a big net to catch the fish fast and sell it for money. However, that is the same fish that the penguin eats, and if you fish it, there is not going be any left for the penguins to eat. Also, sometimes penguins get stuck in fishing nets, and can die because they are stuck.*

Several considerations led to the creations of these scenarios: Each one of them involves the juxtaposition of harming an animal and profiting from it, thus demarcating the moral domain of the scenario (Kahn, 2002). Second, the character in each vignette is a skilled worker - someone who does not just profit from the harmful act, but in fact makes a living out of that type of work. Third, each vignette includes an explanation as to why the harmful act is more beneficial or convenient than the alternative (e.g., fishing companies could fish elsewhere, but they choose the areas near the penguin colonies because it is more convenient). Finally, each scenario represents a realistic situation that could potentially be harmful to the target animal. In other words, each scenario represents a conservation threat to the target animals.

6. Moral Reasoning

Following each moral dilemma, participants were asked three questions, modeled after the work of Kahn and Lourenço's (2002), designed to probe whether they thought harming the target animal for one's own profit is right. Two of the questions drew on the moral-development literature, which defines moral obligations as prescriptive, non-contingent on cultural factors, and generalizable to other culture (Kahn, 1997). In particular, the first question revolved around the prescriptivity criterion (Turiel,1983), or the assessment of whether a given action is right or wrong (e.g., "*How much do you think it is ok for you to fish near the penguin colonies?*" on a scale where 1= *Definitely Ok*; 2=*Kind of ok*; 3= *Never ok*). The second question revolved around the non-contingency criterion (Turiel,1983), which involves assessing whether a given action is right or wrong across cultural contexts and despite contrary practices (e.g., "*Let's say that every fisherman in South Africa fished in areas where the penguins live. How much do you think it is ok for you to fish near the penguin colonies?*" on a scale where 1= *Definitely Ok*; 2=*Kind of ok*;

3= *Never ok*). The third question revolved around what Kahn and Friedman's (1995) call magnitude of environmental harm (e.g., "*Let's say that penguins are endangered: That means that there are not many left in the world, and they may soon be gone. How much do you think it is ok for you to fish near the penguin colonies?*" on a scale where 1= *Definitely Ok*; 2=*Kind of ok*; 3= *Never ok*). Furthermore, for each of these questions, the researcher solicited justifications (e.g., "*Why do you think it is kind of ok for you to fish near the penguin colonies?*"; *Why do you think it is kind of ok for you to fish near the penguin colonies if every fishing company does it?*"; *Why do you think it is kind of ok for you to fish near the penguin colonies if penguins are endangered?*").

After participants had provided a justification for the last of these three questions, the next target item was presented.

Behavioral Intentions Assessment

After participants completed the assessments for each of the four target items, the researcher offered a monetary reward for participating in the study in the form of a $10 gift card. Participants had the option of keeping it, donating the whole amount to an organization protecting one of the four target animals, or donating part of it and keeping the rest.

Specifically, participants were told that, because of their help, they had earned $10, and that they had three options: they could keep the whole sum in the form of an Amazon gift card. Alternatively, they could donate the whole sum to one of the following conservation organizations: the Bee Conservancy, protecting bees; the Ocean Alliance, protecting whales; the Global Penguin Society, protecting penguins; and the International Rhino Foundation, protecting rhinos. The last option entailed splitting the sum and donating part of it to one of those organization, while keeping the rest. Participants could choose how to divide the amount. As to

not burden participants with the task of donating money, they were also informed that the researcher would make the donation for them, should they choose to donate.

Participants who donated all or part of the money were asked what made them choose a specific organization (e.g., "*That was very generous of you! Why did you choose the Global Penguin Society?*"). In the instances in which participants decided to keep the gift card for themselves, they were asked which of the four organizations they would have chosen if they were to suggest someone else to donate, and why (e.g., "*I understand that you want to keep the $10, of course, but if you were to tell someone else to give a donation to an organization that protects either the bees or the whales or the penguins or the rhinos, which ones would you tell them to donate to? Why?*").

Upon completion of the study, we donated the summed totals to each of the selected organizations. The total count of donations if reported in Table 3.4.

Table 3.4

Summary of Donations

Organization	Adults	Children	Total
Bee Conservancy	$42.5	$32	$74.5
Ocean Alliance	$60.5	$21	$81.5
Global Penguin Society	$23.5	$44	$67.5
International Rhino Foundation	$88.5	$25	$113.5

Each interview took approximately 25 minutes for children, 30 minutes for adults. Interviews were recorded and transcribed.

The following chapter will describe the analyses of the data collected.

CHAPTER FOUR: RESULTS

The goal of this section was to test the following two hypotheses, using a variety of methods including ANOVAs and T-tests:

1. *Idiosyncratic Information (II) will enhance positive attitudes toward animals more than Taxonomic Information (TI).*
2. *Idiosyncratic Information (II) will enhance moral reasoning about animals more than Taxonomic Information (TI).*

In the sections that follow, I will first discuss each of these hypotheses in turn along with their developmental component. As discussed in the previous chapter, I expected idiosyncratic information to have a more pronounced effect on the attitudes and moral reasoning of younger children than on those of adults or older children.

Hp. 1 – Examining the Impact of Different Types of Information on Attitudes

The first hypothesis of this study examines attitudes and whether the type of information provided impacts them. Participants' self-reported attitudes toward the target animals were measured at pre-test (i.e., before they received information about them) and at post-test (i.e., after they received the information). At pre-test, we asked participants to rate their liking of each target animal on a 5-point Likert scale. Participants' answers were coded exactly as the self-reported numerical value on the Likert scale they were presented: For example, responses in which participants reported to "Not like (the target animal) at all" were scored "1"; responses in which participants reported to "Like (the target animal) a lot" were scored "5".

After receiving the information about each target animal, participants were asked whether their attitudes had changed (i.e., whether they liked the target animal a lot less, a little less, just the same, a little more, or a lot more). Answers were coded following the same 5-points scale described

before: For example, responses in which participants stated to “Like (the target animal) a lot less” were scored “1”; responses in which participants stated to “Like (the target animal) a little less” were scored “2”; responses in which participants stated to “Like (the target animal) just the same” were scored “3”; responses in which participants stated to “Like (the target animal) a little more” were scored “4”; and” responses in which participants stated to “Like (the target animal) a lot more” were scored “5.”

Was there a significant difference between participants’ attitudes before and after hearing the information provided?

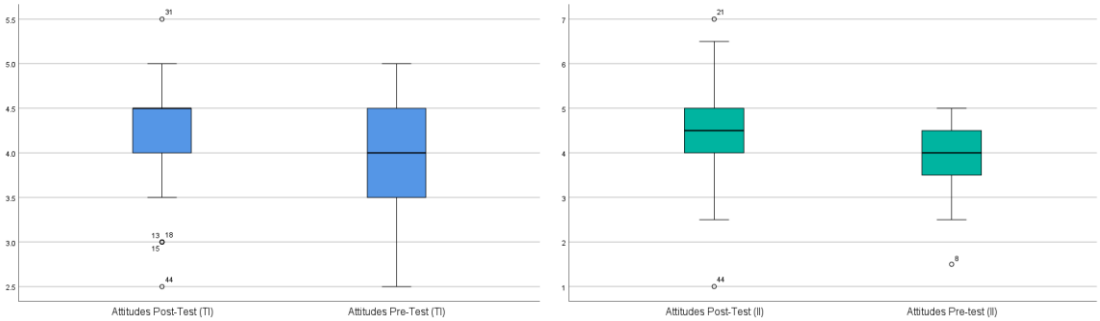
The first question I set to answer was whether participants’ attitudes had changed significantly upon hearing the information we provided, and if so, how. Specifically, I wanted to examine whether hearing idiosyncratic information led to an increase in positive attitudes compared to hearing taxonomic information.

To answer this question, I used paired-samples t-tests and compared the impact of different types of information on participants’ attitude scores within each age group. For both TI (Taxonomic Information) and II (idiosyncratic Information) conditions, I entered the pre- and post-test scores according to the 5-points Likert scales described above, averaging them across the two target animals about which participants had received specific type of information. For example, if a participant received idiosyncratic information about bees and whales, and their self-reported scored at pre-test was 3 for Bees and 4 for Whales, their *Idiosyncratic Attitude Pre-Test* score would be 3.5. If, upon receiving the information, they liked bees “a little more,” and liked whales “a lot more” they would receive a score of 4 and 5, respectively – therefore averaged to an *Idiosyncratic Attitude Post-Test* score of 4.5.

For adults, paired-samples t-test revealed a statistically significant difference in both conditions (Fig. 4.1): In the TI condition, attitudes scores increased significantly from pre-test (M = 4.04, SD = .61) to post-test (M = 4.22, SD = .68), t (44) = 3.21, p = .002. The same pattern was found in the II condition, where attitudes scores increased significantly from pre-test (M = 3.93, SD =.86) to post-test (M = 4.5, SD = 1.12), t (44) = 5.25, p <.001.

Figure 4.1

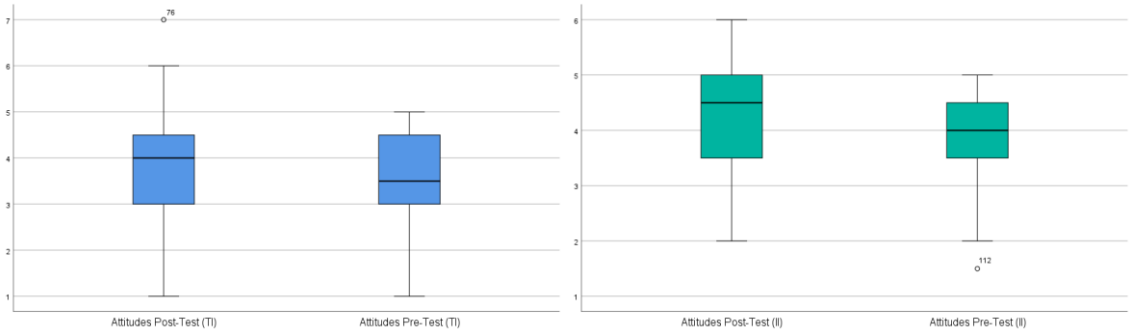
Comparison of Adults' Attitude Scores at Pre- vs. Post-Test in Taxonomic (TI) and Idiosyncratic (II) conditions



Similarly, the scores of Older Children were also significantly different in both conditions (Fig. 4.2). In the TI condition, attitudes scores increased significantly from pre-test (M = 3.61, SD = .96) to post-test (M = 3.99, SD = 1.17), t (36) = 4.03, p <.001. The same pattern was found in the II condition, where attitudes scores increased significantly from pre-test (M = 3.74, SD = .91) to post-test (M = 4.29, SD = 1.1), t (36) = 5.1, p <.001.

Figure 4.2

Comparison of Older Children's Attitude Scores at Pre- vs. Post-Test in Taxonomic (TI) and Idiosyncratic (II) conditions



Finally, among younger children, there was not a significant difference in the attitude scores from pre- to post- test in either condition.

Did Idiosyncratic Information have a stronger impact on change in the attitude towards animals than Taxonomic Information?

The findings from the previous paired-sample t-tests support the hypothesis of a privileged role of idiosyncratic facts compared to taxonomic ones as far as influencing attitudes. However, the scales used to measure attitudes scores before and after the information delivery were slightly different: The Pre-Test scores, in fact, reflected how much participants (dis)liked the target animal, whereas the Post-Test scores indicated whether there had been any change in the participant's attitude toward the target animal. I therefore decided to look at the post-test scores independently, to investigate how different types of information impacted individuals' attitudes toward animals. To do so, I used a mixed between-within subjects ANOVA In the mixed ANOVA, Type of Information (Taxonomic, Idiosyncratic) and the age group of each participant (Adults, Older Children, Younger Children) were entered as within- and between-subjects independent variables, respectively. As the dependent variable, I entered a score

reflecting the change in participants' attitudes before and after the information delivery, which was obtained by subtracting the pre-test scores from post-tests scores and adding 3 points. A score of 3 is equivalent to no change in attitude – and any increase or decrease represented by the subtraction score reflected the magnitude of any (eventual) change. For example, if a participants' attitude score at pre-test was 4, and increased to 4.5 at post-test, their Attitude Change score would be 3.5.

Table 4.1

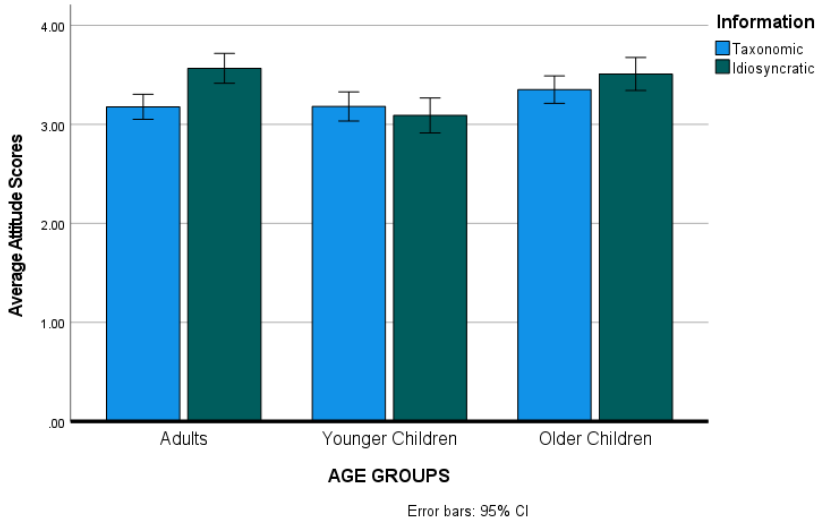
Count, Mean and Standard Deviation of Attitudes Scores at Post-Test Across Age Groups in Taxonomic and Idiosyncratic Conditions

Information	AGEGROUP	N	Mean	SD
Taxonomic	Adults	45	3.178	0.372
	Older Children	37	3.351	0.498
	Younger Children	33	3.182	0.411
Idiosyncratic	Adults	45	3.567	0.560
	Older Children	37	3.509	0.534
	Younger Children	33	3.091	0.404

The mixed ANOVA showed a significant influence of information type on the attitudes scores at post-test (Figure 4.3). Consistent with Hp. 1, the analysis revealed significantly higher scores after participants received idiosyncratic information compared to when they received taxonomic information (F (1,112) =7.91, MSE =.165, p =.006, η^2 = .066). There was a significant interaction between type of information received and age: F (1,112) =6.67, MSE =.165, p =.002, η^2 = .106. Post hoc tests with Tukey correction revealed that the effect of both idiosyncratic and taxonomic information was significant on adults' attitudes (p <.001), but not on either group of children (Older Children p = .55; Younger Children, p = .94).

