

Emotional responses from families visiting the zoo: a study at Parque das Aves in Foz do Iguaçu

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Abstract

In this study, we aim to analyse human emotional responses towards animals, specifically birds, in the context of a visit to a zoo. The study was carried out with seven families in Parque das Aves. The visits were recorded using the point-of-view-camera method, and the data was analysed using qualitative software to identify emotion descriptors. The findings from our study reveal that the physical characteristics of birds, such as their patterns and colours, as well as their behaviours and abilities, triggered emotional responses that were associated with admiration for the species, concern for their well-being and awareness of conservation issues, enabling these families to construct meaning.

Keywords

Environmental communication; Informal learning; Science education; Visitor study; Exhibition; Emotional experience

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Introduction

Emotions are fundamental components of the human experience, influencing our perception, behaviour, and relationships [Kuppens, Realo & Diener, 2008]. In the context of museums, there is an increasing understanding that emotions play a relevant role in the visitor's experience, including perception and appreciation of the aesthetics of objects, engagement, memory, and learning [Rappolt-Schlichtmann, Evans, Reich & Cahill, 2017; Mazzanti & Sani, 2021].

Museum experiences undeniably contribute to the emotional aspect of the entire visit [Falk, 2021]. Yet, little is known about how visitors respond emotionally to those experiences. Within the context of visitor studies and institutional programmes, it is common practice to holistically assess visitors' attitudes regarding their experience by inquiring about their overall enjoyment or satisfaction [e.g., Mastandrea, 2014]. While these results provide a valuable summary of the visit, especially for practical purposes, they offer limited insights into the broad range of emotions that people may have experienced.

The existing literature presents different approaches to investigating the emotions experienced by museum visitors. For example, it is worth highlighting spontaneous verbal self-reports and emotional scale identification [Adelman, Falk & James, 2000; Falk & Gillespie, 2009; Staus, 2012; Tinio & Gartus, 2018]; pre- and post-visit questionnaires [Clayton, Fraser & Saunders, 2009; Falk & Gillespie, 2009; May, Todd, Daley & Rappolt-Schlichtmann, 2022; Staus, 2012]; stimulated video recall [May et al., 2022]; physiological measures [Staus, 2012; Smith, Weiler & Ham, 2008]; analysis of visitors' conversations using the point-of-view method [Rowe, Massarani, Gonçalves & Luz, 2023; Massarani, Rowe et al., 2022], and technology-driven instruments, such as tracking sensors and computer vision utilised for emotion detection based on micro facial expressions and body movements to measure visitors' emotional responses [Del Bimbo, 2021].

Massarani, Bizerra et al. [2022] demonstrates that conducting research on emotions through spontaneous conversations is an effective way to understand how visitors feel during their visit. In addition, visitors' conversations can serve as valuable indicators of their perceptions, helping the institution in finding ways to evaluate its practices and enhance its activities, in order to foster better visitor engagement and experience.

In this article, we investigate the emotions experienced by families during their visits to a zoo and examine the context in which these emotions are expressed and shared.

Like museums, zoos are spaces designed to captivate families' multiple senses, expand their scientific and conservation interests about animals, and reflect on their experiences through meaningful conversations [National Research Council, 2009]. Therefore, emotions play an important role in the experiences of zoo visitors. Establishing an emotional connection with the animals can increase visitors' learning and understanding of different species, rendering their visit unforgettable, and fostering discussion on topics related to conservation and animal welfare [Bekoff, 2004; Falk et al., 2007]. It is worth noting that, while it is true that zoos significantly influence the public's perception of animals, these perceptions can vary widely, encompassing both positive and negative views [Berger, 2009]. For example, there is growing criticism surrounding the role of zoos. This criticism ranges from bioethical issues [e.g., Captive Animals Protection Society, 1999] to the educational and conservation role of zoos [Moss & Esson, 2013]. This underscores the increasing need for a more in-depth examination of emotions in scientific-cultural environments. However, literature in this field is still relatively limited, especially in Latin America, and in zoos, which are the subject of this work.

Emotional responses towards animals

Animals inherently evoke emotional responses. Yet, the emotions triggered by the same animal may have a completely different impact depending on the observer [Briefer, 2018]. To better understand emotions, it is also necessary to understand the circumstances in which they occur [Bericat, 2016], as they can carry different interpretations depending on a person's cultural and personal background, as well as how this human-animal interaction is constructed [Colléony, 2016].

