BRILL

SOCIETY & ANIMALS 26 (2018) 1-21

Animals & Society Institute

brill.com/soan

Animals "Я" Us: Egomorphism in/for Science and Environmental Education

Rute Monteiro
University of Algarve, Portugal
rutemonteiro@ualg.pt

Giuliano Reis
University of Ottawa, Canada

Abstract

We argue for the notion of *egomorphism* as an inexorable discursive element in/for children's interspecies encounters mediated by nature interpreters. We do so by examining the discourses of a public environmental educator in Canada and a dolphin trainer in a marine park in Portugal while mediating such pedagogical experiences. Our analytical work contributes to expanding the understanding of how human–nonhuman interactions can create opportunities in science and environmental education to disrupt the notion that humans are superior and therefore removed from other animals.

Keywords

animal – discourse – education – egomorphism – nonhuman

Introduction

The objective of the present research-based argumentative study is twofold: (i) shed light on the mediational role played by nature interpreters' discourse during human interspecies encounters involving children and (ii) contemplate the centrality of the concept of *egomorphism* in such pedagogical interactions. In doing so, we contribute to further understanding the ways in which

© KONINKLIJKE BRILL NV, LEIDEN, 2018 | DOI 10.1163/15685306-12341526

nonhuman animals figure in human lives. Our argument is built on the detailed analysis of the discourses of two interpreters while attending to young children's experience of meeting nonhumans—specifically, local sea animals and dolphins in captivity. We also draw on notions of peircean semiotics and symbolic interactionism (Habermas, 1987) to help us in extracting meaning from the mediated interactions that we have selected.

In addition, the discursive analytical method that we employ requires us to consider that our participants talk in ways that are both constructive and action-oriented (Edwards, 2005). That is, their discourses not only offer a particular version of things when there are infinitely many alternative versions, but are also constructed in ways that perform actions in and for the occasion of the interactions. More importantly: it dissuades analysts from guessing people's intentionality behind what they say. Rather, the focus is on what is being done when they talk.

In the next section, we examine the way in which a Canadian public environmental educator named Kelly refers to the animals that she wants to introduce to an elementary science class. Her talk allows us to begin contemplating the discursive tensions inherent to interspecies interactions in preparation for the second analysis, which is more comprehensive. At that point, we will turn our attention to an education staff member of a marine park in Portugal while facilitating the encounter of children with trained dolphins. Notably, the distinctive length and detail of each one of the analyses are merely the result of how those different—yet connected—discourses were performed. They nevertheless reflect the subtlety of the education potentialities that such mediated human-nonhuman experiences carry for a young generation of school-age boys and girls.

Pseudonyms are used throughout the manuscript for all participants, including nonhumans. This decision is in line with recent discussions about whether research ethical rights should be extended to *more-than-human* animals (Oakley et al., 2010). This helps counteract attempts to create a hierarchical divide between humans and nonhumans as well as the common tendency to disregard the agency of the latter. Moreover, we have opted to keep the gender-oriented personal pronoun references to the dolphins as they exist in Portuguese.

Introducing Kelly's Friends

Kelly is a public educator who has developed an outreach science/environmental program for public schools in a Western province of Canada (Reis & Roth, 2007). She has been invited to talk to a grade four science class about

some live animals that she has brought in from a local beach. The animals are displayed in open plastic trays filled with saltwater and before students can hold them, the following instructions are given:

> Kelly: *They are other living creatures just like you and I are living creatures. So, you wanna treat them like you would somebody else who's your friend.*

In this transcript, Kelly's discourse contains references that mark both the distinctiveness (discontinuity) and indistinctiveness (continuity) between the nonhuman animals she brought into the classroom and humans. For example, when she refers to the "other living creatures" in the trays, the adjective "other" qualifies them as *different from* Kelly herself, who is as human as any of the students listening to her. As a result, it is safe to assume that Kelly is aware that the sea animals are indeed not humans. Notably, at the same time, she points out that those nonhuman animals are "just like you and I are living creatures." Here, Kelly's use of the preposition "like" followed by the repetition of the expression "living creatures" suggests that the nonhuman animals on display are *similar* to the humans in the room. Kelly concludes: "So, you wanna treat them like you would somebody else who's your friend." This, in turn, requires students to not only understand the nonhuman animals on the basis of their own experiences with human friends, but also to extend that same friendliness to them ("you *wanna* …").

In addition, Kelly's discourse implicitly introduces the notion of conservationism towards nonhuman animals since social convention and common sense determine that people must care about the wellbeing of their friends. Indeed, some may argue that in mentioning the concept of friendship in this context, Kelly considers those animals to be *persons* (Sztybel, 2008). Whatever the case may be, Kelly's discourse is both metaphorically anthropomorphic and an acknowledgement that humans form a not-so-distinct group from "other" animals.