Figure 4.3

Attitude Scores Across Age Groups by Type Of Information (Taxonomic vs. Idiosyncratic)



Note. Attitude scores of Adults, Younger Children and Older Children are shown for Idiosyncratic and Taxonomic conditions (error bars show standard errors).

Were participants' attitude scores significantly different from the population's mean?

Next, I examined whether participants' attitude scores at post-test were significantly different from a neutral attitude (M = 3) towards each target animal. Specifically, I used one-sample t-tests to determine whether participants' attitudes differed from a neutral score of 3 (i.e., *not liking nor disliking* the target animal) on the Likert scale used to measure attitudes. Note that scores below 3 represent negative attitudes (i.e., *not liking a little* or *not liking at all* the target animal), while scores above 3 represent positive attitudes (i.e., *liking a little* or *liking a lot* the target animal).

One-sample t-tests revealed a statistically significant difference in the mean attitude scores of Adults in this sample at post-test compared to the population mean score of 3. Adults' scores (Table 4.2) were significantly different than the mean after participants received taxonomic information (t (44) = 3.209, p = .002, two-tailed). Adults' attitude scores following the presentation of idiosyncratic information were also significantly different than the mean (t (44) = 6.788, p <.001, two-tailed).

Table 4.2

Results of Comparison Between the Mean Attitude Score of Adults with Population Mean

	t	df	p	Mean Difference	95% CI for Mean Difference		Cohen's d	SE Cohen's d
					Lower	Upper		
Attitudes Post-Test (TI)	3.209	44	0.002**	0.178	0.066	0.289	0.478	0.157
Attitudes Post-Test (II)	6.788	44	< .001***	0.567	0.398	0.735	1.012	0.183

** p < .05, ** p < .01, *** p < .001*

The same pattern held for Older Children in both the II and TI conditions (Table 4.3).

Table 4.3

Results of Comparison Between the Mean Attitude Score of Older Children with Population Mean

	t	df	p	Mean Difference	95% CI for Mean Difference		Cohen's d	SE Cohen's d
					Lower	Upper		
Attitudes Post-Test (TI)	4.291	36	< .001***	0.351	0.185	0.517	0.705	0.184
Attitudes Post-Test (II)	5.796	36	< .001***	0.509	0.331	0.687	0.953	0.198

** p < .05, ** p < .01, *** p < .001*

Younger Children's scores, on the other hand, were significantly different from the mean score in the TI condition (t (32) = 2.54, p = .016, 95% CI [.036, .328]), but not in the II condition (p =.206) (Table 4.4).

Table 4.4

Results of Comparison Between the Mean Attitude Score of Younger Children with Population Mean

	T	df	p	Mean Difference	95% CI for Mean Difference		Cohen's d	SE Cohen's d
					Lower	Upper		
Attitudes Post-Test (TI)	2.540	32	0.016*	0.182	0.036	0.328	0.442	0.182
Attitudes Post-Test (II)	1.292	32	0.206	0.091	-0.052	0.234	0.225	0.176

** p < .05, ** p < .01, *** p < .001*

How did participants explain their own attitudes?

To gain additional insights about the justifications for participants' (dis)liking of the target animals, we probed participants by asking them why they liked each target animal as much as they reported. We coded the answers according to the coding manual included in Appendix H. The descriptive coding categories (Saldaña, 2021) were developed inductively from the responses of approximately 40 participants across the different age groups. As interviews began and data collection was underway, I examined the interview transcripts and looked for topics and comments that recurred across age groups and target animals. Six descriptive categories were developed; participants' justifications to their attitudes were coded across these categories, and each recurrence scored as a "1." Both a research assistant trained in the use of the coding manual, and I coded all the interviews. I calculated proportional agreement for all the interviews by counting any score that matched exactly across coders: Scores that matched were coded as '1,' coded that did not match were coded as '0.' In all categories, agreement was high. Specifically, for the *Taxonomic* category, agreement was 96%; for the *Idiosyncratic* category, agreement was 94%; for the *Personal* category, agreement was 97%; for the *Ethical* category,

agreement was 99%; for the *No Knowle*dge category, agreement was 98%; and finally, for the *Other* category, agreement was 92%. A description of each category follows, and a summary is provided in Table 4.5.

- **Taxonomic**: This category includes statements that reflect scientific, biological, physical facts about the target animals. Taxonomic facts can relate to an animal's physiology (e.g., bees have wings; whales are mammals; penguins lay eggs; rhinos have horns on their forehead) as well as to their presence and role in the ecosystem (e.g., bees are important pollinators; penguins live in cold areas).
- **Idiosyncratic**: This category includes statements that, while scientifically accurate, are less known and reflect novel, unique facts (or "fun facts") about each target animal. Idiosyncratic facts include, but are not limited to, mating and offspring-rearing behaviors (e.g., male penguins will take care of the egg while females are hunting for food), animals' primates or records in a given field (e.g., the blue whale is the biggest mammal on the planet; (*Meet the Biggest Animal in the World*, n.d.); species-specific physiological processes (e.g., whales use echolocation to locate food and navigate deep waters); and intraspecies communication practices (e.g., forager honeybees use a figure-eight dance to signal the presence and location of a source of nectar and pollen to the rest of the hive; I'Anson Price & Grüter, 2015).
- **Personal**: This category includes statements that encompass different domains reflecting personal perceptions, preferences, interests, projects (of oneself or others). Examples include, but are not limited to, participants reporting that they, or someone they know, are fond of a given animal; or are familiar with a given animal because of leisurely or work-related activities (e.g., beekeeping; big game hunt). Under this

category are also grouped statements reflecting participants' subjective perceptions of the different animals (e.g., bees may be perceived as scary because they sting; penguins tend to be perceived as funny, cuddly, and cute; rhinos tend to be perceived as threatening, while whales are often referred to as "gentle giants").

- **Ethical**: This category includes statements that highlight moral or ethical issues surrounding a given animal: Typical statements in this category reflects the endangered situation of rhinos (e.g., there are not many rhinos left in the world), and that of bees (e.g., participants reporting knowing that the bee population is dwindling).
- **No Knowledge**: This category includes statements that reflect lack of knowledge or opinion about participants' liking or disking the target animals. While it was not a common occurrence, I noted that it recurred more often among younger (or shyer) children.
- **Other**: This category includes statements that are ambiguous, or do not reflect any of the other codes. Often these statements go beyond the scope of the present study, and speak of participants' personal consumption of media (e.g., an ironic participant joked on the fact that penguins do not like Batman), as well as popular media trend (e.g., many participants cited different movies with penguin characters).

Looking at the distribution of different justifications categories, we notice a very similar pattern across age groups. It is important to note that, at this point, we only coded the justifications across the six main categories mentioned above, and that the following discussion of subcategories is anecdotical and based on a summative answers log. Participants' explanations

have not been quantified, and therefore no other statistical analyses than the ones described above have been performed.

The majority of participants' attitudes toward animals are overwhelmingly based on *Personal* reasons (Adults: 80.7%; Older Children: 74%, Younger Children 62.2%). These justifications can be further divided in the following subcategories:

- *Direct Experience*: Participants justified their attitudes through appeals to direct experience with the target animals. For example, several adults reported holding positive attitudes toward rhinos because they saw them during a safari; both adults and older children reported liking bees because they "watch them buzzing in (our) backyard." Several younger children on the other hand reported disliking bees because they had been stung. Many of the children in both age groups (and adults too, occasionally) mentioned loving penguins because they see them often at the zoo, and the birds are always swimming or otherwise active.
- *Vicarious Preference*: Participants stated that their attitudes toward the target animal were based on attitudes or behaviors of someone close to them. For example, an adult participant reported loving whales because they were their mom's favorite animals. Another adult reported liking penguins because they are always a favorite when they bring their kids to the zoo. Several children across age groups stated liking bees despite the fact that someone they knew (e.g., sibling, friend) had been stung, or disliking bees for that same reason.
- *Perceptual Reasons:* Participants reported liking or disliking a target animal based on their own perception of it. While some of these perceptions might be based on physical features, this subcategory includes statements that do not directly mention

specific, observable physical attributes. For example, penguins were often liked by both adults and children because they are perceived as cute and funny; whales are perceived by adults as majestic and gentle, whereas a child mentioned that "it's cool that they are so big but so calm"; several adults and children mentioned that rhinos reminded them of dinosaurs, and younger children characterized rhinos as "big and scary."

- *Harm to Humans:* Participants justified their attitudes toward a target animal by reasoning about their relationship with humans. For instance, many adults reported liking whales or rhinos because "They do their own thing and do not harm [humans]"; on the other hand, some participants reported negative attitudes toward rhinos because they are aggressive (it is important to mention that several participants were under the false impression that rhinos are carnivores). Many of the younger children mentioned that they do not like bees for fear for fear of being stung (note: This is generic, as opposed to the direct or vicarious experiences).
- *Usefulness to Humans*: Participants reported liking or disliking the target animal based on their usefulness to humans. For example, many participants across age groups held positive attitudes toward bees because bees make honey, and/or because "without them, we would not have fruits and vegetables." On the other hand, two participants reported neutral attitudes toward rhinos because "they don't really do anything for us."

A smaller portion of participants' justifications fell in the *Taxonomic* category (Adults: 12.6%; Older Children: 18.5%, Younger Children 20.9%). These justifications can be further divided into the following subcategories:

- *Ecological Role*: Attitudes were also explained in terms of the target animals' role in their ecosystems. Attitudes based on the ecological roles of animals were positive for the most part, and mostly expressed by adults and older children. For example, participants justified having positive attitudes toward bees because, "as pollinators, they are super important for the environment." Whales were also often reported as having a generic "important role for the ocean and the ecosystem."
- *Physical Features*: this includes justification referring to specific physical attributes of the target animals, and was widely used by younger children who, for instance, mentioned liking penguins "because they are black and white," or whales because "they are gray but some can be black and white" (i.e., orcas). Additionally, both adults and children reported liking penguin because of their flippers, or because they can swim, or because "penguin chicks are fuzzy." Some adults mentioned rhinos' horns as a beautiful feature.

Only 2.2% of Adults' justifications were categorized as *Idiosyncratic*, compared to 3.4% of older children and, surprisingly, 5.6% of Younger Children. The majority of these statements fell into two subcategories, which often co-occurred:

- *Behaviors*: Participants discussed peculiar behaviors of the target animals, such as the facts that whales are monogamous or that male penguins tend to the egg while the females go fishing. Some of the justifications provided by the younger children are simple and do not provide contextual cues to a behavior (e.g., many children discussed how "penguins slide on their bellies," but did not reason about why they do that), but we choose to include them nonetheless because they do represent idiosyncratic evidence. There were some instances of participants who already knew the facts we would eventually provide in the idiosyncratic condition, and used them to justify their attitudes: Several adults and one of the older children

mentioned whales' songs, for instance, and another one of the older children mentioned that bees dance to communicate.

- *Similarity to Humans*: these statements often occurred as a segue to the considerations on peculiar behaviors of the target animals described above. Most participants who mentioned liking penguin because the males take care of the eggs offered statement such as "It is very modern, it's like some families today where dad stays at home while mom goes to work." The child who talked about the bees' waggle dance added that they, too, love to dance. One of the adults participants commented that "applying human characteristics to things makes them reconsider. I didn't think about how they [i.e., bees] are their own people in a way, have communication and all of that."

Approximately 3.7% of Adults' justifications fell in the *No Knowledge* category, as well as 3% of the Older Children's justifications. Not surprisingly, the number was higher for Younger Children (10/7%). In many of these instances, it seemed that "I don't know" was the default response due to shyness or environmental distractions (which occurred somewhat frequently with the younger children, especially given the virtual nature of the interview). With Adults and Older Children, on the other hand, answers such as "I don't know" or "No reason" tended to occur after participants reported a neutral opinion, and the lack of knowledge regarded mainly rhinos.

Very few of the justifications fell in the *Other* category (Adults: 3.2%; Older Children: 3%, Younger Children: 4.08%). For the most part, answers in this category were references to popular media portraying the target animals. For example, participants reported loving penguins because they watched the movies *Happy Feet* (2006) or *The March of the Penguins* (2006). Other statements in this subcategory were ironic remarks from adults participants (e.g., "penguins have a great marketing campaign… never portrayed badly in any movie"). Four younger children mentioned throwing rings

on the horns of the rhinos: Considering that it was not an isolated occurrence, this could very well be a reference to some popular children book, or movie – but neither I nor the research assistant recognized it.

Finally, the *Ethical* category made up the smallest category of justifications (Adults: 0.75%; Older Children: 0.37%; Younger Children: 0.5%), and mostly referred to the facts that rhinos are on the brink of extinction or that bees are in a more generic danger: Adults especially seem to be aware of conservation issues regarding both animals.