In a similar vein, studies show that the emotions triggered by animals differ to a large extent between individuals, depending on variables such as gender [Ballouard et al., 2013; Prokop & Fančovičová, 2017], age [Kaltenborn, Bjerke, Nyahongo & Williams, 2006; Røskaft, Bjerke, Kaltenborn, Linnell & Andersen, 2003], culture, environment [Frynta et al., 2011], and perceived vulnerability for each species. The emotional response to animals may also be influenced by their ecological and economic roles.

For example, Kellert [1996] identified nine core values that adults and children commonly use to describe their relationships with animals. These include moralistic values, which focus on concern for the welfare of animals; aesthetic, which highlights the appreciation and beauty of animals; dominionistic, which emphasises concern for the environment and the interdependence between species and natural habitats; utilitarian, which relates to the practical and material value of animals to human well-being, among others. Similarly, other studies, exemplified by Gavin and Herzog [1992] and Alves [2012], delve into a more affective dimension, in which human beings experience emotions like friendliness, admiration and respect for animals often rooted in religious, mystical, or philosophical beliefs. Conversely, Lescureux and Linnell [2010] point to a more conflicting and negative view of animals, highlighting the potential harm and risks that wild species can cause to humans, whether through predation on livestock, damage to crops, infrastructure, etc.

The emotional responses that people experience towards animals can also be subject to various influences, including the species in question, their physical and behavioural characteristics, their conservation status, their association with characters from films or TV shows, as well as previous personal interactions with animals [York & Longo, 2017]. For example, species with aposematic colours, that is, warning colours that serve to indicate that the animal is poisonous or dangerous, can evoke fear reactions in humans [Lobue & Deloache, 2011; Öhman & Mineka, 2003; Prokop, Fančovičová & Kučerová, 2018]. In contrast, some colours in animals can elicit “positive” feelings in humans. As argued by Lišková, Landová and Frynta [2015] humans tend to favour birds from the *Pittidae* family, especially those with shades of blue and green, commonly found in Southeast Asia, owing to their association with characteristics such as beauty, exoticism, or simplicity. Primates, such as orangutans and gorillas, tend to elicit predominantly positive emotions in interactions with the public, as observed in studies carried out in conservation centres and zoos. This phenomenon may be related to anthropomorphism, a process in which human characteristics are attributed to animals, and the principle of similarity, in which people identify with those who have behaviours that resemble their own [Kruuk, 2002; Myers, Saunders & Birjulin, 2004; Parreñas, 2012]. Other emotions, such as fear and anger, can be induced through cinema and popular culture, as is the case with wolves in films [Wolch & Emel, 1998]. Likewise, beliefs and experiences that societies have historically built around some species also contribute to the expression of more negative feelings towards them, such as snakes, bats, crabs and spiders [Santos, Kelsey, Fuhrman & Irwin, 2020; Myers et al., 2004].

Within the zoo scenario, studies suggest that live animal exhibits can trigger visitors’ positive emotions such as a sense of connection, care, and empathy for animals and nature [e.g., Clayton, Fraser & Burgess, 2011; Myers et al., 2004].

However, negative responses can also manifest. When investigating how emotions and cognitions are involved in visitors' experiences, Marseille, Elands and van den Brink [2012] show that zoos are places where emotional clashes can occur. As an example, while observing the imposing and charismatic polar bears, visitors simultaneously displayed joy as well as sadness when confronted with the confined enclosures and the stereotypical behaviour of animals in captivity. In the same vein, Massarani, Bizerra et al. [2022], in their analysis of visitors' conversations during a visit to the Emílio Goeldi Zoobotanical Park, find that the experience generates both positive and negative emotions for families, both with the potential to leverage meaning-making and learning experiences. On this specific aspect, Anderson [1995] argues that zoos evoke broad, ambiguous and contradictory responses from their visitors. Likewise, Townsend [1988] argues that reactions to zoo animals typically combine excitement, fear, admiration, sadness and nostalgia, coupled with discomfort related to animal captivity.

Packer, Ballantyne and Luebke [2018] studied visitors' perceptions of gorillas' welfare at Brookfield Zoo (Illinois, United States). The results show that visitors assessed the animals' happiness and health based on their observed behaviour. In the same way, Sherman, Minier, Meyers and Myers [2022] studied whether animal welfare perceptions about giraffes at the Oakland Zoo (California, United States) were connected to positive emotional experiences. They observed that visitors who perceived the giraffes as enjoying a better state of well-being displayed more positive emotional reactions. Both studies underscore the importance of understanding emotional perceptions to foster a more meaningful experience during a visit to the zoo.