Looking more closely, it becomes clear that Kelly adopts "humanness" (Milton, 2005, p. 255) as the primary point of reference for her *understanding of*—and *discrimination from*—nonhuman beings. In other words, it appears to be (intuitively in this case) more accurate to say that she refers to the marine animals as *human-like* as opposed to *like humans* (Milton, 2005). More importantly: she probably draws on her sense of *self* rather than her general membership to the category *human* as the primary point of reference for *perceiving human characteristics in*—rather than *attributing characteristics to*—nonhumans. This is a logical choice: humans can only know the human

aspect of everything—what the semiotician Charles Peirce called an "anti-psychologistic stance on communication" (Bergman, 2009, p. 88). It figures: no human can ever know exactly what it is like to be a sea urchin or an eel. Consequently, Kelly has no option but to base her discursive practice on what she knows—and she only knows how to be the human that she is.

By the same token, Kelly's discourse also creates the possibility for the students to exercise their individual humanness when faced with the task of understanding those never-seen-before animals. In establishing that students can befriend the sea creatures (and vice versa), she invites them to *see themselves in* the animals. After all, they presumably understand what it means to be friends with someone. This action is likely further supported by the distinction that Kelly makes between herself ("I") and the students ("you"). Instead of affirming that the nonhuman animals "are other living creatures just like *us*," she opts for saying "they are other living creatures just like *you and I*." We cannot ever know why exactly she says it this way, but in separating her *self* from the students' *selves,* she once again creates a chance for them to explore their own individualities in the same manner that she does when addressing those "other" animals as friendly creatures. If this is indeed the case, the idea of *egomorphism* (Milton, 2005) becomes more suitable than *anthropomorphism* for understanding how Kelly—and others doing the same mediational work that she does—positions herself in relation to nonhumans.

Anthropomorphism—literally "humans at the centre" (Martusewicz, Edmundson, & Lupinacci, 2011, p. 74)—is a term "pretty well established" (Curry, 2006, p. 43). It originated from the human capacity for "reflexive consciousness" (Serpell, 2005, p. 123). Anthropomorphism helps humans to understand (rather than represent) who we are (Heuer, 2002). It reflects the way people think about nonhuman animals as an integral part of their unique personal existence, which presumably grants them membership to the larger category of human(ity). It is more than merely imposing human traits onto other animals (Gendlin, 1985); it is about perceiving qualities in animals that we *recognize in ourselves*. If this is indeed the case, the concept of *egomorphism* (Milton, 2005) seems to be a better suited term to describe this possibility, as it would arise from our efforts to make sense of the world and the natural empathetic connections with other animals. Besides, this definition entails openness to acknowledging the existence of shared characteristics as well as the occurrence of direct contact among different animal species.

In sum, egomorphism is different from anthropomorphism in that it offers a person-centered perspective on how individual humans make sense of the nonhuman universe. As the etymology of the word indicates (*ego* = "self" + *morphism* = "structure"), the term egomorphism literally specifies that one's

sense of self—along with its bodily constitution—is the reference against which comparisons are made possible between a human being and other animals (like sea urchins and dolphins). In the words of Lewontin (1982): "the organization of environmental possibilities into a coherent system has its source within the individual, being a projection of its own internal organization onto the world outside its body" (p. 160).

Finally, rather than explore the potentially contentious and problematic nature of egomorphism—as is the case with anthropomorphism in the natural sciences—here we seek to advance the idea of egomorphism as an inevitable way for every human being (as opposed to a unified collective "humanity" represented in each one of us) to apprehend the meaning of nonhuman animals. Egomorphism also has a component of empathy towards the other. For instance, this seems to be evident in preoperational children, who make sense of the external world always in terms of their own (individual) perspective (Siegler & Alibali, 2005).

Expanding on Significance of Kelly's Discourse for Our Argument

Kelly's example reveals the complexity of human interspecies encounters. It also offers details of how one's approach to teaching mediates students' science and environmental learning. The situation where an expert like Kelly facilitates the encounter between students and other animals is motivated by the fact that the study of "living things" is a recurring topic in most science programs (Venville, 2004). Therefore, from an early age, children are probed for their explanatory understanding of the characteristics and needs of different beings.

In schools, the investigation of life relies upon children's innate curiosity that—perhaps irresistibly—draws them to explore nature (Ministério da Educação e Ciência, 1991; Ontario Ministry of Education, 2007). In addition, there is the anticipation that such interactions with the natural surroundings could contribute to the realization that humans have the responsibility to care for the places and living things with which (or whom?) we share our existence, including other fellow humans (Reis et al., 2015).

The duty of protecting nature/environment is a laudable aspiration in and of itself. Not only does it stress the existing close bonds between the fields of science and environmental education (Haluza-DeLay, 2013), but it also implies a paradox similar to the one observed in Kelly's transcript—that is, where humans position themselves at the same time distinctly and indistinctly from everything else (Vining, Merrick, & Price, 2008).

This seemingly contradictory way in which humans situate themselves in relation to other living organisms can also be seen in the interchangeable use of the words *nature* and *environment*. While the former is characterized as an objectified notion of the physical world available only to the detached observer—*reality of*—the latter suggests a more constituting perspective on a person whose environment it is—*reality for* (Ingold, 1992, p. 44). Although both are cultural constructs, nature corresponds to "a certain set of human ideas about the world and our place in it" (McKibben, 1990, p. 7), whereas environment "recognizes that the so-called 'human' and 'non-human' natures are ineluctably intertwined, parts of a proverbially inseparable whole" (Elliot, 2006, p. 1). At the risk of having our decision judged as inadequate by some readers, we have nevertheless decided to use these two concepts interchangeably throughout our paper to facilitate a more focused construction of our argument.