Table 4.5

Summary of Coding Categories and Subcategories for Attitudes Justifications

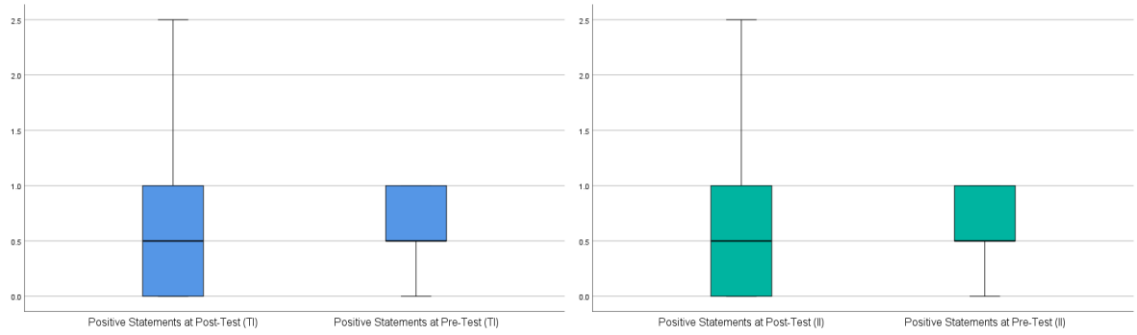
Category	Definition	Subcategories	Example
Taxonomic	Statements that reflect scientific, biological, physical facts	*Ecological Role*	"Bees are useful for the environment"
		Physical Features	"Penguins are black and white"
Idiosyncratic	Statements that reflect novel, unique, facts (or "fun facts")	*Behaviors*	"Whales are monogamous"
		Similarity to Humans	"Male penguins take care of the eggs, much like modern stay-at-home-dads"
Personal	Statements that reflect personal perceptions, preferences, interests, projects (of oneself or others)	*Direct Experience*	"I have been stung by a bee before"
		Vicarious Preference	"My sister has been stung by a bee before"
		Perceptual Reasons	"Whales are gentle and calm"
		Harm to Humans	"Bees can sting and it hurts"
		Usefulness to Humans	"Bees help us have fruits and veggies"
Ethical	Statements that reflect moral or ethical issues		"Rhinos are endangered"
No Knowledge	Statements that reflect lack of knowledge, no information		"I don't know"
Other	Statements that are ambiguous, or do not reflect any of the other categories		"I saw the movie *Happy Feet*"

As we coded the data described above, we came across a significant number of spontaneous statements indicating positive or negative attitudes – especially after they reported that their attitudes had not changed (e.g., "I like penguins the same, I just think they are really cool"). Therefore, we recorded the occurrence of these spontaneous comments reflecting overall positive or negative opinions on each target animal. Emotionally charged answers were scored as "1", according to whether they reflected a positive attitude toward the target animals (e.g., "I think bees are really cool") or a negative one (e.g., "Bees are gross").

A paired sample t-test was conducted to assess any changes in participants' unsolicited opinions about the target animals across conditions. Overall, positively charged statements toward the target animals tended to decrease after new information was introduced (Fig. 4.4). In the Taxonomic Information condition such a decrease was statistically significant from Pre-test (M = .65, SD = .34) to Post-test (M = .45, SD = .46), t (114) = -4.387, p <.001). That was not the case for Idiosyncratic Information condition: Participants did not respond significantly less positively when exposed to idiosyncratic facts from Pre-test (M = .63, SD = .34) to Post-test (M = .55, SD = .47), t (114) = -1.829, p <.07).

Figure 4.4

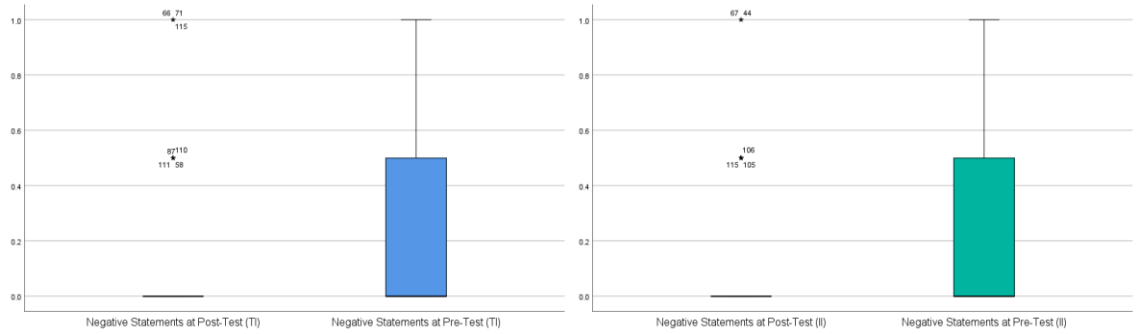
Comparison of Unsolicited Positive Comments at Post- vs. Pre-Test in Taxonomic (TI) and Idiosyncratic (II) conditions



Interestingly, negatively charged attitudes toward the target animals also tended to decrease at post-test (Fig. 4.5). In both condition the decrease was significant: In the TI condition, participants reported more negatively charged statements at Pre-test (M = 1.34, SD = .23) than at Post-test (M = .56, SD = .19), t (114) = -3.209, p <.001). Likewise, in the II condition participants' negatively charged statements decreased from Pre-test (M = .22, SD = .30) to Post-test (M = .96, SD = .23), t (114) = -4.96, p <.001).

Figure 4.5

Comparison of Unsolicited Negative Comments at Post- vs. Pre-Test in Taxonomic (TI) and Idiosyncratic (II) conditions



In Sum: Do Different Types of Information (Taxonomic v. Idiosyncratic) Impact Attitudes Differently?

The first hypothesis of this study predicted that idiosyncratic information would impact participants' attitudes toward target animals more than taxonomic information. Overall, results show significantly higher (i.e., more positive) attitude scores in both conditions: Participants' reported more positive attitudes toward the target animals upon learning both taxonomic and idiosyncratic facts. However, consistently with the hypothesis, this effect was stronger in the Idiosyncratic Information condition than in the Taxonomic Information condition.

When examining the results under a developmental lens, the prediction that idiosyncratic information would ha stronger impact on Younger Children than on Older Children and Adults was not supported – quite the opposite. Comparisons between the attitude scores of participants before and after receiving the information revealed a significant increase in the scores of Adults and Older Children in both conditions, but no significant difference in the scores of Younger Children in either condition.

Additionally, some interesting findings emerged from the analysis of the narrative explanations of participants' self-reported attitudes. First, individual across age groups tend to rely on personal reasons (such as direct experience or perceptual motives) to explain why they (dis)like a target animal. Second, Adults are the only age group that seems to consider ethical issues a reason for liking a target animal. Third, Younger Children tend to make a higher use of idiosyncratic explanations that the other age groups: This is perhaps the most relevant finding that emerged from the analysis of participants' explanations, and will be further discussed in Chapter 5 as a possible reason as to why the attitudes of the younger participants were impacted the least by idiosyncratic facts. Finally, participants' unsolicited statements expressing positive

feelings toward the target animals tended to decrease after the information delivery; however, negative statements also tended to decrease after participants learned both taxonomic and idiosyncratic facts.

Hp. 2 – Examining the Impact of Different Types of Information on Moral Reasoning

The second hypothesis of this study examines whether different types of information impact moral reasoning differently. Specifically, it examines whether idiosyncratic information would promote biocentric reasoning more than taxonomic information.

Participants were presented with a moral dilemma depicting harm committed by a human against each target animal across three different scenarios, and were asked to self-report their agreement to harming the target animal on a scale of 1-3, where 1=*Definitely Ok*, 2=*Kind of Ok*, 3=*Never Ok*. The scores of these three questions were summed to reflect the degree of each participant's pro-environmental moral reasoning. Subsequently, I averaged the scores across conditions, so that each participant received a score for the animals for which they received Taxonomic Information (*TaxoMoralScore*) and one for the animals for which they received Idiosyncratic Information (*IdioMoralScore*). I ran preliminary analyses (i.e., mixed between-within subjects ANOVA with the moral scores as the dependent variable; Type of Information (Taxonomic vs Idiosyncratic) and the age group of each participant (Adults vs Older Children vs. Younger) as within- and between-subjects independent variables, respectively), which yielded no significant findings.

While these preliminary analyses did not find a significant impact of information type on moral scores, those scores are not the most interesting data obtained from the moral dilemma-related questions: Assessing moral reasoning does not involve solely assessing whether individuals consider an act as permissible or not, but rather how they understand and think about it (Lapsley, 2006).

Research on moral reasoning, in fact, has traditionally focused on participants' justifications to moral dilemmas, rather than binary answers such as *It is morally right / it is morally wrong* (Clayton & Myers, 2009a; Kahn, 2002; Thoma, 2006). Therefore, after each self-rating question, we asked participants' to explain their answers, and analyzed their justifications.

Participants' justifications were coded qualitatively according to the coding manual developed for the study. Justifications were coded across three categories and each recurrence scored as a "1." The categories used reflect the ones developed by Kahn and colleagues (Howe et al., 1996; Kahn, 2002; Kahn & Friedman, 1998; Kahn & Lourenço, 2002) to describe the two overarching forms of reasoning about environmental moral dilemmas, biocentrism and anthropocentrism. A description of each category follows, and a summary is also provided in Table 4.6:

- **Anthropocentric**: This category includes justifications that appeal to the effects that the environment (or actions upon it) has on humans. Justifications in this category consider nature in relation to how it can benefit/harm humans and include, but are not limited to:
    - Personal interests, perceptions and preferences (e.g., it is wrong to harm bees because they are cute);
    - Material and physical welfare of human beings (e.g., it is wrong to harm bees because they are instrumental in pollinating fruits and vegetables needed by humans);
    - Negative social consequences (e.g., it is wrong to hunt rhinos because it is illegal);

    - Cultural practices (e.g., it is alright to kill rhinos for indigenous populations for which it may be a culturally accepted practice).

- **Biocentric**: This category includes justifications that appeal to the moral standing of nature, (in part) independently from its usefulness to humans. Nature is considered in itself, has having rights, and as something to be protected. It also encompasses the category that Kahn and colleagues call *Unelaborated Harm to Nature* (Howe et al., 1996; Kahn, 1997b; Kahn & Friedman, 1995; Kahn & Lourenço, 2002), which includes generic appeals to the welfare of nature without specifically anthropocentric or biocentric considerations. According to Kahn and Friedman's (1995) coding manual, this category would include statements such as "it is wrong to use pesticides because then the bees will die." However, in my opinion, a statement such as that reflects the inherent value of nature, if nothing else because it ignores reference to humans and only focuses on nature. Justifications in this category include, but are not limited to:
    - The value of nature in itself, and related to its benefits to humans (e.g., all creatures have the right to be alive);
    - Religious or moral beliefs (e.g., it is wrong to kill creatures of God; It is immoral to kill a rhino to sell its horn);
    - The balance of the natural environment, ecosystems, food chain (e.g., it is wrong to kill bees because the extinction of dwindling of a species can damage the entire ecosystem);

- Statements reflecting a harmonious relationship between humans and nature (e.g., Humans and animals share the world; Humans should respect and protect animals);
- Statements that equate the welfare, happiness and right of animals to those of humans (e.g., Animals have the same right to live and exist as humans do).

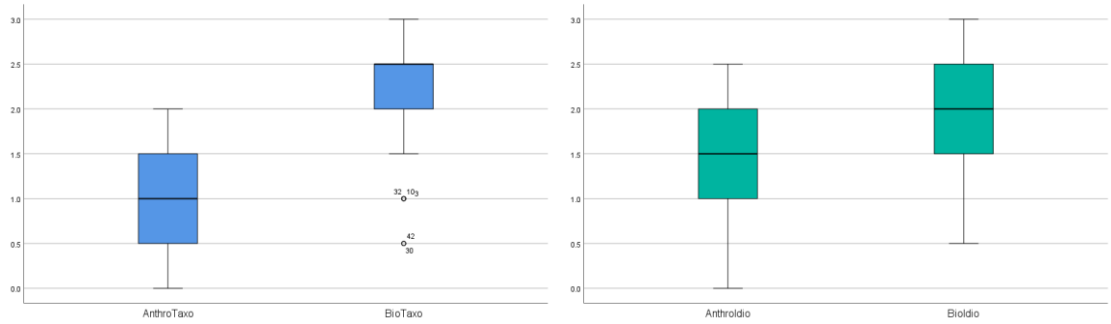
Other: This category includes justifications that could not be categorized as either Anthropocentric or Biocentric. The vast majority of statements in this category referred to null justifications (i.e., "I don't know"), or were unintelligible comments: For these reasons, even though the category was part of the coding manual, I decided to exclude it from any analyses.

Did Idiosyncratic Information have a stronger impact on Biocentric reasoning than Taxonomic Information?

Upon coding participants' answers as biocentric or anthropocentric, I wanted to examine whether different information had a different impact on the overarching form of moral reasoning (i.e., Anthropocentric v. Biocentric) that participants used to explain their answers to the moral dilemmas-related questions. Specifically, I wanted to examine whether hearing idiosyncratic information led to an increase in biocentric justifications more than hearing taxonomic information. A paired-samples t-test was conducted to compare the impact of different types of information on participants' Anthropocentric vs. Biocentric moral reasoning scores. The t-tests for Adults revealed a statistically significant difference between anthropocentric and biocentric moral reasoning scores in both conditions (Fig. 4.6). In the Taxonomic Information condition, Biocentric scores were higher than Anthropocentric (t (44) =-6.588, p<.001); in the Idiosyncratic Information condition Biocentric scores were higher than Anthropocentric (t (44) =-2.108, p=.041).

Figure 4.6

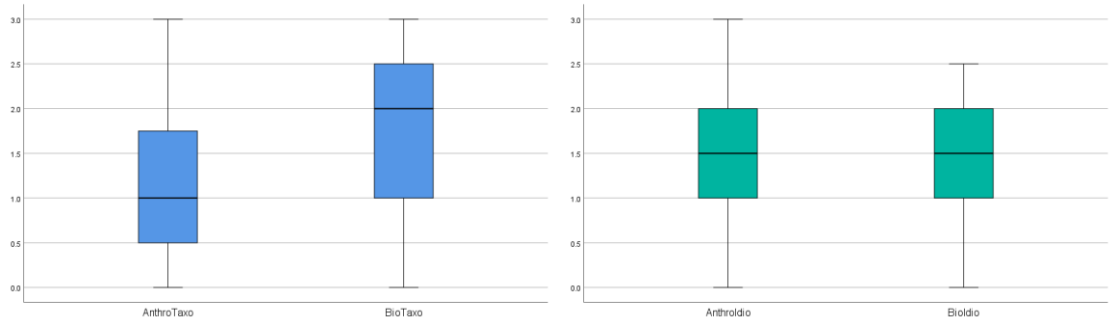
Comparison of Adults' Anthropocentric vs. Biocentric Moral Reasoning Scores in Taxonomic (TI) and Idiosyncratic (II) conditions



The t-tests for Older Children, on the other hand, revealed a statistically significant difference between Anthropocentric and Biocentric moral reasoning scores only in the TI condition (Table Fig. 4.7), where Biocentric scores were higher than Anthropocentric (t (35) = -2.617, p =.013). In the II condition, the difference between scores was not statistically significant.