In conclusion, emotional responses towards animals are subject to several influencing factors. However, research has shown that these encounters can elicit profound and meaningful emotional responses in a wide range of people. Aiming to contribute to studies in this field, the present article delves into the emotional responses exhibited by families during visits to a bird zoo, using group conversations as supporting evidence.

Methodology

This study, which forms part of a broader research initiative in museums and science centres in Latin American countries [Massarani, Reznik et al., 2019; Massarani, Poenaru, Rocha, Rowe & Falla, 2019; Massarani et al., 2021], presents an exploratory nature and has a qualitative approach [Minayo, 2001], following ethical guidelines and principles approved by the Ethics Committee of the Biosciences Institute of the University of São Paulo (CAAE 72217717.6.0000.5464). Our research aims at providing an applied analysis of human emotional responses towards animals, specifically birds, during a visit to the zoo. The question we wish to answer is: what are the emotions manifested in conversations held by families during their bird-watching experiences?

Procedures and participants

The data collection took place in September 2017 at Parque das Aves, located in Foz do Iguaçu, Paraná. Parque das Aves, considered the largest bird park in Latin America, was opened in 1994 and is recognised worldwide for its role in the conservation of birds from the Atlantic Forest [Parque das Aves, 2021].

The park's exhibition area consists of a signposted trail in the middle of the forest. This 1.5 km long circuit houses various animal enclosures, including five immersion aviaries [Parque das Aves, 2021]. For the purposes of our study, we selected a particular section that stretches from the "Saving parrots" aviary to the end of the "Aviary of Aras". The rationale for this choice is justified by the presence of immersion enclosures, greater diversity of animal specimens and vegetation, and the presence of exhibition elements, such as informative signs, to support visitor interaction.

Upon arrival at the chosen point, families were approached by the researchers and invited to participate in the research. After accepting the invitation, a staff member filled in the Free and Informed Consent Form (TCLE) with information about the research objectives and procedures. To carry out data collection, we provided each family with four recording devices (Zoom Q3 HD), which were attached to a cord and worn around the neck of those who expressed the willingness to use them. At least one adult and one child from each group carried a recorder. The point-of-view approach [Burris, 2017; Glăveanu & Lahlou, 2012] was used to record visitors' experiences at the exhibition from their own perspectives, reducing researchers' interference during the data collection process and following procedures described in Massarani, Reznik et al. [2019], Massarani, Poenaru et al. [2019] and Massarani et al. [2021].

The study saw the participation of 27 people, divided into seven family groups made up of 14 adults and 13 children. All families were tourists, five of which were from other Brazilian states: São Paulo ($n = 3$), Brasília ($n = 1$), and Espírito Santo ($n = 1$), one from the city of Foz do Iguaçu itself and a group (G1) did not provide this type of information. The participating families shared the same middle-class socio-economic background. As for the level of education of the adult respondents (1 per group), seven had higher education at the undergraduate level, and three at the postgraduate level.

Analysis

The videos were uploaded to Dedoose, an online qualitative data analysis software application. Initial coding was performed directly on the video without using transcripts, allowing the research to consider gestures, tone, movements, body position, gaze, touching behaviour, and other paralinguistic markers of emotion and interaction during coding.

We then transcribed considerable segments of conversations, similar to those proposed by Ash et al. [2007], Rowe and Kisiel [2012], Rowe et al. [2023], Massarani, Rowe et al. [2022] and Scalfi, Massarani, Gonçalves and Marandino [2022], in which a significant event is characterised by: i) having a clear beginning, middle, and end; ii) have discursive content related to the exhibition; iii) be an externalised conversation between participants, with themselves or with an imagined other and iv) have linguistic descriptors of emotion (spoken or gestural). Significant events were transcribed following the protocol specified in the "description code" item.

In significant events, the emotion descriptors used were based on those proposed by the Emotion Annotation and Representation Language (EARL) and a Wheel of

emotion¹ [Plutchik, 2001], which, for this study, comprised a total of 59 emotions. Then, we presented the emotions, as suggested by EARL, which categorises the descriptors as positive (pleasant sensations) and negative (unpleasant sensations), based on intensity and attitude (Chart 1).

Table 1. List of emotion descriptors. (Source: adapted by the authors.)