The apparently conflicting discourse around the human dis/connection from/with other living creatures is not confined to classrooms and ministries of education documents. Indeed, this is an unfortunate characteristic of our Western culture more broadly, where "human life [is situated] outside and above an inferiorised and manipulable nature" (Plumwood, 2002, p. 4). In this context, and as suggested elsewhere (Louv, 2005), the combined *study of* and *exposure to* nonhumans holds the potential to help humans realize that "however important [we] may be, [we] are a mere speck of dust in the larger picture of nature" (de Waal, 2016, p. 124). This is not to deny that humans are special in some ways—and so are other animals—but to acknowledge that cognitive, emotional, and behavioral continuity across life forms is larger (and more important in terms of emphasis) than any discontinuity or differences that might serve to set us apart in a position of superiority to other living creatures.

In situations where children are intentionally brought together with other animals, the mediation role played by knowledgeable individuals like Kelly—generally known as *interpreters*—is commonplace. This is especially true for circumstances where young children's "desire to touch" (Bulbeck, 2005, p. 32) can be fulfilled while also triggering a sense of intimacy (Servais, 2005). Moreover, these types of situations often take place during field excursions that are adult-supervised (monitored) regardless of their direct connections with school activities. Therefore, pedagogical exchanges between visitors and trained staff have been documented in zoos (Wijeratne, 2014), aquaria (Dohn, 2011), natural parks (Wallace, 2012), and botanical gardens (Vergou & Willison, 2016). In addition, the messages that trained professionals convey to visitors have been found to be relevant, meaningful, enjoyable, and thematically organized as to facilitate learning about the natural world (Beck & Cable, 2011). In

other words, there is a systemic effort, by those employed to facilitate human interspecies encounters, to promote a positive attitude and empathy towards nonhumans.

On the other hand, little is known about the specific significance of interpreters' discursive pedagogical exchanges during these types of interactions in/for science and environmental education. Specifically, and as suggested in the analysis of Kelly's talk, the notion of egomorphism remains to be better situated within the discussion about the intricacies of educating children to learn not only *about*, but also *in* and *for,* science and the environment (Palmer & Neal, 1994).

Having elaborated on the significance of Kelly's discourse for our central argument, now it is time to turn our attention to another set of interactions. They contribute to the understanding of how an egomorphic approach to human-nonhuman interactions creates opportunities for disrupting the cultural assumptions that we are superior to, disconnected or independent from other animals.

Swimming with Dolphins

The pedagogical encounters that we selected for the second analytical portion of our argument come from a database collected at a private marine park in Portugal. They pertain to a larger study on the discursive interactions between adults and children in/for science and environmental education. In addition, their selection was based on the fact that they best represent the egomorphic characteristic of the interpreter's discursive interactions with young visitors.

In total, 36 children took part in the data collection process (video recording was the main instrument used for information-gathering purposes), of which 41.6% were girls (n = 15) and 58.4% were boys (n = 21). These children were between the ages of 6 and 12 years old and had permission from their parents to volunteer for this study. The children were equally divided into 6 groups for meeting with the dolphins in the pool. Table 1 details specific information pertaining to each session, including their duration and the names and ages of the dolphins. The analyses that we perform next come from our observations recorded in two of those groups—selected on the basis of their convenience for better illustrating our argument.

According to the institutional website of the park, the dolphin attraction is based on the principles of conservation and environmental education. Akin to the curriculum documents consulted from Canada and Portugal (Ontario

TABLE 1 *Interactive sessions*

Month/Day	Group	Number of female children in the group	Number of male children in the group	Duration of videotaped educational session	Duration of videotaped pool session	Name of dolphin (sex)	Age of dolphin	Name of trainer/ interpreter
May 1	1	0	6	15′49″	44′18″	Darwin (m)	16	
May 3	2	1	5	18′09″	34′35″	Shakespeare (m)	18	
	3	3	3	18′09″	31′42″	Homer (m)	10	
	4	3	2	22′03″	33′48″	Zeus (m)	11	Anna
May 17	5	5	1	25′15″	32′55″	Homer (m)	10	
	6	3	4	25′15″	32′25″	Darwin (m)	16	

Ministry of Education, 2007; Ministerio da Educacao e Ciencia, 1991), the park's official website indicates a conviction that the observation and direct learning with different species increase public appreciation and concern for those environmental problems that threaten life on the planet.

After completing a mandatory 30-minute training on the physiological anatomy of dolphins (educational session), participants dressed up in polyethylene suits and were escorted by an educator to the lagoon. Once in there, they were introduced to the dolphin trainer who was already in the water with a dolphin. That moment marked the beginning of each of the interactive sessions (pool session), which lasted an average of 35 minutes. Our analyses pertain to two specific moments in this second part of the day experience, both mediated by the same interpreter: introduction of the dolphin's name followed by a brief period dedicated once again to the dolphin's physiology and anatomy (about 15 minutes long).