Figure 4.7

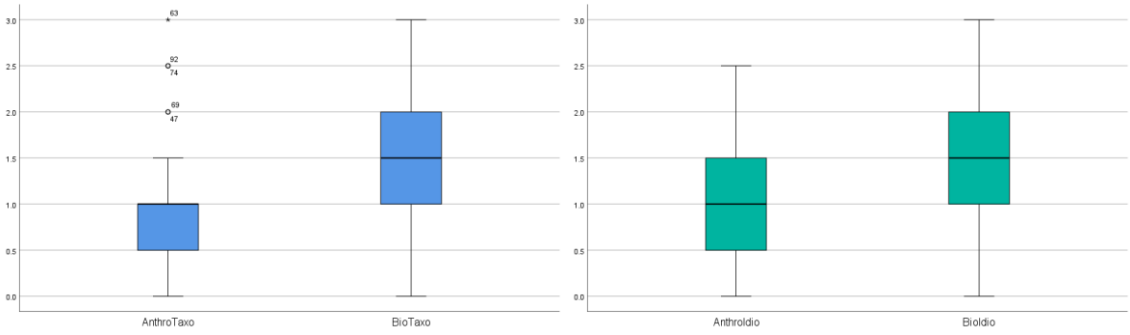
Comparison of Older Children's Anthropocentric vs. Biocentric Moral Reasoning Scores in Taxonomic (TI) and Idiosyncratic (II) conditions



Similarly, the t-tests for Younger Children indicated a statistically significant difference between Anthropocentric and Biocentric moral reasoning scores only in the TI condition (Fig. 4.8), where Biocentric scores were higher than Anthropocentric ones (t (32) =-2.892, p =.007). In the II condition, the difference between scores was not statistically significant.

Figure 4.8

Comparison of Younger Children's Anthropocentric vs. Biocentric Moral Reasoning Scores in Taxonomic (TI) and Idiosyncratic (II) conditions



What justifications do participants use to explain their moral judgments?

To strengthen our understanding of participants' moral reasoning about environmental dilemmas involving the target animals and the role of different types of information, we examined the narrative justifications provided. It is important to note that, at this point, we only coded the justifications as Anthropocentric or Biocentric. The following discussion of subcategories is anecdotical and based on a summative answer log: The justifications have not been quantified, and therefore no other statistical analyses than the ones described above have been performed.

The majority of the justifications coded fell into the Biocentric category (Adults: 61.4%; Older Children: 55.1%; Younger Children: 59.6%). We examined them according to the subcategories identified and described by previous research (Howe et al., 1996; Kahn, 2002; Kahn & Friedman, 1998; Kahn & Lourenço, 2002), and added one (i.e., *Population Decline*) specific to this study. Biocentric justifications can be classified in the following subcategories:

- *Intrinsic Value*: Participants' answers reflected an appeal to the value of the target animals independently from any human interests. One of the older children was particularly keen on stating that each of the target animal is "a creature of existence," and that as such we

should not harm them. Several adults and children also appealed to Christian values, arguing for instance that we should not kill bees "because God made them" or, more generically, because they "wouldn't want to destroy a piece of nature that God created."

- *Rights*: Participants offered considerations regarding the facts that the target animals have rights, and/or deserve to be respected. Sometimes these statements were paired with comparisons between animals and humans, and this was especially true for older children. One of them kept asking the interviewer "How would you feel if I did that to you? You wouldn't like it, and animals don't either!" Another child stated that "Rhinos should live freely and poke at trees." Similarly, another child argued that rhinos need their horns.
- *Relational*: Participants discussed the relationship between humans and animals in terms of stewardship (e.g., "It is our duty to protect animals from being endangered") or kinship (e.g., many young children stated that animals, penguins especially, are their friend). Participants also referred to the importance of the target animals on the ecosystem to justify why they thought it is wrong to harm them: Answers of that kind were common across target animals, and mostly offered by Adults and Older Children, who offered justifications such as "Because it would have a substantial impact on the environment," "Because if you kill bees then it just keeps going, to flowers and plants," or "I think we should keep [penguins] alive, they do good for the ecosystem."
- *Population Decline*: Many participants gave answers who were somewhat tautological, for example by stating that it is wrong to kill rhinos if they are endangered "because then they will all be dead," or "because there are not many left." This subcategory is not part of the original coding manual developed by Kahn and Friedman (1995), but it encompasses a large number of answers given by our sample of both adults and children.

Most of the answers in the Anthropocentric category (Adults: 38.6%; Older Children: 44.9%; Younger Children: 40.4%) also fell under the subcategories described by previous research (Howe et al., 1996; Kahn, 2002; Kahn & Friedman, 1998; Kahn & Lourenço, 2002). In this case, two additional subcategories were developed for this study (i.e., *Personal Safety*; *Wastefulness*). The subcategories used to classify the Anthropocentric justifications are:

- *Welfare*: Most of the Anthropocentric justifications fell into this subcategory, which encompassed appeals to the welfare of humans above that of nature. Participants reasoned about the moral dilemmas in terms of their effects on humans. For example, 12 children and one adult argued that we should not use pesticides that could harm bees because otherwise we would not have honey (and Honey Nut Cheerios, as mentioned more than once by one of the older children). Other participants extended that line of reasoning from honey to flowers and produce in general. Several adults shifted the focus of the vignette away from bees, and reported being against the use of pesticides because they are bad for humans.
- *Personal Interest*: Participants explained their reasoning about the moral dilemmas through appeals to personal interests, either material, psychological, or recreational: Many adults reasoned that it is somewhat ok to use pesticide, or to fish near the penguins' colonies because there can be "some balance between income and the environment." Two children expressed concerned that, if penguins and rhinos go extinct, respectively, they could not see them at the zoo anymore. One of the younger children made the very convincing argument that we should not harm penguins because, without them, Santa would not be able to bring gifts to children.

- *Aesthetic*: Not many justifications fell into this subcategory, which includes appeals to the subordination of nature to humans for their viewing pleasure. For example, two children stated that, if a given animal is gone (specifically rhinos and whales), humans in the future would not know what it looks like. Adults stated that we should not harm whales because they are beautiful and majestic "gentle giants."
- *Personal Safety*: This subcategory is not part of the original coding manual (Kahn & Friedman, 1995) used to examine justifications to environmental moral dilemmas, but it is extremely interesting in the context of the present study. Statements of concern for one's personal safety were in fact mostly expressed by younger children, who were extremely worried about the following: First, that fishing poles could break as one is fishing whales, thus one "could die because [they get] dragged in the water and drown." Second, that when one is fishing a whale and pulling it on the boat, they could be killed under the weight of the huge animal. Third, that as one is trying to kill rhinos, they could be attacked and/or stampeded on. Adults, on the other hand, were concerned for a different type of personal safety: When considering the vignettes asking them whether it is alright to harm rhinos and whales for one's profit, several adults said choose the neutral option because they did not know "enough about the laws there," and "if you risk going to jail."
- *Wastefulness*: Like the previous one, this subcategory was also specifically developed for this study, and virtually all the justification in this category pertain to rhinos. Specifically, an impressive number of participants (26 adults and over 15 children) reasoned about the issue of killing a rhino to take the horns in terms of "the waste of an animal." They argued that it is wrong to kill a creature *just* for the horn – perhaps implying that their opinions on the issue at hand might be different if one poached a rhino for *more than just the horn*.

Additionally, when reasoning about the moral dilemma involving bees, a smaller number of participants stated that it is not right to use pesticides when one could simply eat fruit that has small brown spots on them: They emphasized that the sheer look of produce is not enough to justify potentially killing bees.

Table 4.6

Summary of Coding Categories and Subcategories for Moral Reasoning Justifications

Category	Definition	Subcategories	Example
Biocentric	Statements that reflect an appeal to the moral standing of nature, independently (at least in part) from its usefulness to humans.	*Intrinsic Value*	"Bees are important"
		Rights	"Whales have the right to swim in the ocean"
		Relational	"If we kill bees, other plants and birds will die, too"
		Population Decline	"There are not many rhinos left"
Anthropocentric	Statements regarding the effects that the environment (or actions upon it) has on humans.	*Welfare*	"If we kill all the bees, we will not have fruits and veggies"
		Personal Interest	"It is ok to use pesticides to protect your livelihood"
		Aesthetic	"Whales are beautiful"
		Personal Safety	"Rhinos could attack you"
		Wastefulness	"It is wrong to kill rhinos just for a piece of decoration"

Is there a relationship between attitudes and moral reasoning?

So far, the data supports the hypothesis that different types of information have different impacts on attitudes. Next, upon examining participants' moral scores, I was interested in exploring the relationship between attitudes and moral justifications: Are more positive attitudes associated with more biocentric justifications?

To explore this question, participants' self-reported scores on the 5-points Likert scale were re-coded. Specifically, attitudes at post-test were re-coded as "1" if they were positive (i.e., scores above 3 on the 5-points Likert scale), or "2" if they were neutral (i.e., scores equal or below 3 on the 5-points Likert scale). At the beginning of the coding process, scores below 3 were coded as "negative": However, only 12 out of 460 total scores (4 scores per participant, one for each target animal) were negative. Furthermore, those were scores from individual answers of 12 different participants, all children, and only 2 of them were scores below 2. Therefore, these 12 scores were coded as neutral. Overall, at post-test, in the Taxonomic Information condition, participants held more neutral attitudes across age groups. In the Idiosyncratic Information condition, on the other hand, Adults and Older Children tended to hold more positive than neutral attitudes, whereas the reverse was true for Younger Children. A summary of the percentage of attitudes across conditions and age groups at post-test is reported in Table 4.7.

Table 4.7

Percentages of Type of Attitudes at Post-Test Across Age Groups in Taxonomic and Idiosyncratic Conditions

Information	Age Groups	N	Positive Attitudes	Neutral Attitudes
Taxonomic	Adults	45	22.22%	77.78%
	Older Children	37	43.24%	56.76%
	Younger Children	33	27.27%	73.73%
Idiosyncratic	Adults	45	64.44%	35.56%
	Older Children	37	56.76%	43.24%
	Younger Children	33	24.24%	75.76%

A mixed between-within subjects ANOVA was conducted separately for the Idiosyncratic Information and Taxonomic Information conditions, with age groups and attitudes as between-subjects factors. As dependent variables, I entered the morality scores obtained by coding participants' justification as "Anthropocentric" or "Biocentric," according to the criteria specified in the coding manual.

In the II condition, there was an interaction between attitudes and moral scores: $F(2,109) = 4.7$, $MSE = .817$, $p = .032$, $\eta^2 = .041$). In other words, participants who displayed positive attitudes scored differently in terms of Anthropocentric or Biocentric moral reasoning (Table 4.8). Post-hoc t-test with Tukey correction indicated that participants with positive attitudes had higher biocentric scores than those with neutral attitudes.

Table 4.8

Means, Standard Deviations, and Mixed Analyses of Variance in Moral Reasoning Scores in the Idiosyncratic Condition Across Age Groups

Cases	Sum of Squares	df	Mean Square	F	p	η^2	η^2_p
Moral	1.770	1	1.770	2.167	0.144	0.013	0.019
Moral ✻ AgeGroup	3.762	2	1.881	2.302	0.105	0.028	0.041
Moral ✻ AttitudeIdio	3.839	1	3.839	4.699	0.032*	0.028	0.041
Moral ✻ AgeGroup ✻ AttitudeIdio	0.387	2	0.194	0.237	0.789	0.003	0.004
Residuals	89.051	109	0.817				

Note. Type III Sum of Squares
** p < .05, ** p < .01, *** p < .001*

In the TI condition, there was no significant interaction (Table 4.9). In other words, participants who displayed positive vs. neutral attitudes did not display significantly different scores as far as anthropocentric or biocentric reasoning.

Table 4.9

Means, Standard Deviations, and Mixed Analyses of Variance in Moral Reasoning Scores in the Taxonomic Condition Across Age Groups

Cases	Sum of Squares	df	Mean Square	F	p	η^2
Moral	28.077	1	28.077	32.185	< .001***	0.166
Moral ✻ AgeGroup	2.594	2	1.297	1.486	0.231	0.015
Moral ✻ AttitudeTaxo	0.668	1	0.668	0.766	0.383	0.004
Moral ✻ AgeGroup ✻ AttitudeTaxo	0.016	2	0.008	0.009	0.991	9.587×10^{-5}
Residuals	95.088	109	0.872			

Note. Type III Sum of Squares
** p < .05, ** p < .01, *** p < .001*

In Sum: Do Different Types of Information (Taxonomic v. Idiosyncratic) Impact Moral Reasoning Differently?

The second hypothesis of this study examined whether different types of information would have a different impact on individuals' environmental moral reasoning. Specifically, I predicted that Idiosyncratic Information would foster more Biocentric moral reasoning than Taxonomic Information.

Preliminary analyses yielded no significant results on the impact of different types of information on whether participants' considered permissible a harmful act against the target animals. However, the most relevant information regarding moral reasoning is not whether participants consider a moral transgression right or wrong (or to what extent), but rather the justifications participants used to explain their answers about the moral dilemmas. Specifically, the present study examined whether participants would offer more biocentric justifications upon hearing idiosyncratic facts than taxonomic ones. Additionally, I expected age differences: Namely, I expected younger children's moral reasoning to be more impacted than that of older children and adults. The study's results do not support Hp.2: Across age groups, participants tended to make a statistically significant larger use of Biocentric than Anthropocentric reasoning upon hearing taxonomic facts. Adults were the only age group who showed a significantly higher use of Biocentric reasoning after being told idiosyncratic facts. Overall, however, participants from all age groups and in both conditions made a larger use of biocentric justification than anthropocentric ones; This is an especially interesting finding, as it suggests a pattern opposite to the one found in Kahn's work (Kahn, 2002), wherein biocentric justifications were much rarer than anthropocentric ones.

While the results summarized so far do not support the second hypothesis of this study, nor its developmental component, an exciting finding comes from analyses on the relationship between attitudes and moral reasoning: Participants who held positive attitudes in the Idiosyncratic condition had higher biocentric scores than those with neutral attitudes, whereas a similar pattern was not manifested by participants who had received Taxonomic Information.

Did the Type of Information Received impact Behavioral Intentions?

Before ending the interview, we thanked each participant by offering them a $10 gift card. Participants had the choice to keep or to donate it (in its entirety or in part) to one of four organizations, each engaged in the conservation and protection of one of the target animals. The data collected on participant action related to the gift card was used to assess the presence of a relationship between the type of information received and participants' decision to donate, specifically, whether participants would be more likely to donate to organization protecting animals for which they had received idiosyncratic facts. However, a Chi-Square test of independence showed no correlation between type of information and decision to donate (χ^2 (1,115) =.037, p =.847), suggesting that type of information had no relationship with participants' decision (not) to donate to an organization protecting one of the target animals. Furthermore, there was not relationship between participants' age and intention (not) to donate, as indicated by an additional Chi-Square test of independence (χ^2 (2,115) = 4.366, p=1.113).