Negative and strong	20 – Distrust	39 – Excitement
1 – Anger	21 – Estrangement	40 – Happiness
2 – Annoyance	22 – Shame	41 – Joy
3 – Contempt	Negative and passive	42 – Pleasure
4 – Disgust	23 – Boredom	Care
5 – Irritation	24 – Despair	43 – Affection
5 – Impatience	25 – Disappointment	44 – Empathy
6 – Disagreement	26 – Hurt	45 – Friendliness
7 – Disapproval	27 – Sadness	46 – Love
Negative and uncontrolled	Unrest	Positive thoughts
8 – Anxiety	28 – Stress	47 – Confidence
9 – Embarrassment	29 – Shock	48 – Courage
10 – Fear	30 – Tension	49 – Hope
11 – Helplessness	Quietly positive	50 – Humanity
12 – Powerlessness	31 – Calmness	51 – Satisfaction
13 – Worry	32 – Contentment	52 – Pride
Negative thoughts	33 – Relaxation	53 – Trust
14 – Doubt	34 – Relief	Reactive
15 – Perplexity	35 – Serenity	54 – Interest
16 – Envy	Positive and cheerful	55 – Curiosity
17 – Frustration	36 – Amusement	56 – Politeness
18 – Guilt	37 – Enchantment	57 – Surprise
19 – Defensiveness	38 – Euphoria	58 – Enthusiasm
		59 – Admiration

Transcription code

The transcription follows a detailed model described by Kasper and Wagner [2014] and Peräkylä and Sorjonen [2012]. This model considers temporal and sequential relationships, including overlapping conversations, uninterrupted combinations of sentences by speakers, moments of silence, intervals and pauses, all of which are illustrated in Table 2. In addition, the model considers elements such as intonation, volume, variations in tone or speed and facial expressions, such as laughter or aspiration, which are essential for a refined analysis of the emotions that emerge from the interactions.

Results and discussion

Overall, 33 significant events were identified in 254.5 minutes of recording, corresponding to 8.6% (22 minutes). Furthermore, 18 emotion descriptors were applied. Figure 1 shows the occurrence of descriptors by family groups, indicating the frequency with which the descriptor “X” was recorded across these groups. The figure also illustrates the total occurrence of each descriptor in the audio-visual dataset.

¹The EARL proposes 48 emotions within its studies, whereas Plutchik’s work considers 56 emotions. For the purpose of our study, we decided to use references from both frameworks, selecting the emotions with the highest possibility of occurrence.

Table 2. Transcription convention adopted.

Adult speaker: e.g. A1, A2 / Child speaker: C1, C2 / Pause: (.), (0,4) / Loud voice: AAfrica / Breathing: h / Laughter: [laughter] / Overlapping speech: [] / Rising intonation: ? / Continuing the intonation: , / Speaking in a softer voice: °word° / Laughter in words: (h) / Descending intonation . / Lengthening of word elements: : / Continuous speech, without pause: = = / Speaking with a smile: ☺word☺ / Sound of speech with evidence of inhaling/exhaling: Hhhhhh / Text read out loud: “word” / Emphasis on a certain syllable: word

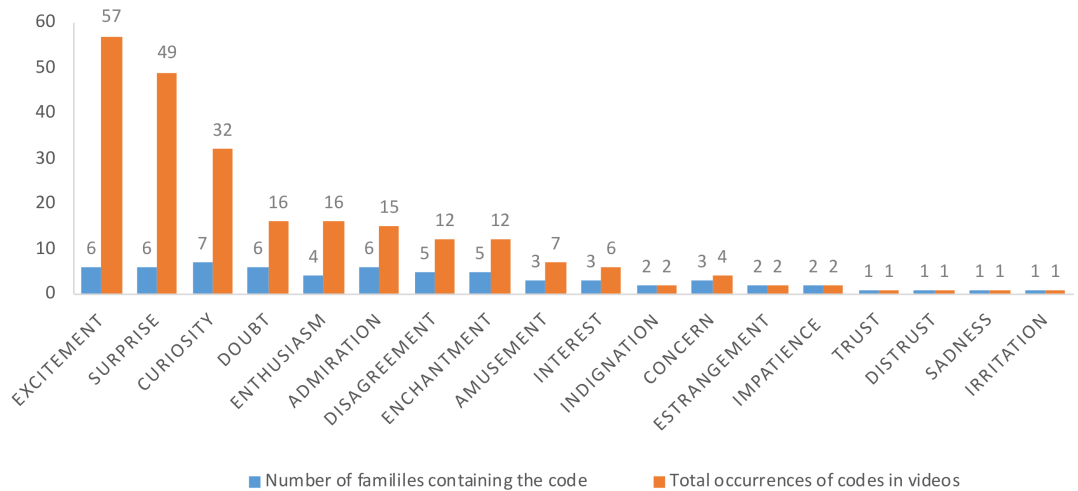


Figure 1. Occurrence of identified emotion descriptors. (Source: produced by the authors.)