During all times, children were not allowed to interact with the animals without the direct supervision and mediation of the interpreter. In addition, she frequently asked questions about the animals to the children, who in turn were expected to listen attentively. The following exchange involving a 10-year-old boy (Victor), an interpreter (Anna), and a dolphin (Shakespeare) illustrates the typical interactions that we observed (and transcribed according to Jefferson, 2004):

Victor: *Is he with the eyes open?* (Slightly tilts his body to the right and looks at the dolphin's eye)
Anna: (Standing in front of the Dolphin and holding the bottom part of his mouth) *Yeah, he has his eyes open to see you.* (Tilts her head sideways as if to see the dolphin's eyes)
Victor: (Widens his eyes, brings his head back and smirks)
Anna: *Right?*
Victor: *But now it looks like his eyes are shut.* (Looking at the dolphin's right eye)

During this interaction, Victor interrupts Anna to ask her if the dolphin's eyes are open. Anna, who is in front of the animal, uses an interjection ("yeah") to confirm that "his" (the dolphin's) eyes are indeed open. At the same time, she leans her head sideways to verify it (Figure 1). She adds: "he has his eyes open to see you." Victor's facial expression suggests that he is surprised (Darwin, 1872): he widens his eyes, brings his head back and smirks. That implies that Anna's answer and his observation of the dolphin likely did not match his anticipation of Anna's answer to his question. As a result, one can say that Victor initially misinterpreted the dolphin's actions. This way, this particular mediated encounter between Victor and Shakespeare could be said to have forced Victor to expand his perception of the dolphin as they were both looking at each other at the same time, which denotes that their presences were mutually acknowledged.

This particular mutual gaze exchange between Victor and Shakespeare supports the notion that in such situations "humans would then be encouraged to recognize that they are not the only ones looking … [nonhuman animals] can

FIGURE 1 *Left: Anna (interpreter) points to the dolphin's right eye while talking to Victor (forefront). Right: Victor slightly tilts his body to the right to observe the dolphin's right eye.*

and do look back" (Warkentin & Fawcett, 2010, p. 113). Moreover, in the words of Berger (1980): "Man becomes aware of himself returning the look.... And so, when he is *being seen* by the [nonhuman] animal, he is being seen as his surroundings are seen by him" (pp. 4-5). Finally, Victor's tilting of the head can be also considered as an "appeasement signal" (Servais, 2005, p. 224).

Another anatomical part of the dolphin that was discussed was the fins:

> Anna: *Let's see if you have paid attention* [*to the educational session*]. *What do dolphins have here in these pectoral fins?*
> Philippe: *Fins.*
> Anna: *And what do we have here?* (Her hands are placed on top of the pectoral fins of the dolphin)
> Philippe: *Hands.*
> Anna: *Bones.* (Raises both her hands back and puts them again on the pectoral fins with the palms up) *Bones like our hands. They are in here as well, but only they are covered.*

In this exchange, the interpreter starts by indicating to the children that she was going to check whether they had paid attention to the instructional session that took place before they came to the pool. This can also be seen as a challenge to the children, where they have to show how much they had learned from the environmental educator. Next, Anna points to the pectoral fins of the dolphin with her right index finger while the dolphin is with the ventral side up: "What do the dolphins have here in these pectoral fins" (see Figure 2). The fact that she points to the object of her question in itself indicates to the children what part of the dolphin she is referring to. At the same time, it provides a visual cue of what structure they are expected to talk about.

One child (Philippe) says "fins," as if repeating what he just heard Anna say. In response, the interpreter uses the conjunction "and" followed by another question ("what do we have here?"), which indicates that the child's response was incomplete. This time, both her hands are placed on top of the pectoral fins. Philippe's immediate reaction is to say "hands." This, in turn, suggests that he sees the type of relationship that Anna attempts to discursively construct between her hands and the dolphin's fins: there are hand (-like) structures concealed inside them. (On that note, according to Servais [2005]: "the fin and the thumb [are] a metaphor for the *hubris* of man—contrasted with the grace of the dolphin" [p. 212].)

Anna reacts almost immediately to Philippe's answer and says "bones." This demonstrates that she not only knew the answer to her own question, but also that Philippe's second guess was wrong. At this point in the interaction, Anna

FIGURE 2 *Left: Anna (interpreter) touches the dolphin's fins to specify that her talk is directed to that part of the animal's body. Right: Anna turns her palms up to create an analogy between her hands and the dolphin's fins. (Note that a number of students keep their hands on the dolphin.)*

lays down her hands, open with palms up, on both fins and continues: "bones like in our hands." Next, she once more lays her hands down on the pectoral fins and concludes: "[the bones] are here, but they are covered." In this context, Philippe not getting the answer right is understandable since bones are not apparent on the outside of either the fins or human hands. Nevertheless, this specific comparison between hands and fins is extended by Anna during a later interaction with a different group of children:

> Anna: *Here* (Touching the base of the two fins) *they have a little arm and a shoulder. But at the bone level is what we have here, in hands.*

In noting that dolphins have "a little arm and shoulder," Anna points to children that there is a strong similarity between the anatomy of humans and dolphins, although the dimensions of their bodies vary. Even when the anatomical similarities between the two species were much more evident, for example, with regards to the presence of teeth, students seemed to be surprised by the information provided by the interpreter.