To further investigate potential indications of any effects of information on participants' intentions to donate to an organization protecting each of the target animals, we looked to the justifications they provided. The focus of the following section is on the justifications: Therefore, I considered all the answers, regardless of whether participants had actually chosen to donate or

not. Answers were coded according to 4 descriptive categories (a summary of these categories is also included in Table 4.10):

- **Personal**: This category includes justifications appealing to personal preferences or perception of a given animal (e.g., donating to the Global Penguin Society because penguins are one's favorite animals; donating to the Bee Conservancy because bees are directly affecting one's community, neighborhood, etc.);
- **Ethical**: This category includes statements reflecting awareness of the endangerment of a given animal (e.g., donating to the International Rhino Foundation because rhinos are the most endangered of the four animals),
- **Information**: This category includes justifications directly referring to the information provided in the first part of the interview (e.g., donating to the Ocean Alliance because it was interesting to learn that whales can sing);
- **Other**: This category includes justifications that do not fit into any other category (e.g., donating to the International Rhino Foundation because likely everyone prefers to donate to other animals; "I don't know.").

As some participants' justifications were more detailed and richer the others, we were able to identify 129 instances of the categories described above. Overall, the majority (51%) of participants' answers were based on *Personal* reasons, although Younger Children resorted to this category more than the other groups (70% of their justifications were *Personal*, compared to 44% of the Adults' and 45% of the Older Children's). The most frequent subcategories include:

- *Target Animal*: Participants appealed to pre-existing liking of the target animal in itself. For example, penguins were a crowd pleaser, so to speak: Adults and children alike who chose penguins as the target of their (hypothetical) donation justified doing

so because “penguins are cute,” “baby penguins are the cutest,” “they are just the nicest animal.”

- *Direct Experience*: Participants justified their choice of a target animal because of the possibility of directly interacting with it. This subcategory was mostly used when participants chose bees at recipients of their donation (e.g., “I would choose bees because I see them every day,” or “because bees are everywhere in Wisconsin”).
- *Vicarious Interest*: Participants occasionally choose animals that are/were a favorite of someone close. The same participant who reported having positive attitudes toward whales because they were her mother’s favorite animal chose to donate to the Ocean Alliance for that same reason. A child stated that they would donate to the International Rhino Foundation because their parents saw rhinos on a trip.
- *Usefulness to Humans:* this subcategory encompasses justifications appealing to the material value of the target animal for humans. A common example of this was choosing bees as recipients of a (hypothetical) donation because participants loved honey, or because “bees have a lot to do with food sources.”

Justifications in the *Ethical* category were the second most common occurrence (23%): Answers in this category were all concerned with the endangerment of the target animal (e.g., donating to the organization protecting “rhinos because there are not many left,” or “bees, because I know that there is some issue with them, the population is dwindling or something.”). Only one of the *Ethical* justifications was provided by a younger child, whereas most of the answers coded as *Other* were statements along the lines of “I don’t know” or “no reason” offered by Younger Children. Three adults, on the other hand, choose a given animal because they

assumed that no one else would choose it (e.g., “rhinos, because no one would pick them,” or whales because “everyone is going to choose penguins”).

Admittedly, not many justifications appealed to the information provided in the first part of the interview, as only three answers fell into this category. However, all three of the justification provided draw upon the idiosyncratic facts participants had been told. Two adults stated that they chose bees and whales because they “dance” and “sing,” respectively. Finally, one of the younger children said that they would donate to protect the penguins because “they could get more stuff to keep them warm.” While this statement could stem from just knowing that penguins live in cold regions, the focus on *keeping warm* seems to reflect the idiosyncratic information with penguins’ behavior of taking turns at the center of a huddle to keep warm.

Table 4.10

Summary of Coding Categories and Subcategories for Donations Justifications

Category	Definition	Subcategories	Example
Personal	Statements reflecting personal preference or relations for a given animal	*Target Animal*	"Penguins are just so cute!"
		Direct Experience	"I see bees everyday"
		Vicarious Interest	"Whales were my mom's favorite animal"
		Usefulness to Humans	"Bees give us honey and I love honey"
Ethical	Statements reflecting the moral need to help a given animal		"Rhinos are the most endangered"
Information	Statements mentioning the information provided in the interview (TI or II)		"It is so cool that bees can dance"
Other	Statements that are ambiguous or do not fit the other categories.		"I don't know"

CHAPTER FIVE: DISCUSSION

The tendency to engage in action to protect the environment is not innate, nor does it develop in a vacuum. Rather, it is the result of the interplay of cognitive and socioemotional factors: What we know about a conservation issue or an animal and how we "feel about it" will influence whether we decide to engage in conservation behaviors, and to what extent. The present study set out to investigate whether learning different types of information, namely taxonomic and idiosyncratic, about an animal might influence individuals' attitudes toward that animal. Aside from our feelings about an animal or the environment, the decision to engage in conservation behavior also relies on the extent to which we care about protecting it. This study therefore also examined the relationship between attitudes and care, as manifested in different forms of moral reasoning.

The first hypothesis of the study predicted that idiosyncratic information would impact participants' attitudes toward different animals more than taxonomic information. To begin with, participants' baseline attitudes toward four animals (i.e., bees, rhinos, whales, penguins) were measured on a 5point Likert scale. Additionally, participants were asked to explain their initial ratings, which were coded based on the 6 descriptive categories described in the previous chapter: *Taxonomic*; *Idiosyncratic*; *Personal*; *Ethical*; *No Knowledge;* and *Other*. Overall, the striking majority of participants explained their attitudes through personal reasons, such as perceiving a given animal as cute or funny, having a direct interest in it, or because of the personal interest in it of someone close. Participants' explanations of their own attitudes paint a picture that closely maps the evaluative development trajectory described by Kellert (1985). Younger children's answers manifest the concerns for material needs and safety that are typical during that first stage of evaluative development, characterized by the Utilitarian, Dominionistic

and Negativistic values: Many of the younger interviewees, for example, reported negative or neutral attitudes toward bees because they had been stung, or watched someone else being stung, or just for fear of being stung. Similarly, some of the younger children's justification to their reasoning about the moral dilemmas also show concern with personal safety: In more than one instance, children stated that it was ok or somewhat ok to harm the target animals because that will prevent the target animal from harming us (e.g., a child argued that it is ok to use pesticides that could kill bees because that will prevent bees from coming into our houses and sting us). Interestingly, younger children also made a comparatively large use of idiosyncratic information to justify their attitudes. Older children on the other hand made a significant use of taxonomic information to justify their attitudes toward each target animal: For example, they reported liking penguins because of their colors, or because they are "swimming birds." This is consistent with the predominant values in the second stage of evaluative development – namely the Aesthetic and Scientistic ones. Finally, Adults were the ones most likely to mention ethical reasons to support their attitudes toward the target animals, which aligns with the Moral value that emerges during stage three.

After being asked to explain their pre-existing attitudes about each target animal, participants were presented with taxonomic facts about two of the animals and idiosyncratic facts about the other two. Participants' attitudes were assessed again, to test the hypothesis that they would be more positive in the Idiosyncratic Information condition. Overall, participants reported more positive attitudes after being exposed to both types of information: This finding is not surprising, as it aligns with the mere-repeated-exposure phenomenon described by Zajonc (2001). Simply making the stimulus accessible to participants' awareness by providing information about it (and to their visual receptors, through the picture we showed of each target

animal) caused a change in participants' preference toward the stimulus itself. Importantly, though, the study's results support the prediction that idiosyncratic information would have a stronger influence that taxonomic information on attitudes. A possible explanation for this (and one of the considerations that dictated the choice of this type of information in the present study) is that idiosyncratic information enhances individuals' recognition of animals as social others, which is foundational to building obligations toward them (Myers & Saunders, 2002; Kahn, 2006). The second consideration behind the choice of idiosyncratic information is that it is unusual, or unexpected – or schema-incongruent (Hunt et al., 1992), which may foster memorability and deeper processing. Not only do the results of the statistical analyses reported in Ch.4 support the relevance of idiosyncratic information on shaping individuals' attitudes, but so do some of the comments made by the study's participants. We did not code participants' justifications for the changes in their attitudes (or lack thereof), because of the intrinsically leading nature of the question, which could lead to biased answers: Asking participants why they thought their attitudes had (or not changed) after learning the facts we had told them could lead to answers that aim to please the researcher (e.g., "because the facts you told me are cool!"). This is especially true for children, but we also recorded several comments of that kind with adults. I can only hope that those comments stem from the information themselves, but unfortunately, they are not scientifically reliable. Interesting, however, is the fact that several adult participants reported that their attitudes had not changed as a result of learning taxonomic facts, specifically. When asked why they thought their attitudes had remained the same, answers converged around the following themes:

- *Pre-existing knowledge*: adult participants reported already knowing the information we provided, and therefore it did not impact their feelings toward the target animal(s);

- *Lack of Relevance*: Participants reported that the facts provided held no significance, even when they had no previous knowledge of them. For instance, an interviewee stated that they wished they had learned "more personal" information about rhinos.

On the other hand, when we asked participants why they thought their attitudes at changed upon learning idiosyncratic information, we found that they answers were richer and more varied, and centered around the following themes:

- *Learning New Information*: Participants reported that the facts we had provided were new, and that learning them was an overall positive experience. Many of the adults said it was "cool to learn that (target animal) could do (idiosyncratic information)". A participant who started with particularly negative attitudes toward bees (due to being stung and finding the buzzing annoying) stated that they "didn't think anything you could tell me would make me like them, but I am impressed!! [It's a] wow factor. Not enough to like them, but it was impressive."
- *Comparisons to Humans/Other Animals*: Participants discussed the facts learned in terms of similarity with what humans or other animals (specifically, pets) do. For instance, one adult and two children who were told idiosyncratic facts about rhinos (i.e., they can decipher the presence of other rhinos from feces) reported that it was similar to what their pet dog does.

From a developmental standpoint, the data does not support the additional predictions that the effect of idiosyncratic information would be stronger on the attitudes of children than of adults – quite the opposite: While the effects of both taxonomic and idiosyncratic information influenced adults' attitudes toward the target animals, that was not the case for children in either age group. This was a surprising finding: According to the evaluative developmental trajectory

described by Kellert (2002), the attitudes and values of younger children are rooted in affect-based motives: I expected children to be more impressed, or emotionally engaged by facts that they may not be exposed to at school. A potential explanation for this finding stems from the observation that children, especially the younger ones, tend to make a larger use of idiosyncratic facts when reasoning about their attitudes toward animals than adults do. While this study did not find significant differences at a statistical level on the impact of idiosyncratic information on younger children compared to older ones and adults, it is reasonable to infer that the young ones could be more naturally inclined to consider novel facts as a reason for feeling a certain way about a given animal. This could in turn explain why they were not as impacted by additional idiosyncratic information as the other age groups – that is, they may not perceive idiosyncratic information as novel, exciting or unique. A possible explanation for this could be that younger children are more exposed to idiosyncratic information than older children and adults, perhaps through books and media that focuses on engaging "fun facts." Anecdotally, a parent who emailed us to sign up their children to participate in the study also wrote: "I'm a school librarian and I know so much non-fiction for younger kids is presented in the way of 'fun facts'. I am interested in learning about the results of this study, so even if we don't qualify, I'd love to read about your findings!" Children are exposed (especially at an early age) to anthropomorphizes characters in movies and books that portray bunnies in police uniforms, bear in rainboots, and mice who go to college: It may very well be that there is nothing incongruent for them in begin told that bees dance to communicate with other bees, or that penguins take turns to keep warm in cold climates.

On the other hand, adults and older children are more likely to think about animals and learn about them through more taxonomic-based materials, such as textbooks, documentaries,

and signage exhibited in zoos, aquaria, and other nature centers. Therefore, when they are nudged to think about animals in novel ways, it adds a "wow factor," or has a "mind-blowing effect," to use the terms some adults used to describe the idiosyncratic facts we provided.

The second prediction of this study was that idiosyncratic information would impact moral reasoning more than taxonomic information: I expected participants to display higher rates of biocentric justifications in the Idiosyncratic condition compared to the Taxonomic condition. Furthermore, I hypothesized that the effect would be more pronounced on younger children. While the data suggest that participants overall consider the act of harming the target animals for one's own economic benefit as morally wrong, results do not support the stronger impact of idiosyncratic facts over taxonomic ones: Taxonomic information had a more pronounced effect than idiosyncratic on adults, as it led to more biocentric justifications.

Despite the overall lack of support for the second hypothesis and its developmental component, this study yielded two interesting findings relative to environmental moral reasoning. First, the rate of biocentric vs. anthropocentric justifications found in this study is quite the opposite as that described in previous research. Kahn and colleagues (Howe et al., 1996; Kahn, 2002; Kahn & Friedman, 1998; Kahn & Lourenço, 2002), in fact, found that most of their participants across all studies tended to appeal to anthropocentric reasons to justify their moral reasoning on environmental dilemmas. On the other hand, participants in this study favored biocentric explanations across all age groups. There are several possible explanations, in my opinion, for this surprising finding: The first explanation is methodological in nature, as this study conflates two categories that Kahn and colleagues considered as separate. This study in fact integrates in the Biocentric category justifications appealing to welfare of nature, which, in Kahn's work, were coded under the *Unelaborated Harm to Nature* category. Second, the moral dilemmas in this study focused

specifically on acts that result in killing the target animals, whereas Kahn's line of inquiry focuses predominantly on pollution and other acts that could eventually lead to the death of animal species. When Kahn's line of questioning revolved directly around animals, on the other hand, for instance harming them or caring for them, the rate of biocentric justification increased considerably (Kahn & Lourenço, 2002). This seems to reinforce the idea proposed by Myers and Saunders (2002) that animals occupy a privileged position in humans' understanding of and caring for nature.