Excitement was the most commonly evoked emotion, occurring 57 times and present in six of the seven family groups. Surprise ranked second, with 49 occurrences and being equally present across family groups ($n = 6$). Curiosity was counted 32 times and was recurrent in the seven groups. However, it is important to highlight that a high expressiveness of the descriptors Excitement, Surprise, and Curiosity was concentrated in group 5, with descriptors counted 32, 21, and 14 times, respectively. Doubt, Enthusiasm, Admiration, Disagreement and Enchantment had an average occurrence of 14 times and were present in five of the seven family groups. Among the other codes, the total occurrence in the videos is less than or equal to 7, with low presence ($\bar{x} = 1, 9$) among family groups.

Nine of the identified descriptors have a positive meaning, and nine have a negative connotation. That is a balanced result reflecting the interactions and conversations within the families and will be qualitatively delved into in the following topics. However, the occurrence of positive descriptors is more significant, implying that the visit was pleasant for the families.

After identifying emotions in the context of the families' conversations and actions during their visit to the zoo, we were able to clearly articulate the interactions between expressions of emotions and the context in which animals were mentioned. This way, we highlighted the main themes that emerged from the emotions expressed in families' conversations about animals, namely: 1) admiration, 2) concern for well-being, 3) care or reflections on environmental issues and conservation, and 4) construction of meaning and evidence of learning.

The following sections are titled to reflect the recurring themes that surfaced from the data and use examples to illustrate how such descriptors manifested in the families' conversations.

Admiration

Birds are often considered one of the most attractive groups of animals, alongside mammals such as lions, giraffes, and elephants [Lišková & Frynta, 2013; Moss & Esson, 2010]. In our study, we considered that the sensory characteristics of birds, including their colours and active behaviour, had a considerable impact on the high occurrence of emotional responses with a positive connotation, such as Excitement, Surprise, Admiration, Enthusiasm, and Enchantment, as shown in the following examples.

Group 6. Ara Macaws' aviary

A2: Look [SURPRISE; EXCITEMENT]

A1: LOOK AT THE ARA GABI! (.) COME AND LOOK AT THE ARA! (0.2) ARA:: (.)

Wow, look at how gorgeous it is (.) so cute! [SURPRISE; EXCITEMENT; ENCHANTMENT]

Group 4. Toucans' aviary

C1: This one has a green beak (.) green beak dad! (0.2) green beak! (0.2) the only one! (0.3) Wow!= [ENTHUSIASM; EXCITEMENT]

A1: =The one with the green beak?= [DOUBT; CURIOSITY]

C1: Yeah! [TRUST]

A1: Oh

C1: Look at its green beak! Wow, it's very rare, right, dad? This must be the rarest there is [ENTHUSIASM, EXCITEMENT]

A1: I only saw it here, I never saw it before! [SURPRISE]

C1: The rarest thing there is (.) isn't there?! [SURPRISE]

Group 1. Ara Macaws' aviary

A1: Beautiful, isn't it, sweetheart? (.) Huh [ADMIRATION]

C2: Yup, I [filmed her]

A1: [Hey luiz!] Pay attention!

C1: Listen to her scream! [ENTHUSIASM; EXCITEMENT]

C2: And I recorded this=

Group 4. Toucans' aviary

A1: Look at this one, this one here! blue with white (.) what a beau::ty, right! just look! [EXCITEMENT; ENCHANTMENT]

C1: Blue, yellow [and white!] [EXCITEMENT]

A1: [Man, this animal must weigh a little bit, doesn't it?!] it has the strength to stay there, doesn't it?! [SURPRISE]

Group 5. On the way

A2: There (.) come and see! Ah there (.) in the middle of the woods there [INTEREST]

A1: Where? [INTEREST; CURIOSITY]

A2: There

A1: Ah::: it's a little sparrow bird! [SURPRISE]

C1: Oh how cute! He is proper cu:::te= [ENCHANTMENT]

A1: = you want to take a picture=

C1: =cute! [ADMIRATION]