> Anna: *Pay attention.* (Grabs the dolphin nose)
> Philippe: *He has teeth!*
> Biana: *He does.*
> Anna: *Of course!*

Biana: *Everyone has teeth!*
Anna: *You know how many teeth dolphins have? More or less, in a dolphin? You were not attentive?* (Dolphin has his mouth open)
Anna: (Shakes her head from side to side while the dolphin imitates her)
Children: (Five children move away with their shoulders shrugged. Andrea screams)
Philippe: *Twenty.*
Anna: *You were not attentive to what the educator said! Well no, no Zeus, they don't know!* (Anna is talking to the dolphin)
Children: (laughs)
Philippe: *He was saying no.*
Anna: *Well, you were not attentive.*
Children: (They approach the dolphin)
Anna: *Dolphins have approximately between 80 and 100 teeth.*
Philippe: *Fire, so many!*
Anna: *There are many teeth. Have you ever seen this! And did you know that they do not chew the food!?* (Shaking her forefinger twice)
Children: *Yes. Yes, swallow.*
Anna: *Exactly.* (Nodding) *There are many teeth. Have you ever seen this!*
Philippe: *They only have teeth to hold.*
Anna: *To hold, defend themselves or cut any fish that is too large.* (Shows her hands and shakes her fingers twice) *But they usually swallow the fish entirely.*

This pedagogical encounter begins with Anna asking for the six children in the group to pay attention to Zeus's open mouth. Philippe exclaimed: "He [the dolphin] has teeth!" which was followed by the confirmation of two other children ("he does" and "everyone has teeth") and Anna ("of course!"). Interestingly, to say that dolphins have teeth like "everyone" is to place them among people and accept the existing parallelism/continuity of the two species. When Anna asks the children how many teeth dolphins have, there is no immediate response. She jokingly expresses "disappointment" and signals the dolphin by moving her head from side to side, to which Zeus reacts by moving his head the same way several times as if saying "no." Then, Philippe takes a guess: "twenty." Anna does not talk back to Philippe but refers to the lack of attention of the children in the session prior to the interaction: "you were not attentive." That also means that Philippe's answer is wrong. Anna reinforces the notion that children did not pay attention before giving out the answer: "Dolphins have

approximately between 80 and 100 teeth" (Figure 3). Once again, this shows that she knew the answer to her own question. Philippe expresses surprise, which denotes that this information was new to him: "Fire, so many!" On the other hand, when Anna asks if the children knew that dolphins do not chew their food, they all appeared to have remembered the instructional session with the environmental educator by stating: "Yes, swallow." Anna says "exactly" and nods, thus confirming that it was the desirable answer she was looking for. Philippe adds: "They [dolphins] only have teeth to hold." Anna complements: "to hold, to defend themselves …"

In this exchange, the number of teeth can be seen as a distinction between humans and dolphins that is introduced to the children. On the other hand, it is clear that the children know that teeth are used differently by each species. In

FIGURE 3 *The dolphin (Zeus) opens his mouth so that the interpreter (Anna) can show his teeth to the children.*

addition, chewing is a concept that needs not to be explained in this context. That is, Anna's talk is centered on the comparable anatomical parts of humans and dolphins—even when the association is not evident at first sight. The next example illustrates that aspect of her discourse:

Anna:	*Here we have the caudal fin.* (Holding the dolphin's caudal fin with both her hands) *Thomas, come closer to me. Do you know what are these little marks?* (Points to the marks on the caudal fin)
Children:	*Fingerprints.*
Anna:	*Here, in the dorsal fins too!* (Pointing to the marks) *Look, those little marks.*
Rui:	*As we have on the fingers.* (Touching his thumb with the index finger) *They have it.* (Pointing to the dorsal fin)
Anna:	*You are paying close attention, yes ma'am. You all paid attention to what the educator said. They are like our fingerprints.* (Points with her index finger)
Thomas:	*Have you marked other dolphins? Ah, with marks? On the sea?*
Elsa:	*Sea.*
Anna:	*No, here, we don't mark dolphins, we <u>recognize</u> dolphins. If we mark or if we recognize?*
Thomas:	*If you mark them, to know if everything is ok?*
Anna:	*We, no, but there are places, people, like scientists, that they make the identifications. Look, Shakespeare is doing poo.* (Pointing) *They make pictures, Thomas. They record the marks and then identify all dolphins by pictures, it is called photo identification.*

Anna is holding the dolphin's caudal fin with both her hands when she directs the children's attention to it. The fact that she asks Thomas to get closer also shows that she wants all children to be able to see the part of Shakespeare (dolphin) that she is talking about. While pointing to the marks on the caudal fin, she asks: "Do you know what are these little marks?" The children respond in unison: "fingerprints." Pointing to the dorsal fin next, Anna uses the adverb "also" to reveal that those fins too bear marks, a hint that the children's answer was right. Anna's interjection "look" reinforces the importance of what she is saying. At the same time, Rui touches his thumb against his index finger (right hand), as if wanting to locate his own fingerprints (Figure 4). Anna demonstrates satisfaction with the children's responses by using Portuguese expressions of extreme agreement: "But you are very careful" and "yes ma'am!"

FIGURE 4 *Left: Anna is pointing to the fingerprints of the dolphin. Right: Rui is touching his thumb with the index finger* (*see arrow*).