The second, important finding of this study is that idiosyncratic information does impact moral reasoning by impacting attitudes. The analyses described in the previous chapter indicate that participants who displayed positive attitudes upon learning idiosyncratic facts provided more biocentric justifications than participants whose attitudes were neutral. This finding, however, was not replicated in the Taxonomic condition, where there was no statistical difference between types of justifications across participants who held positive or neutral attitudes. A possible explanation for why positive attitudes should lead to more biocentric reasoning is that positive attitudes toward an animal may make it more emotionally salient and relevant as a "social other" (Clayton & Myers, 2009b). This, in turn, can elicit feelings of connectedness, and moral emotions such as sympathy (Matsuba et al., 2020). While research suggests that emotional affinity with nature is one of the strongest predictors of pro-environmental behaviors (Kals et al., 1999; Matsuba et al., 2020), it is possible that it may also influence the way in which we make moral considerations about the environment, by bringing the object of our reasoning to the forefront of our cognition (i.e., through biocentric considerations) rather than ourselves (i.e., through anthropocentric considerations).

The present study has only begun to explore the potential impact of idiosyncratic information on environmental attitudes and moral reasoning, but it does overall paint a promising picture. Along with the analyses' results and participants' responses and comments, there is one

final consideration to discuss, which strengthens the argument in favor of idiosyncratic information as a tool to foster individual's conservationism. Differently from previous research, the present study investigates the interplay of information and environmental attitudes by exploring the impact of "bite-size" information. In fact, the bulk of the research examining the relationship between information and cognitive, behavioral, or socioemotional processes was conducted in the context of environmental education programs of varying lengths, from multiple days (Bexell et al., 2013) to repeated sessions taking place over a school year (Schmitz & Rocha, 2018). Results of the present study, on the other hand, indicate that exposure to a minimal amount of idiosyncratic information about a given animal is enough to foster more positive attitudes toward it, leading in turn to a more biocentric form or reasoning about it. Taken together, the findings of this study can inform the practical work of conservation-oriented institutions in a number of ways. First, social media is increasingly being used as an outreach tool as these institutions strive to attract and educate larger audiences (Hamid et al., 2017) as well as monitoring the audience's perception of conservation (Soriano-Redondo et al., 2017). Rose et al. (2018) examined the trend in the content shared by conservation-oriented institutions by conducting an analyses of the social media (i.e., Facebook) posting history of nine BIAZA - accredited zoos in the UK and Ireland. Their results suggest that social media audience is particularly attuned to content regarding mammals and births/hatchlings, whereas content focusing on conservation education did not yield significant interest. Interestingly, the categories used by Rose and colleagues (2018) to code and describe the social media content did not mention idiosyncratic information: It is possible that idiosyncratic facts may bridge the gap between the audience's engagement with animal-focused content and conservation education. For example, zoos and aquaria could develop multi-content posts (e.g., Instagram or Facebook

stories) that begin by presenting fun facts about a given species to "hook" the audience by eliciting positive attitudes toward that species, and move on to present conservation-related content. Alternatively, these institutions could capitalize on the interactive features of many social media platforms, that allow for quizzes or poll that users can participate in: Once again, idiosyncratic facts may act as a lure to foster positive attitudes toward a given animal and promote continued engagement with facts related to conservation issues regarding that animal.

Another way in which conservation-oriented institutions could capitalize on the effectiveness of idiosyncratic information is through interactive exhibit signage – for instance, through QR codes that prompt the visitor to learn more about creatures' little-known behaviors or habits. Along the same lines, idiosyncratic facts may be used in the development of games or other social activities that visitors can engage in together (e.g., trivia games; scavenger hunts). In examining interpersonal interactions during a zoo visit, in fact, Clayton et al. (2011) found that viewing animals is a social experience, which also contributed to creating a relationship between animals and humans. The study suggests that viewing animals was used to encourage conversation rather than education; however, it is possible that providing idiosyncratic facts, or questions about idiosyncratic facts in the style of a game of trivia, might facilitate the educational portion of the conversation. For example, zoos might provide a QR code in front of specific exhibits that visitors can use to access questions and prompts about the animals of that exhibit: The questions or prompts may initially address idiosyncratic facts, and progressively transition into a more specifically conservation-related domain.

Overall, this study represent, to my knowledge, the first attempt at exploring the impact of idiosyncratic information as an avenue to foster positive attitudes and moral reasoning about animals specifically within the realm of conservationism. Despite the acknowledge limitations, it

does paint a promising picture in support of “fun facts” as not only pervasive and entertaining, but also beneficial as conservation-oriented institutions strive to educate individuals of all ages about issues and best practices. We live at the crossroads of converging environmental crises, increasing interest in protecting biodiversity, and shifts toward interactive education and virtual communication: It is necessary not to lose momentum, and to further research on avenues to promote and foster conservation behaviors.

CHAPTER SIX: CONCLUSIONS

The present study is relevant in at least two ways. First, it supports the hypothesis that idiosyncratic information may foster more positive attitudes toward animals. This finding in itself is something that conservation-oriented institutions can capitalize upon, as it seems to be an especially interesting tool to foster positive attitudes toward animals that many people are not regularly exposed to. Virtually every person living in the United States will at some point in their life interact with pet animals or bees, but not everyone may have access to direct experiences with wild animals such as rhinos, whales or penguins. Providing information that may foster positive attitudes "remotely" may prove a fruitful asset as conservation-oriented institutions strive to educate about and raise awareness of conservation issues. The relevance of the finding on the impact that idiosyncratic facts can have on attitudes is amplified when we consider that participants in this study were exposed to very small bits of information – reading each paragraph containing either taxonomic or idiosyncratic information took less than 90 seconds. Zoos, aquaria, nature centers and similar institutions have a well-established history of educational programs and activities of varying lengths, but at the same time they are increasingly sharing educational content on social media in the form of short videos or captured pictures. Idiosyncratic facts are extremely suitable information for this type of content, as they are novel, captivating, and can easily be delivered in short passages or quotes. These same considerations are relevant from a theoretical perspective, as they indicates that attitudes toward animals can change in considerably shorter amounts of time than the time required of educational programs, field trips, or other similar endeavors. This is by no means an argument against those educational activities, which can certainly provide individuals with direct experiences with nature and much more complex learning experiences than just a snippet of a "fun fact." Rather, it suggests a

complementarity between the two or that idiosyncratic facts presented as social media, marketing, or advertising content might act as a "lure" to engage individuals who may otherwise not be interested in conservation issues and environmental education.

The second way in which the present study is relevant is that it strengthens the theoretical link between knowledge of and feelings for nature (Schmitz & Rocha, 2018; Berenguer, 2007) as a mean to foster care, if not conservation behaviors. The study's findings suggest in fact that idiosyncratic information may play a role in fostering more biocentric moral reasoning about environmental dilemmas, by influencing attitudes: While idiosyncratic information did not directly impact moral reasoning, the study's results indicate that participants who held positive attitudes upon learning idiosyncratic facts were more likely to think about environmental moral dilemmas in biocentric terms.

Limitations

Among the limitations of the present study, the main one was the absence of a control condition to make stronger conclusions about the impact of taxonomic and idiosyncratic information. Although a control condition would have strengthened any conclusions drawn from the results, it would have meant adding two more target animals to the study's procedure, thus increasing by a third the length of the interview. This would not have been ideal when interviewing children, or when considering the virtual nature of the interview, which constitutes another limitation of the present study. When interviewing children, especially the younger ones, it was quite challenging to keep them on task. Many of them tended to roam around the house with the tablet, laptop or phone used to participate in the interview, while others kept playing with the device. While an in-person interview might have warranted more focused participants, I

believe that the fact that it was conducted via Zoom allowed for a larger sample than if we had to go to schools or learning centers, or ask participants to come to us. An additional limitation in the methodology of the study was the sampling of the participants, recruited mainly through flyers posted in public spaces (e.g., spaces in the University, learning centers, libraries, coffee shops) or on online newsletters of schools who agreed to help us. While the demographic profile of the sample is somewhat diverse, most of our participants live in the city of Milwaukee or its suburbs (with few exceptions of participants recruited through a dance school in Minnesota). It would have been interesting to gauge the impact of the study's manipulation on individuals from rural areas.

Two limitations need to be discussed regarding the information presented to participants: First, while this study conceptualized the information provided to participants as "bite-sized," it was conveyed in the context of an interview which lasted, overall, somewhere between 25-30 minutes. This could have led to fatigue effects (especially in younger participants), and may have worked against the goal of providing small amount of information – or against its effectiveness. Second, the idiosyncratic facts provided were exclusively positive. This choice was dictated on one hand by the fact that study is, to my knowledge, the first to examine the impact of idiosyncratic information, and therefore I thought it beneficial to focus on facts that are more likely to poster positive intentions. On the other hand, the study was conducted on children as young as 4, and we wanted to provide uplifting facts. However, it would be extremely interesting to explore the impact of "dark" idiosyncratic information (e.g., various species of animals kill their own offspring) on individuals' attitudes and moral reasoning: My somewhat educated guess is that we would still see an impact on attitudes, although a negative one (e.g., liking those

animals less) but not on moral reasoning (e.g., justifying the animals' behaviors as part of their instinctual nature).

Another limitation of this study is the absence of a second coder for the moral justifications as Anthropocentric or Biocentric. Due to logistical issues such as turn-over of trained research assistants and time constraints, I was the only coder for the justifications to participants' reasoning about moral dilemmas, which leads to issues of interrater reliability. Finally, in the previous chapter I introduced many subcategories that are encompassed by the overarching descriptive categories used to code justifications to questions regarding attitudes, moral reasoning and donation intentions. However, the present study could benefit from more structured, in-depth analyses of those subcategories, which were reported and discussed here solely as observed occurrences.

Future Research

It is a momentous time for the field of conservation psychology: On one hand, a line of research explores the impact on proenvironmental behaviors of existing educational programs and settings (e.g., Clayton et al., 2009; Hughes, 2013; Pearson et al., 2013). On the other hand, a growing body of research is investigating the psychological mechanisms that play a role in the interactions between humans and non-human animals and nature in general (e.g., Berenguer, 2007, 2010; Clayton & Myers, 2009a). Future research on idiosyncratic information falls, in my opinion, in this second line of inquiry.

One possible avenue would be to extend the research on the impact of this type of information on pre-existing *negative* attitudes: Our data, in fact, indicates that overall individuals held positive attitudes toward bees, rhinos, whales and, especially, penguins. However, it would be interesting to replicate the study on traditionally disliked animals, such as spiders, snakes, and

bugs. These animals tend to have a pretty grim reputation, as the number of horror movies about them suggests (*Horror: Snakes - IMDb*, n.d.). Research is already exploring whether using anthropomorphic language to describe these animals might foster more positive attitudes towards them (Reider & LoBue, poster presented at SRCD in March 2023), but anthropomorphism is a double-edged sword: On one hand, attributing human-like qualities to animals might broaden one's range of empathic concern (Tam, 2013), and may be an effective way to connect people with a conservation cause. On the other hand, people may misattribute human psychological and physical needs and feelings on animals, which in turn may lead to: Expectations of human-like behaviors and needs that non-human animals do not share, as well as projection on animals of negative human traits or stereotypes (Root-Bernstein et al., 2013). Exploring the impact of idiosyncratic information rather than anthropomorphic language on attitudes toward disliked animals, however, may lessen the risk of projecting human-like needs and qualities, and may inform educational practices and programs about these animals.

The present study also found that idiosyncratic information does not seem to have an impact on children's attitudes, and that children (especially the younger ones) use this type of facts more than adults to explain their attitudes toward a given animal. The lack of support for this developmental prediction brings into question whether younger children reason about idiosyncratic information in the same way as they do with other facts (i.e., taxonomic). Perhaps, children are not as enthralled by fun facts as much as adults because they do not see the novelty and "fun" in them. Future research aiming to gauge the extent to which idiosyncratic properties are akin to other properties (e.g., biological) in children's folkbiological reasoning could investigate whether children generalize idiosyncratic information from one animal to another, and the constraints that regulate these generalizations.

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APPENDICES

APPENDIX A

IRB Letter of Approval

UNIVERSITY of WISCONSIN
UWMILWAUKEE

Institutional Review Board

uwm.edu/irb
irbinfo@uwm.edu
414-662-3544

Date: April 20, 2022

To: Christopher Lawson
Dept: Educational Psychology
CC: Vittoria Sipone - Co-Inv (Full Access w/Notify)

IRB #: 22.242
Title: DANCING BEES, TALKING TREES: THE IMPACT OF IDIOSYNCRATIC INFORMATION ON ATTITUDES TOWARD AND CARE FOR NATURAL ITEMS

The University of Wisconsin-Milwaukee Institutional Review Board has approved your protocol as minimal risk under Expedited Category 6, 7 as governed by 45 CFR 46.110. This protocol has been approved on **April 20, 2022** and IRB approval will expire on **April 19, 2023**. Before the expiration date, you will receive an email explaining how to either keep the study open or close it.

Your protocol has also been granted a waiver of documentation of informed consent as governed by 45 CFR 46.117 (c).
Any proposed changes to the protocol must be reviewed by the IRB before implementation, unless the change is specifically necessary to eliminate apparent immediate hazards to the subjects.

It is your responsibility to:

- promptly report unanticipated problems to the IRB
- maintain proper documentation of study records
- ensure that all study staff receive appropriate training as outlined in the approved protocol
- adhere to the policies and guidelines set forth by the IRB, UWM, and the UW System, and to all applicable state and federal laws

Contact the IRB office if you have any further questions. Thank you for your cooperation and best wishes for a successful project.

APPENDIX B

Parental Consent Form

UNIVERSITY of WISCONSIN
UWMILWAUKEE

Parental Permission for Research Participation
IRB #: 22.242
IRB Approval Date: 04/20/2022

Study title	Dancing Bees, Talking Trees: The Impact of Idiosyncratic Information on Attitudes Toward and Care for Animals
Researchers	Chris Lawson, PhD, Associate Professor, UW-Milwaukee Vittoria Sipone, Doctoral Candidate, UW-Milwaukee

We're inviting your child to participate in a research study. Participation is completely voluntary. If you agree to let your child participate now, you can always change your mind later. There are no negative consequences, whatever you decide.

What is the purpose of this study?
We are interested to know more about the impact of different types of knowledge on attitudes toward and care for animals.

What will my child(ren) do?
Your child(ren) will participate in an individual virtual interview with one of our trained researchers.

- Your child(ren) will be presented with different information about different animals, for example bees and whales, and will be asked questions about how they feel toward each animal.
- Then, your child(ren) will be presented with a brief scenario involving the animals, and will be asked some follow-up questions. For example, we will ask your child(ren) whether they think it is ok to use pesticides that make fruit and vegetables look better, but may harm bees.
- At the end of the interview, we will offer your child(ren) a $10 gift card to thank them for helping with our study. We will give them the option to keep it, or donate it (all or part of it) to an organization that protects animals.