Group 4. Parrots' aviary

C1: Oh:: how beau::tiful::: [ENCHANTMENT]

A1: They are very sweet! very cute [ADMIRATION; ENCHANTMENT]

Group 6. Ara Macaws aviary

C1: LOOK AT HER LONG TAIL (.) LOOK AT THE TA::IL! [EXCITEMENT; SURPRISE]

A2: [inaudible] You were lucky (.) it did [a poo there]

C1: [Look at the ta::il]= [EXCITEMENT; SURPRISE]

A1: =[laughter] [AMUSEMENT]

A2: It was right under her=

A1: =Scraped through

C1: Look at her tail (.) look at her tail, mum= [SURPRISE; EXCITEMENT]

A1: = yu::p

C1: Look at the tail:: [SURPRISE; EXCITEMENT]

In these examples, we identified positive emotions concerning physical attributes of the animals, such as being "gorgeous", "cute" and "beautiful" which are linked to emotions of Enchantment and Admiration. As shown in the examples from

groups 6 and 1, observing various species elicited emotional responses of Surprise, Excitement, and Enthusiasm, especially when visiting the macaws' immersion aviaries. Probably, it was due to the unique opportunity it provided for direct interaction with the birds as they flew over and above the visitors' heads. When admiring the animals, emotions of Curiosity and Interest were also evoked, especially when paying attention to some characteristics of the species. For example, this occurred in group 4 when visitors noticed the beak of the green-beaked-toucan, or when they identified and recognised the animal. We also noticed that the macaws' space — simply a transit aviary — led to emotions of admiration and emotionality among the participants.

Research on the factors that attract the public to birds indicates that some characteristics, such as morphological traits and colours, contribute to this preference. For example, Frynta, Lišková, Bültmann and Burda [2010] conducted studies on the human preference for parrots through photographs and demonstrated that birds with yellow and blue colours were the ones that stood out in the participants' choices. The authors interviewed 316 people, including students and employees at the University of Duisburg-Ess, in Germany, showing 40 photos of parrots. Participants were asked to assign each species numbers from 0 (least attractive) to 6 (most attractive). The researchers also indicated that the shape of the birds mattered, with long-tailed species amongst the favourites. In 2013, another study applied a similar methodology [Lišková & Frynta, 2013], and its results showed that colours played an important role in people's preferences for birds, reinforcing that blue and yellow were more prominent in participants' choices. The study also shows that birds with shorter necks and large eyes attract more attention from those interviewed.

In this study, most families' comments are about sensory characteristics, especially colours, and their statements reflect their emotions. For example, the conversations within family no. 4 underscore their Excitement and Enchantment, which are evoked by the colours of the Canindé macaws (*Ara ararauna*) species.

Concern for well-being

The perceived well-being of zoo animals shapes visitors' emotional experiences during their visit [Sherman et al., 2022]. This statement is corroborated by the families' comments presented in this study, showing that groups make judgments based on observations of animals' behaviour and the enclosure in which they live.

Group 5. Bird-watching

A2: What's wrong (.) what happens with these animals? (.) they all lay just two to three eggs in forty years (.) it's not much, is it?! (0.2) Look at this one (.) [WORRY]

C1: THREE OR FOUR! [EXCITEMENT]

Group 7. Ara Macaws' aviary

A1: It's nice to see it like this, you know? (.) there is a nursery (.) they take care of it (.) but the rest has to be left free! (.) why take it and imprison it in a [shameless old cage] [ADMIRATION; INDIGNATION]

Group 6. Ara Macaws' aviary

A1: It's burying something (.) look over there: (.) like a dog buries it (.) it looks like a little metal ring (.) [INTEREST]

C1: It's:: a little something:: to put on the beer cap

A1: Ah:: from the beer cap? [SURPRISE]

C1: Yup=

A1: = What a danger, right?! You see, we can't throw rubbish on the street, right (.) otherwise:: (0.2) they can swallow it and feel sick, right [SURPRISE; WORRY]

The previous examples illustrate the prevailing frequency families express their concerns about animal welfare issues. The statements reinforce concerns regarding the reproduction of the species and the maintenance of the enclosure, both crucial to ensure the animals' well-being. Miller, Luebke and Matiasek [2018], who investigated families' perceptions of the welfare of elephants at the zoo, states that visitors value spaces that are perceived as large enough, well-maintained, and natural. The adult's comments — *"It's nice to see it like this, you know? There is a nursery, they take care of it, but the rest has to be left free!"* — highlight that the size of the nursery is an important issue for the animals to have an adequate quality of life. In the same way that participants care about the animal, they also demonstrate that they are aware of the environments where animals live.