Next, Anna reinforces the parallelism/continuity between dolphins and humans by stating that the marks on the fins "are like our fingerprints." At this point, Thomas breaks Anna's script of this ritualized interaction (Monteiro et al., 2010) to ask her a series of interrelated questions: "Have you marked others dolphins? With marks? On the sea?" This suggests that Thomas associates the fin marks with human-made identification protocols (or tags) used in scientific animal studies. Anna replies: "No, here we don't mark dolphins, we recognize them." That is, according to the interpreter, at least at the marine park, dolphins are not branded or harmed, but simply known by the staff. Markedly, this also resembles humans in that we are "simply known" by others. Anna adds: "but there are places, people, like scientists" who use the marks to identify the animals by pictures ("photo identification"). In doing so, she separates the work of scientists from the work they do at the marine park, which is depicted as more personal and empathetic towards dolphins.

Expanding on the Significance of Swimming with Dolphins for Our Argument

The four transcripts provided above exemplify the types of mediated interactions that participants experienced in the informal learning setting of the marine zoo when they were in contact with the captive dolphins. Overall, those exchanges revolved around Anna's discourse that sought to reveal (explain) the similarities between dolphins and those young children who agreed to participate in our study.

Based on our analysis, the encounters between the children and dolphins as mediated by the interpreter—another human being—created opportunities for the children to learn as much about the dolphins as themselves. As a result, the children—as any other visitor in the park—can potentially create an emotional interpersonal bond with dolphins in a way that could serve as a starting point for the development of a more ecologically oriented behavior (Milton, 2002). This empathy, in turn, makes the proximity to dolphins a memorable event, where children realize that the "other" animal has a subjectivity on his/her own. (The same can be argued for Kelly's example.)

In going beyond "the moral worlds we humans create, which [permeate] our lives and so deeply affect those of others" (Kohn, 2013, p. 5), Victor is able to realize that seeing is not an exclusive human affair, which tells him something about the dolphin as much as it does about himself (Servais, 2005). To say "he [dolphin] has his eyes open to see you" is to convey a sense of purpose: the dolphin's eyes are not open to see everyone, but his gaze is directed to Victor. And Victor can only understand what it means "to see" based on his own (egomorphic) experience of seeing. In other words, Anna's talk demands that Victor draws on his own personal understanding of what it means to see in order to grasp the dolphin's sense of sight.

Likewise, when Philippe realizes that the dolphin has hand (-like) structures "hidden" in the fins and teeth, he does so from a personal and unique perspective. Although the fact that the interpreter says "bones like our hands" conveys a sense of general membership to the human species, Philippe—and everyone else participating in the interaction—can only understand what it means "to have a hand" based on their own personal (egomorphic) experience of having hands. Rui experienced the same feeling as Victor and Phillipe when he identified the "like-fingerprint" marks on the fins of the dolphins—which prompted him to touch his own fingers. Ultimately, one's subjectivity is accessible to oneself in ways that it can never be to others. In sum, Anna (an external agent to both the child and dolphin) intentionally introduces the signs (anatomy of the dolphin) into the ongoing flow of her instruction in order to help each child in becoming a "fluent user" (Wertsch, 2007, p. 186) of that sign system (essentially egomorphic).

The conversation between Anna and the children can be seen as a social interaction where the latter are gradually acquiring a new cultural tool (scientific language to represent/refer to dolphins) designed to engage them in increasing levels of conservationism (higher commitment to the environmental cause). In any case, the interpreter offers a representation of the dolphin by means of egomorphism. It was the first time that the children encountered a dolphin;

therefore, Anna's discourse is clearly constructed towards assisting them in understanding what they see in front of them.

Conclusion

In the present article, we carefully investigated the naturally occurring interactional talks that took place during authentic children's interspecies encounters involving the mediation of trained, adult nature interpreters. In doing so, we argued that the notion of egomorphism—rather than anthropomorphism—was an inexorable discursive element present in those pedagogical situations where our human and nonhuman participants were brought together. Moreover, we sought to show how this egomorphic discourse created opportunities in/for both science and environmental education to disrupt the notion that humans are superior and therefore removed from other animals. That way, we confirmed our initial interest in deepening our understanding of the interactions that are contextually situated/afforded by children's interspecies interactions and how they can be further facilitated/developed.

More specifically, we emphasized that nature interpreters made references to humans according to their individual self ("me"), their bodies, and body languages. For instance, they made these references when referring to their experiences with friendship or when using their hands to establish an analogy with homologous organs of dolphins. Likewise, when they made reference to children's bodies ("your" or "our" tummy or "fingerprints"), they prompted them to understand the comparison from an individual perspective (their own human bodies). According to Desmond (1999): "Ultimately, whenever we talk of animals, we talk about ourselves" (p. 149).

In the mediated interspecies encounters that we analyzed here, all participants shared a continuous presence in the moment and were able to react in real time to one another's presence (Berger & Luckmann, 1966). The bodies of the animals—and their corresponding movements and behaviors—were displayed and offered for holding, touching, and comparing (Neves & Monteiro, 2014).