There are no right or wrong answers. We are simply interested in your child(ren)'s responses.

The research study will take approximately 30 minutes.

Risks

Possible risks	How we're minimizing these risks
Breach of confidentiality: There is a chance your child(ren)'s data could be seen by someone who shouldn't have access to it.	- All identifying information is removed and replaced with a study ID. - We'll store all electronic data on a password-protected, encrypted computer.
Usually children enjoy participating in this kind of studies. However, should any child(ren) find the questions uncomfortable, they may not want to participate any longer.	Your child(ren) can withdraw at any point without consequences.

Other Study Information

Possible benefits	We hope the findings from this study will help us develop educational programs for zoo, aquaria, and other conservation-oriented institutions.
Estimated number of participants	Approximately 120 children between the ages of 4-10, and 75 adults.
How long will it take?	Approximately 30 minutes.
Costs	None.
Compensation	Your child(ren) will be offered a $10 gift card as our token of appreciation for their participation. We will give them the option to keep the gift card, or to donate the whole amount or part of it to an organization that protects animals. Due to UWM policy and IRS regulations, we may have to collect your name, address, social security or tax ID number, and signature in order to give you this compensation.
If I don't want my child to be in this study, are there other options?	Unfortunately, there are no other options.
Future research	Your child's data won't be used or shared for any future research studies.
Recordings / Photographs	We will record your child. The recordings will be used only to ensure accurate transcription. We will dispose of the recordings within a month from the interview. The recording is necessary to this research. If you do not want your child to be recorded, they should not be in this study.
Removal from the study	In order for our data to be useful, it is important that your child answers all our questions. If your child wishes to interrupt the study, we'll have to take them out of the study, which will mean they will not be offered the gift card.

Data Security

What identifying information will be collected and why?	We will collect your child(ren)'s name and email address in order to schedule the interview and send them an electronic gift card.
How long will my child's data be kept?	Recordings will be kept for one month after the interview. The transcribed interview will be kept for five years: The interviews will be de-identified, meaning that participants will be given an ID and it will not be possible to link the interviews with participants' names.
How is data kept secure?	All data (email correspondence; interview recordings; interview transcripts) will be stores in a password protected computer and accessible only by the research team.

Who might see my data and why?

The researchers	To conduct the study and analyze the data
The IRB (Institutional Review Board) at UWM	To ensure we're following laws and ethical guidelines

The Office for Human Research Protections (OHRP) or other federal agencies	
Anyone (public)	We plan to share our findings in publications or presentations. Your child will not be identified by name. If we quote your child, we will use a pseudonym.

Contact information:

For questions about the research, problems, or complaints	Chris Lawson, PhD	608-335-0598 / lawson2@uwm.edu
For questions about your child's rights as a research participant, problems, or complaints	IRB (Institutional Review Board; provides ethics oversight)	414-662-3544 / irbinfo@uwm.edu

Signatures

If you have had all your questions answered and give permission for your child to participate in this study, sign on the lines below. By signing this form, you are also consenting to the interview being recorded.

We are also asking you to provide some demographic information about your child(ren) on the next page.

Remember, your child's participation is completely voluntary, and you're free to remove them from the study at any time.

Please sign the present document. You can:

- Use a digital signature; or
- Print the document, sign it and scan/send us a picture of it; or
- Simply type your name – this will count as an acknowledgment that you have read the information we have provided.

_____
Name of Child (print)

_____
Name of Child if more than one (print)

_____
Name of Parent or Guardian (print)

_____ _____
Signature of Parent or Guardian Date

Give a copy of this form to the parent/guardian

Child(ren)'s Demographic Information

- Name of child: _____
- Age: _____
- Indicate your child's gender:

  ☐ Male
  ☐ Female
  ☐ Other gender identity not listed here (please specify _____)
  ☐ Prefer not to disclose

- Indicate your child's race/ethnicity (select all that apply):

  ☐ White
  ☐ Black or African-American
  ☐ American Indian or Alaskan Native
  ☐ Asian
  ☐ Native Hawaiian or other Pacific islander
  ☐ Other (please specify _____)

(if more than one child))

- Name of child: _____
- Age: _____
- Indicate your child's gender:

  ☐ Male
  ☐ Female
  ☐ Other gender identity not listed here (please specify _____)
  ☐ Prefer not to disclose

- Indicate your child's race/ethnicity (select all that apply):

  ☐ White
  ☐ Black or African-American
  ☐ American Indian or Alaskan Native
  ☐ Asian
  ☐ Native Hawaiian or other Pacific islander
  ☐ Other (please specify _____)

APPENDIX C

Verbal Assent Procedure

Hi (CHILD'S NAME), thank you for helping me today!

We are going to play a game today. We are going to look at some pictures of animals. I will tell you some facts about them, and then I will ask you some questions.

Now, it is important to remember that you do not have to participate if you don't want to! And if at any point you want to stop, just let me know – there is no consequence if you want to stop. Ok? Do you have any questions for me before we begin?

APPENDIX D

Debriefing Procedure

Children participants

Thank you so much for playing with me today!

The reason why I asked you to participate is because I am trying to understand what type of facts makes people like and want to protect animals more. That is why I told you some facts about what a (TYPE OF ANIMAL) looks like or about the creatures that live with and depend on the (TYPE OF ANIMAL), or about how (TYPE OF ANIMAL) communicate with each other.

(If they have chosen to donate)

You were extremely generous and decided to donate (AMOUNT) to the (ORGANIZATION). I wanted to let you know that I will take care of that. There are other children, and also adults, participating in this study, and as soon as I have collected all their donations, I will give the money to the (ORGANIZATION).

Do you have any questions for me?

Thank you again so much for helping me out today!

Adult participants

Thank you so much for participating in this study!

I am conducting this study to examine whether different types of facts have a different impact on how people "feel" about animals.

That is why I told taxonomic facts about (TYPE OF ANIMAL), and unique facts about (TYPE OF ANIMAL).

(If they have chosen to donate)

You were extremely generous and decided to donate (AMOUNT) to the (ORGANIZATION).

I wanted to let you know that the research team will take care of donating the money, as soon as we have finished running our experiment and have collected all the monetary donations.

If you have any additional questions, please feel free to contact the primary investigator, Vittoria Sipone, at dancingbeesuwm@gmail.com .

Thank you for your participation in this study!

APPENDIX E

Visual Representation of Target Animals

Visual representation of a honeybee.

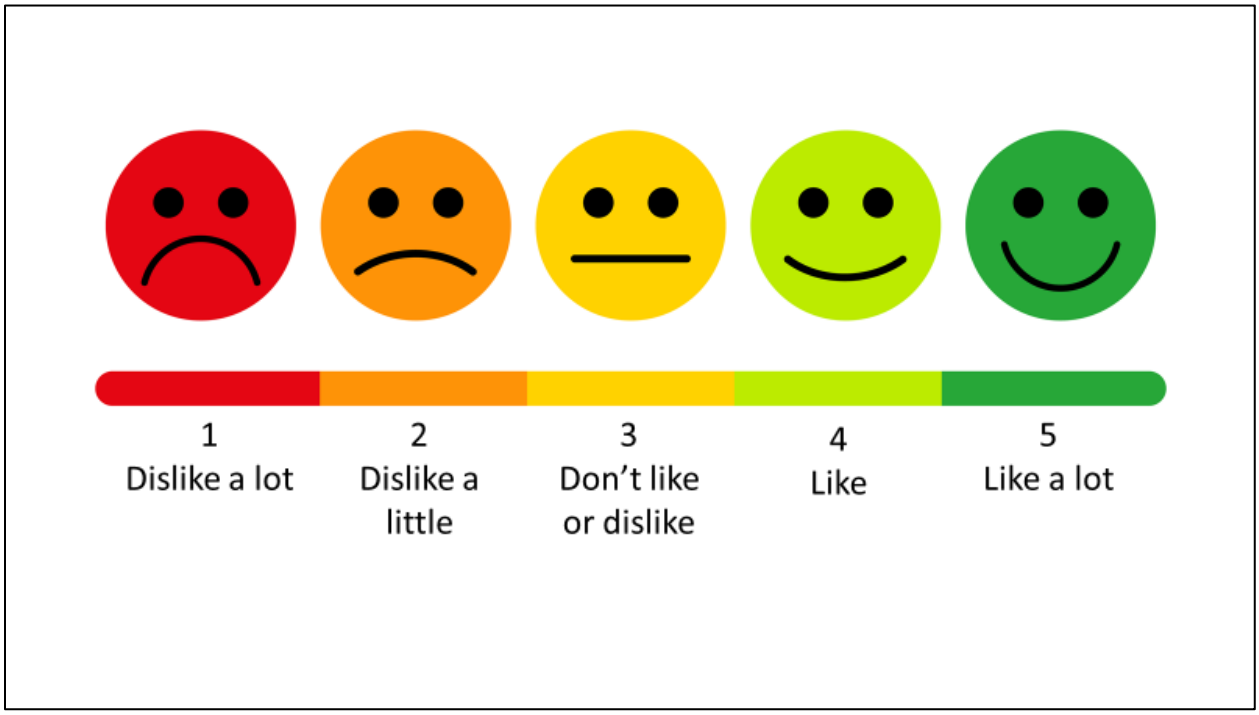
Visual representation of a humpback whale.

Visual representation of an emperor penguin.

Visual representation of a white rhino.

APPENDIX F

Visual Representation of Likert Scale



APPENDIX G

Complete Interview Guide

BEES

Part I – Attitudes and Feelings

1. *(Show animal picture)* This is a bee. Tell me what you know about bees. If you don't know anything, that's ok too!
2. *(Show Likert scale picture)* How do you feel about bees? On a scale of 1-5, how much do you like bees?
    1. *I dislike them a lot*
    2. *I dislike them a little*
    3. *I don't like them or dislike them*
    4. *I like them*
    5. *I like them a lot*
3. Why?

Now, I want to tell you something about bees…

Idiosyncratic Information (II) → Did you know that bees talk to each other? Not like us, they don't use words – but they do communicate by dancing! Bees eat pollen and nectar from flowers. When a worker bee finds a good spot full of nectar and pollen, like a big field of wildflowers, she goes back to the hive and does a waggle dance with her body to let the other worker bees know where the field is! Bees tell other bees where the flowers are by moving their butts in different ways depending on how far the flowers are, and which direction!

OR

Taxonomic Information (TI) → Bees are insects, so they have six legs, and four wings that make them fly about 20 mph. They tend to live in hives that contain up to 50,000 bees. They fly from flower to flower to collect nectar and pollen to bring it back to the other bees, because nectar and pollen is what bees eat, what gives them energy to keep flying from flowers to flower and then to go back to the hive.

4. After learning these facts do you think you like bees any more or less, or it hasn't changed?
5. A lot more/less or just a little more/less
6. Why do you think you like bees more/less/just the same?

Part II – Moral Reasoning

Now I am going to tell you a story that involves bees…

I want you to imagine that you are a farmer, and that you grow fruits and vegetables and sell them for a living. Sometimes, insects, not bees, but insects like stinkbugs or spiders, bite the fruits and vegetables, which can leave small brown marks on the peel and leaves of the fruits and vegetables. It's important to know that the fruit and veggies are still okay to eat, but sometimes people don't like to buy fruits and vegetables that have these marks on them. So, in order to make money by selling your fruits and vegetable, you need to make sure that these fruits and vegetables don't have brown marks on them: So, to keep away the insects like stinkbugs and spiders that can bite your fruits and vegetables, you can use something called pesticides: While the pesticides are really good at keeping insects away, they kill bees, too.

7. How much do you think it is ok for you to use pesticides that kill bees?
    1. It is definitely ok
    2. It is kind of ok
    3. It is never ok
8. Why?
9. Let's say that every farmer that grows fruits and vegetables uses pesticides that kill bees. How much do you think it is ok then?
    1. It is definitely ok
    2. It is kind of ok
    3. It is never ok
10. Why?
11. Let's say that bees are endangered animals. That means that there are not many left in the world, and soon they might all be gone. How much do you think it is ok?
    1. It is definitely ok
    2. It is kind of ok
    3. It is never ok
12. Why?

WHALES

Part I – Attitudes and Feelings

1. *(Show animal picture)* This is a whale. Tell me what you know about whales. If you don't know anything, that's ok too!
2. *(Show Likert scale picture)* How do you feel about whales? On a scale of 1-5, how much do you like whales?
    1. I dislike them a lot
    2. I dislike them a little
    3. I don't like them or dislike them
    4. I like them
    5. I like them a lot
3. Why?

Now, I want to tell you something about whales …

Idiosyncratic Information (II) → Did you know that whales talk to each other? Not like us, they don't use words, but they do communicate to each other with specific sounds! Whales swim together in groups. In these groups each sound has a specific meaning. Some whales make whistles, or squeaks: whales whistle to let other whales know they are there (like saying hello!), and they squeal when they are happy (like when they find a tasty fish). Also, some whales can even sing! For example, the songs of the humpback whale can be heard from almost 20 miles away!

OR

Taxonomic Information (TI) → Whales are mammals, even though they live in the ocean and may look like fish. Whales usually live in groups called pods. They breath air just like we do – but instead of a nose they use the blowhole on the top of their head. Some species can stay underwater for up to 90 minutes! Some whales, like the blue whale, do not have actual teeth, and eat mainly very tiny creates called krill and plankton. There are also whales who have teeth, like orcas. In some species, female whales are bigger than male whales. Whales have an amazing hearing.

4. After learning these facts do you think you like whales any more or less, or it hasn't changed?
5. A lot more/less or just a little more/less
6. Why do you think you like whales more/less/just the same?

Part II – Moral Reasoning

Now I am going to tell you a story that involves whales…

Imagine that you own a fishing company in Norway. The sea in Norway is full of flounder, cod, and other type of fish that are good to eat, but your company fishes whales, because whales are very big, and you can sell more fish meat and earn more money with less effort. You only have to fish one whale to make the same amount of money that you would make with a lot of cods and flounders!

7. How much do you think it is ok for you to fish whales?
    1. It is definitely ok
    2. It is kind of ok
    3. It is never ok
8. Why?
9. Let's say that every fishing company in Norway fishes whales. How much do you think it is ok then?
    1. It is definitely ok
    2. It is kind of ok
    3. It is never ok
10. Why?
11. Let's say that whales are endangered animals. That means that there are not many left in the world, and soon they might all be gone. How much do you think it is ok then?
    1. It is definitely ok
    2. It is kind of ok
    3. It is never ok
12. Why?