Care or reflections on environmental issues and conservation

Human emotions and attitudes influence wildlife populations' presence, absence, and recovery [Herzog & Burghardt, 1988]. In the same way that studies show that empathy for some animals, often driven by their beauty and charisma, favours the success of conservation projects for endangered species [Breed & Moore, 2016; Gunnthorsdottir, 2001], others reveal an alternate perspective, indicating that human affection for birds, such as those charismatic species kept as pets, inadvertently exerts pressure on wild populations, thus promoting their illegal trade [Alves, Lima & Araujo, 2013]. Therefore, it is necessary to discern the public's emotional responses from a conservation perspective, with the aim of effectively contributing to the conservation of wild species.

In this study, families' conversations presented statements that showed awareness of environmental and conservation issues. A couple of examples are available in the table below:

Group 6. Ara Macaws' aviary	Group 4. Parrots' aviary
A1: Look, sweetheart, the macaw is digging a hole in the ground (.) look how beautiful [SURPRISE; ADMIRATION]	A1: When I was:: small like you (.) I had a parrot like that at home
C2: What for:: [CURIOSITY]	C1: Oh:: how beauti::ful:: [ENCHANTMENT]
A1: I don't know (0.2) She's burying something	A1: They are very sweet! very cute [ADMIRATION; ENCHANTMENT]
C2: Is it some fo:od? [DOUBT; CURIOSITY]	
A1: Poor thing, look at her beak below, it's broken, sweetheart! [SURPRISE; WORRY]	
C2: Why?::	
A1: Many birds that are here (.) came (.) from:: cages, they were trapped birds (.) and got released (.) and came here because they are unable to return to nature (.) so maybe she got hurt.	

In the transcribed conversations, the feeling of Concern is recurring in the statements of group 6, where emotions of Surprise and Worry were evoked by the discussion of animals rescued from animal trafficking. Another way in which issues about conservation emerged from the families' dialogues was related to a longstanding practice still prevalent in Brazil: the captivity of small birds

imprisoned in cages or at home, often with their wings clipped, driven by an appreciation for their beauty and/or their song. For instance, this is the case of parrots [Nunes, Barreto & Franco, 2012; Pereira & Brito, 2005]. One of the participants, who remembers the animal with affection and comments about the species with Admiration and Enchantment, reports this common practice in Brazil. In contrast to the previous example, where concerns about animal trafficking are not rendered as problematic, the conversation in Group G7 takes a different turn. Here, the adult asks the child a question to turn the topic into a problematic issue, provoking emotions of Enchantment and Admiration.

In this way, it becomes clear that zoos, besides being a place for the *in situ* conservation of species, can also play an important role in the *ex situ* conservation of species [Balmford, Mace & Leader-Williams, 1996; Lees & Wilcken, 2009]. Although they play a crucial role in bringing endangered species to the fore, they do not equally attract the same attention, empathy and positive emotions from visitors.

These findings hold significant relevance, especially considering that certain social groups often critique these institutions for perpetuating a disrespectful and obsolete hierarchy between humans and non-humans. Authors such as Regan [1995], as well as civil groups, concentrate their criticism on the reductive nature of the rights and moral status of animals to mere instruments for human purposes. Coutinho [2017] takes this criticism further by asserting that, both from a symbolical and practical perspective, zoos have reinforced human dominance over nature, resulting in a profound adverse impact on the balance of lives.

Therefore, it becomes clear that tensions and conflicts permeate the historical constitution of zoos and are currently reflected in the positions taken by these institutions. Even when facing diverse institutional responses, there is a noticeable rise in the number of zoos explicitly presenting their programmes aimed at animal welfare and species conservation. The results of this study point to visitors' explicit concerns regarding animals' well-being, as well as to admiration and enchantment related to their conservation.