Here one might question the real level of participation of the nonhuman individuals in the two situations we analyzed since they were trapped in contained environments. We agree that the confined condition of sea animals and dolphins in our examples denotes a degree of involuntary membership in the interaction. The power asymmetry in the interactions curiously mimics the existing one between the children and the nature interpreters. Nevertheless, that did not prevent them from often reacting to the human presence in one

way or another (and vice versa). And this is all we could base our interpretative work on.

Although, as social creatures, humans are specially drawn to interact with highly responsive animals, nonhuman animals in general are a compelling part of the human experience of the natural world (Myers & Saunders, 2002). Indeed, our fascination with animals is the result of their similarities to and differences from ourselves (Berger, 1980). In this context, animals are social "others" with whom we can form relationships. More so, human interspecies encounters can provide a bridge to care about the natural world in general, thus making it evident how nature is persuasive on its own right. In the case of children, these encounters open up the possibility to perceive any animal as another being with subjective experiences of his/her own (Stern, 1985)—and who sees, hears, and has teeth and hand-like structures.

Although issues of animal ethics, rights, and welfare are beyond the immediate scope of our paper, the analytical-argumentative work that we performed certainly has implications for the use of animals in the entertainment, leisure, and tourism industries (Fennell, 2012). Our discussion can serve to further assess the scientific and environmental impact of this type of industry that can persuade people to "consume radical bodily difference" (Desmond, 1999, p. 146). For instance, it might invite us to consider if these direct encounters that take us closer to other animals—whether sea creatures in a school classroom or trained dolphins in captivity in a marine park pool—are promoting the desired ethical, scientific, and conservationist expectations that they were meant to be evoked in our children and their families (Cater, 2010). Nevertheless, the fact that egomorphism is an intrinsic aspect of the pedagogical embodied interactions analyzed in this paper suggests the possibility for increased environmental awareness and concern for these nonhuman populations. Far from suggesting a causal relationship between the interaction and an attitudinal and behavioral change in the children, we simply advocate that the egomorphic discursive element found in the participants' discussion seems to stress connection and kinship between the natural world and our own bodies and experiences as social beings.

References

Beck, L., & Cable, T. (2011). Expanding our interpretive perspectives. In *Proceedings from Zoos, Wildlife Parks, and Aquaria InterpNET Conference*.

Berger, J. (1980). *About looking*. London: Writers and Readers.

Berger, P., & Luckmann, T. (1966). *The social construction of reality: A treatise in the sociology of knowledge*. New York: Anchor Books.

Bergman, M. (2009). *Peirce's philosophy of communication*. New York: Continuum.

Cater, C. (2010). Any closer and you'd be lunch! Interspecies interactions as nature tourism at marine aquaria. *Journal of Ecotourism, 9*(2), 133-148.

Curry, P. (2006). *Ecological ethics: An introduction*. Cambridge, UK: Polity Press.

Darwin, C. (1872). *The expression of the emotions in man and animals*. London, UK: Murray.

De Waal, F. (2016). *Are we smart enough to know how smart animals are?* New York: W. W. Norton.

Desmond, J. (1999). *Staging tourism: Bodies on display from Waikiki to Sea World*. Chicago: University of Chicago Press.

Dohn, N. (2011). Situational interest of high school students who visit an aquarium. *Science Education, 95*(2), 337-357.

Edwards, D. (2005). Discursive psychology. In K. Fitch and R. Sanders (Eds.), *Handbook of language and social interaction* (pp. 257-273). London: Lawrence Elbaum.

Elliot, N. (2006). *Mediating nature*. New York: Routledge.

Fennell, D. (2012). *Tourism and animal ethics.* New York: Routledge.

Gendlin, E. (1985). Crossing and dipping: Some terms for approaching the interface between natural understanding and logical formulation. *Minds and Machines, 5*(4), 547-560.

Habermas, J. (1987). *Teoría de la acción comunicativa, II: Crítica de la razón funcionalista*. Madrid, Spain: Grupo Santillana de Ediciones.

Haluza-DeLay, R. (2013). Educating for environmental justice. In R. Stevenson, M. Brody, J. Dillon, and A. Wals (Eds.), *International handbook of research on environmental education* (pp. 394-403). New York: Routledge.

Heuer, K. (Ed.). (2002). *The lost notebooks of Loren Eiseley*. Lincoln, NE: University of Nebraska Press.

Ingold, T. (1992). *The perception of environment. Essays on livelihood, dwelling and skill.* London, UK: Routledge.

Jefferson, G. (2004). Glossary of transcript symbols with an introduction. In G. H. Lerner (Ed.), *Conversation analysis: Studies from the first generation* (pp. 13-31). Amsterdam, Netherlands: Benjamins.

Kohn, E. (2013). *How forests think: towards an anthropology beyond the human*. Berkeley, CA: University of California Press.

Lewontin, R. C. (1982). Organism and environment. In H. C. Plotkin (Ed.), *Learning, development and culture* (pp. 151-170). New York: Wiley.

Louv, R. (2005). *Last child in the woods: Saving our children from nature-deficit disorder*. Chapel Hill, NC: Algonquin Books of Chapel Hill.

Martusewicz, R., Edmundson, J., & Lupinacci, J. (2011). *Ecojustice education: Toward diverse, democratic, and sustainable communities*. New York: Routledge.