PENGUINS

Part I – Attitudes and Feelings

1. *(Show animal picture)* This is a penguin. Tell me what you know about penguins. If you don't know anything, that's ok too!
2. *(Show Likert scale picture)* How do you feel about penguins? On a scale of 1-5, how much do you like penguins?
    3. I dislike them a lot
    4. I dislike them a little
    5. I don't like them or dislike them
    6. I like them
    7. I like them a lot
3. Why?

Now, I want to tell you something about penguins…

Idiosyncratic Information (II) → Some penguins, like the emperor penguins, live in Antarctica, where it is super cold. Because it is so cold, penguins huddle really tight to one another in groups called huddles or waddles. Every 30 to 60 seconds, these penguins that are packed super tightly shuffle around and reorder themselves: They do that because that allows every penguin to spend some time in the center of huddle, which is the warmest part. That way, they take turns at the center of the huddles and every penguin can get warm for a bit!

OR

Taxonomic Information (TI) → Penguins are aquatic flightless birds, which means that, while they can't fly, their stiff flippers, webbed feet, and sleek shape make them excellent at swimming. In fact, they spend most of their lives in the ocean and do nearly all of their hunting for food such as squid and crabs underwater. There are about 17 and 20 living species of penguins.

4. After learning these facts do you think you like penguins any more or less, or it hasn't changed?
5. A lot more/less or just a little more/less
6. Why do you think you like penguins more/less/just the same?

Part II – Moral Reasoning

Now I am going to tell you a story that involves penguins …

Imagine that you are own a fishing company in South Africa, where penguins live and make their nests in colonies with other penguins. You decide to fish near the penguins colonies because there is plenty of fish there: You can simply use a big net to catch the fish fast and sell it for money. However, that is the same fish that the penguin eats, and if you fish it, there is not going be any left for penguins to eat. Also, sometimes penguins get stuck in fishing nets, and can die because they are stuck.

7. How much do you think it is ok for you to fish in areas where penguins live?
    1. It is definitely ok
    2. It is kind of ok
    3. It is never ok
8. Why?
9. Let's say that every fisherman in South Africa fishes in areas where penguins live. How much do you think it is ok then?
    1. It is definitely ok
    2. It is kind of ok
    3. It is never ok
10. Why?
11. Let's say that penguins are endangered. That means that there are not many left in the world, and soon they might all be gone. How much do you think it is ok then?
    1. It is definitely ok
    2. It is kind of ok
    3. It is never ok
12. Why?

RHINOCEROS

Part I – Attitudes and Feelings

1. *(Show animal picture)* This is a rhino. Tell me what you know about rhinos. If you don't know anything, that's ok too!
2. *(Show Likert scale picture)* How do you feel about rhinos? On a scale of 1-5, how much do you like rhinos?
    1. I dislike them a lot
    2. I dislike them a little
    3. I don't like them or dislike them
    4. I like them
    5. I like them a lot
3. Why?

Now, I want to tell you something about rhinos…

Idiosyncratic Information (II) → Rhinos talk to each other. Not like we do, they don't use words, but they use many funny noises when they're communicating. When rhinos fight, they growl and make a noise that sounds like a trumpet. When they are angry, they make alarm noises that sound like sneezes. Rhinos also communicate through their poo. When there are several rhinos poos in the same place, rhinos can tell who is in the area just by smelling the poos!

OR

Taxonomic Information (TI) → Rhinoceroses are also called rhinos, and there are only five species of them. They are some of the biggest animals that live on earth: most weight well over a thousand pounds! They are herbivores, which means that they eat mostly leaves. They have one or two horns on their forehead, and a thick skin that protects them from the weather. They have a very big cylindrical body with shorter legs.

4. After learning these facts do you think you like rhinos any more or less, or it hasn't changed?
5. A lot more/less or just a little more/less
6. Why do you think you like rhinos more/less/just the same?

Part II – Moral Reasoning

Now I am going to tell you a story that involves rhinos…

Imagine that you are a merchant in South Africa, where some rhinos live. Some people think that rhinos' horns are very beautiful, and are willing to pay a lot of money to buy these horns. To sell the horns though, many merchants end up killing rhinos – they can't just remove the horns. Merchants can then sell horns and make a lot of money for themselves.

7. How much do you think it is ok for you to kill rhinos to take their horns?
    1. It is definitely ok
    2. It is kind of ok
    3. It is never ok
8. Why?
9. Let's say that every merchant in South Africa kills rhinos to get the horns. How much do you think it is ok then?
    1. It is definitely ok
    2. It is kind of ok
    3. It is never ok
10. Why?
11. Let's say that rhinos are endangered. That means that there are not many left in the world, and soon they might all be gone. How much do you think it is ok then?
    1. It is definitely ok
    2. It is kind of ok
    3. It is never ok
12. Why?

Part III – Behavioral Outcome

(AFTER COMPLETING ALL THE FOUR ITEMS)

Thank you so much for helping me today! Because of your help today, you earned $10!

I can either give you the whole $10 and you keep it, or you can donate it to an organization that protects animals.

There is the Bee Conservancy, which protects bees; the Ocean Alliance, which protects whales; the Global Penguin Society, which protects penguins; and the International Rhino Foundation, which protects rhinos.

You can either donate to one of either the whole $10, or you can donate part of it, and you get to keep the rest. We would donate it for you, so you don't have to actually go and donate it. What do you think?

(*If they choose to donate*) Which one do you want to donate to? Why?

(*If they choose NOT to donate*) Now, I understand that you might want to keep the $10, of course, but if you were to tell someone else to give a donation to an organization that protects either the bees or the whales or the penguins or the rhinos, which ones would you tell them to donate to? Why?

APPENDIX H

Coding Manual

Coding Manual

1. Make a copy of the Excel Data Sheet (only you will be using this new document);
2. Open the Excel Data Sheet;
3. Go through every question in order:
    a. Quantitative Questions (Qs 2, 4/5,7,9,11) → Data has already been entered in numerical form, and does not need any more coding. Should there be missing data, they can be entered following the Coding Scheme described below.
    b. Qualitative Questions (Qs 1,3,6,8,10,12,13) → Within every question, look for the themes described in the Coding Scheme below: If a participant's answer presents the elements of a given theme, highlight/underline the corresponding part of the answer, and write how many times each code appears in the answer (e.g. if a participant answers Q1 with four taxonomic facts, write "4" in the TAXO column).
    Note that:
        i. Some statements need to be "deconstructed."

            Ex. *You can throw rings on a rhino's horn*: This statement seems unrelated to our categories, which places it in the **OTH** (Other) category, but it also assumes that participant knows that *rhinos have horns*, which is coded under **TAXO** (Taxonomic).

        ii. Questions can have more than one code!

            Ex.: *Bees are cute and they give us honey*:

            Bees are cute → **PER** (it is Personal, because it refers to the participant's perception of bees),

            They give us honey → **TAXO** (It is a taxonomic fact)

        iii. If you are not sure, use the code **OTH** (Others).
4. Repeat 4 & 5 for each interview.

Coding Categories

Write how many times a participant's answer contain any statements that fit the criteria below. Each answer can have one more than one code (e.g. **Taxo** and **Oth**) and more than one statement per code (e.g. "Bees have wings, they sting, they make honey"→ That is 3 taxonomic facts, so write "3" in the **Taxo** column).

Q 1 – What do you know about *x*? (This will be coded in the columns after the "HOW MUCH DO YOU KNOW (Q1)" column on the Excel Data Sheet)

Code	**Taxonomic**	**Idiosyncratic**	**Personal**	**Ethical/Moral**	**No Knowledge**	**Other**
Abbreviated Code	TAXO	IDIO	PER	ETH	NO	OTH
Criteria	Statements that reflect scientific, biological, physical facts	Statements that reflect novel, unique, facts (or "fun facts")	Statements that reflect personal perceptions, preferences, interests, projects (of oneself or others)	Statements that reflect moral or ethical issues	Statements that reflect lack of knowledge, no information	Statements that are ambiguous, or do not reflect any of the other codes
Examples	- *Bees have wings;* - *Rhinos have horns;*	- *Bees can do a waggle dance;* - *Whales can sing;* - *You can fit a car into a whale's mouth.*	- *Whales are gentle giants;* - *Penguins are cute and awesome;* - *They are fun to watch at the zoo;* - *Bees do not sting us unless we threaten them.*	- *Rhinos are endangered;* - *It is illegal, I think.*	- *I don't know anything;* - *I don't know.*	- *There are many movies about penguins.*

Q2 – On a scale of 1-5, how much do you like x?

1. Dislike a lot
2. Dislike a little
3. Don't like, don't dislike
4. Like a little
5. Like a lot

Q3 – Why? (Same as for Q1. This will be coded in the columns after the "WHY? (Q3)" column on the Excel Data Sheet)

Code	**Taxonomic**	**Idiosyncratic**	**Personal**	**Ethical/Moral**	**No Knowledge**	**Other**
Abbreviated Code	TAXO	IDIO	PER	ETH	NO	OTH
Criteria	Statements that reflect scientific, biological, physical facts	Statements that reflect novel, unique, facts (or "fun facts")	Statements that reflect personal perceptions, preferences, interests, projects (of oneself or others)	Statements that reflect moral or ethical issues	Statements that reflect lack of knowledge, no information	Statements that are ambiguous, or do not reflect any of the other codes
Examples	- *Bees have wings;* - *Rhinos have horns;*	- *Bees can do a waggle dance;* - *Whales can sing;* - *You can fit a car into a whale's mouth.*	- *Whales are gentle giants;* - *Penguins are cute and awesome;* - *They are fun to watch at the zoo;* - *Bees do not sting us unless we threaten them.*	- *Rhinos are endangered;* - *It is illegal, I think.*	- *I don't know anything;* - *I don't know.*	- *There are many movies about penguins.*

Q4/5 – After learning these facts, do you like x:

1. A lot less
2. A little less
3. Just the same
4. A little more
5. A lot more

Q6 – Why do you think you like *x* more/less/same?

This question has two different sets of codes. Both will be coded in the columns after the "WHY? (Q6)" column on the Excel Data Sheet

- Statements that reflect reactions toward the information provided

Code	**Positive**	**Negative**	**Neutral**
Abbreviated Code	POS	NEG	NEUT
Criteria	Statement that reflect positive attitudes, emotions, valence	Statement that reflect positive attitudes, emotions, valence	Statement that have no positive/negative valence, do not reflect any positive/negative quality or emotion
Examples	- *They are cool and awesome!* - *That is an interesting fact!* - *That's cool!*	- *That is gross* - *That is lame* - *I still don't like that*	- *That is not interesting to me* - *I don't know* - *Still don't really care either way*

- Statements reflecting whether participants knew that already

Code	**Yes**	**No**
Abbreviated Code	Y	N
Criteria	Statement that reflect participants' knowledge of facts	Statement indicating that participants did not know the facts
Examples	- *I knew that already*	- *I didn't know they could do that*

Q7 - How much it is ok for you to do it?

1. Definitely ok
2. Kind of ok
3. Never ok

Q8 – Why do you think it is ok/not ok/kind of ok to do it? (This will be coded in the columns after the "WHY? (Q8)" column on the Excel Data Sheet)

Code	**Anthropocentric**	**Biocentric**	**Unsure**
Abbreviated Code	ANTHRO	BIO	UNS
Criteria & Examples	Statements that highlights the effects that the environment (or actions upon it) has on humans. The focus of this reasoning is on humans. Nature is considered in relation to how it can benefit/harm humans. Includes statements that reflect: - Personal interests, preference, predilections, entertainment; projects of self and others. Ex: o *Because I like honey* o *Because they are cute* - Material and physical welfare of human beings (self or others). Also involves justifications related to cultural norms, rights and beliefs. Ex: o *Because we will not have different fruits and veggies anymore*	Statements that reflect an appeal to the moral standing of nature, independently (at least in part) from its usefulness to humans. Nature is considered in itself, has having rights, and as something to be protected. Includes statements that reflect: - The value of nature as not only related to its benefits to humans. Ex.: o *They are creatures and have the right to be alive* - Religious or moral beliefs. Ex.: o *They are creatures of God* o *It is wrong to kill animals* - The balance of the natural environment, ecosystems, food chain. Ex.:	Statements that are hard to categorize as either ANTHRO or BIO

	○ *Because they don't harm us* ○ *It is maybe a practice among indigenous peoples.* - Negative consequences, whether legal or personal. Ex.: ○ *It may be illegal* - Importance of nature for human viewing or sensorial pleasure. Ex.: ○ *they help pollinate flowers and flowers are beautiful;* ○ *because they are beautiful and majestic*	○ *If they die, the environment will be off balance, and other animals will die too* - Statements reflecting a harmonious relationship between humans and nature. Ex.: ○ *Humans and animals share the world, and we should respect and protect animals.* - Statements that equate the welfare, happiness and right of animals to those of humans. Ex.: ○ *They have the same right to live as we do* ○ *Would you like it if I stole your food?*	

Q9 - How much it is ok do it if everyone does it?

1. Definitely ok
2. Kind of ok
3. Never ok

Q10 – Why do you think it is ok/not ok/kind of ok to do it? (Same as for Q8. This will be coded in the columns after the "WHY? (Q10)" column on the Excel Data Sheet)

Q11 - How much it is ok to do it if x is endangered?

1. Definitely ok
2. Kind of ok
3. Never ok

Q12 – Why do you think it is ok/not ok/kind of ok to do it? (Same as for Q8/10. This will be coded in the columns after the "WHY? (Q12)" column on the Excel Data Sheet)

Q 13 – Why would you choose to donate to *x*? (This will be coded in the "Justification – Donation" column in Excel Data Sheet)

Code	**Personal**	**Ethical**	**Information**	**Other**
Abbreviated Code	PER	ETH	INFO	OTH
Criteria	Statements reflecting personal preference or relations for a given animal	Statements reflecting the moral need to help a given animal	Statements mentioning the facts we provided in the interview (taxonomic or idiosyncratic)	Statements that do not fit the other categories.
Example	- *Because I really like penguins* - *Because I can see bees everywhere and they are more part of my world than animals that maybe live far away*	- *Because they are the most endangered of all of the animals, I think* -	- *Because that thing you said about the bees that can dance was very cute*	- *Because I feel like no one donates to them*