McKibben, B. (1990). *The end of nature*. New York: Anchor Books.

Milton, K. (2002). *Loving nature: towards an ecology of emotion*. London, UK: Routledge.

Milton, K. (2005). Anthropomorphism or egomorphism? The perception of nonhuman persons by human ones. In J. Knight (Ed.), *Animals in person: Cultural perspectives on human-animal intimacies* (pp. 255-271). Oxford, UK: BERG.

Ministério da Educação e Ciência. (1991). Programa ciências da natureza: plano de organização do ensino-aprendizagem (Vol.II, Ensino Básico 2o Ciclo). Lisboa, PT: Imprensa Nacional Casa da Moeda. Available at http://metasdeaprendizagem.dge.mec.pt/wp-content/uploads/2010/09/programa_C_Natureza_2Ciclo.pdf.

Monteiro, R., Carrillo, J., & Aguaded, S. (2010). Teacher scripts in science teaching. *Teaching and Teacher Education, 26*(6), 1269-1279.

Myers, O., & Saunders, C. (2002). Animals as links toward developing caring relationships with the natural world. In P. Kahn and S. Kellert (Eds.), *Children and nature: Psychological, sociocultural and evolutionary investigations* (pp. 153-178). Cambridge, UK: MIT Press.

Neves, J., & Monteiro, R. (2014). How full is your luggage? Background knowledge of zoo visitors regarding sharks. *Environmental Education Research, 20*(3), 291-312.

Oakley, J., Watson, G., Russel, C., Cutter-Mackenzie, A., Fawcett, L., Kuhl, G., Russel, J., van der Waal, M., & Warkentin, T. (2010). Animal encounters in environmental education research: Responding to the "question of the animal". *Canadian Journal of Environmental Education*, *15*, 86-102.

Ontario Ministry of Education. (2007). The Ontario curriculum grades 1-8: Science and technology. Toronto, ON: Queen's Printer for Ontario.

Palmer, J., & Neal, P. (1994). *The handbook of environmental education*. London, UK: Routledge.

Plumwood, V. (2002). *Environmental culture: The ecological crisis of reason*. New York: Routledge.

Reis, G., & Guimaraes-Iosif, R. (2012). The death and life of a school-based environmental education and communication program in Brazil: Rethinking educational leadership and ecological learning. *Applied Environmental Education and Communication*, *11*(3-4), 123-132.

Reis, G., & Roth, W.-M. (2007). Environmental education in action: a discursive approach to curriculum design. *Environmental Education Research, 13*(3), 307-327.

Reis, G., Ng-A-Fook, N., & Glithero, L. (2015). Provoking ecojustice: taking citizen science and youth activism beyond the school curriculum. In M. Mueller & D. Tippings (Eds.), *Ecojustice, citizen science and youth activism* (pp. 39-61). New York: Springer.

Serpell, J. (2005). People in disguise: Anthropomorphism and human-pet relationship. In L. Daston and G. Mitman, *Thinking with animals: New perspectives on anthropomorphism* (pp. 121-136). NYC: USA: Columbia University Press.

Servais, V. (2005). Enchanting dolphins: An analysis of human-dolphin encounters. In J. Knight (Ed.), *Animals in person: Cultural perspectives on human-animal Intimacies* (pp. 211-229). New York: Berg.

Siegler, R. S., & Alibali, M. W. (2005). *Children's thinking*. Englewood Cliffs, NJ: Prentice-Hall.

Stern, D. (1985). *The interpersonal world of the infant*. New York: Basic Books.

Sztybel, D. (2008). Animals as persons. In J. Castricano (Ed.), *Animal subjects: An ethical reader in a posthuman world* (pp. 241-257). Waterloo, Ontario: Wilfrid Laurier University Press.

Venville, G. (2004). Young children learning about living things: A case study of conceptual change from ontological and social perspectives. *Journal of Research in Science Teaching, 41*(5), 449-480.

Vergou, A., & Willison, J. (2016). Relating social inclusion and environmental issues in botanic gardens. *Environmental Education Research*, *22*(1), 21-42.

Vining, J., Merrick, M., & Price, E. (2008). The distinction between humans and nature: Human perceptions of connectedness to nature and elements of the natural and unnatural. *Human Ecology Review, 15*(1), 1-11.

Wallace, K. (2012). Environmental story-telling with dirty hands. *Education Review, 2*(2), 8-9.

Warkentin, T., & Fawcett, L. (2010). Whale and human agency in world-making: Decolonizing whale-human encounters. In R. Acampora (Ed.), *Metamorphoses of the zoo: Animal encounter after Noah* (pp. 103-121). Lanham, MD: Lexington Books.

Wertsch, J. (2007). Mediation. In H. Daniels, M. Cole, and J. Wertsch (Eds.), *The Cambridge companion to Vygotsky* (pp. 178-192). Cambridge, UK: Cambridge University Press.

Wijeratne, A. J., Van Dijk, P. A., Kirk-Brown, A., & Frost, L. (2014). Rules of engagement: the role of emotional display rules in delivering conservation interpretation in a zoo-based tourism context. *Tourism Management*, *42*, 149-156.