Meaning-making and evidence of learning

Research into the emotions experienced by zoo visitors has demonstrated the important role of emotional responses in the processes of meaning-making and learning while observing animals [Bekoff, 2004; Falk et al., 2007; Mazzanti & Sani, 2021; Rappolt-Schlichtmann et al., 2017]. The results of our study are in line with this statement, showcasing different instances that highlight the integral role of emotions in the process of acquisition, correction and construction of the specific scientific content presented in the exhibition. Below, we provide some examples:

Group 5. Ara Macaws information board

A1: Look there! that male one! [That yellow one!] [EXCITEMENT]
C1: [He's so:: handsome!] let's go and see (.) he:: eats fruit [ADMIRATION]
A1: Do you know what she's called?(.) Maned MACAW
C1: [Is there only her?] [CURIOSITY]
A2: [Maned Macaw]=
A1: =find out what they eat
C1: "Fru::t" (.) "seeds" (.) "and:: flowers"
A1: [Yes] [EXCITEMENT]
A2: [Yes::] [EXCITEMENT]
Group 3. Ara Macaw aviary
A1: Look, they eat peppers! would you believe it! How healthy they are (.) I thought (.) I thought they only ate fruit! [SURPRISE; EXCITEMENT]

Group 5. Ara Macaws' aviary

C1: LOOK AT THE BLUE MACAW WITH THE RED MACAW! [EXCITEMENT]
A1: Yeah:: there (.) there was a mix of species [excitement]
C1: I DON'T KNOW WHY THE RED MACAW GOT MARRIED TO THE BLUE MACAW (.) DO YOU KNOW? [DOUBT; CURIOSITY]
A1: I didn't understand either (.) there (.) there are two species there (.) but it looks like they form a couple too [SURPRISE]
C1: Yeah::=
A1: = I think that now even in natu::re (.) there are different couples [SURPRISE]
C1: Many couples [SURPRISE]
Group 6. Parrots (?) aviary
A1: It looks like a parrot (0.3) Wow, this little animal lives thirty years (0.3) longer than a dog [SURPRISE]
A2: He just stands there (.) [inaudible]
A1: Yeah::
C1: A::THERE, THERE Here:: [SURPRISE; EXCITEMENT]
A1: This number of eggs is laid throughout his entire life?! [DOUBT; CURIOSITY]
M: I think it depends on posture
A1: Oh yeah
M: Because::=
A1: =It depends on how often it reproduces, you know. [INTEREST]
M: [Yeah::]

In these examples, we highlight emotions such as Excitement, Admiration, and Curiosity, which help the discussion and facilitate a deeper understanding of some topics. For example, Curiosity led families to look for more information about the species, specifically, the details provided on information boards available on the routes and in the enclosures, about food, posture, behaviour, distribution, and conservation status. Our studies [see: Massarani et al., 2021; Scalfi, Massarani, Kei Sato, Araujo & Bizerra, 2022] pointed out that Curiosity tends to occur mainly with questions, leading visitors to look for information, explore the environment and fill (or not) knowledge gaps. Furthermore, Curiosity appears as a driver for the cognitive effort shared between adults and children, which occurs through spontaneous exploration in front of animals.

Research studies generally focus on positive emotional responses, highlighting their connection to the learning process and the stimulation of environmental awareness and environmentally responsible behaviour [Ballantyne & Packer, 2016; Dillard, 2012; Packer & Ballantyne, 2010; Powell & Bullock, 2014]. The studies developed by our research group have contributed to this discussion by adding the role of negative emotions in the learning process [Massarani, Bizerra et al., 2022; Scalfi, Massarani, Gonçalves & Marandino, 2022; Rowe et al., 2023]. For example, Doubt, an emotion initially considered negative, surfaced 16 times in important instances, and stimulated group discussion, prompting comparison, correction and knowledge construction skills to attribute meaning to what they saw. In group 5, the child asks her mother if she knows why the blue macaw married the red one

because she did not know. As they are both curious to find the answer, they go to another section and ask the assistant to resolve their doubts. Thus, Doubt sometimes occurred together with Curiosity, one driving the other in the search for information.

Final considerations

Zoos present certain peculiar aspects in relation to other types of museums. By displaying live animals with unique characteristics, these spaces can awaken a variety of emotions in their visitors. Within this study, which aimed to analyse human emotional responses towards non-human animals, specifically birds, during a visit to the zoo, we observed that a range of emotions, predominantly positive, were present in the experience of families. Negative experiences were also present, albeit to a lesser degree.

Our analysis identified that families had a positive and pleasant visiting experience, given the high occurrence of emotions of this nature. We also point out that the negative emotions expressed were not seen as harmful but rather as potential for constructing meaning about what was being viewed. Furthermore, we found that the physical characteristics of birds, such as their colours and patterns, as well as their behaviours and abilities, triggered emotional responses that were associated with admiration for the species, concern for their well-being and conservation issues, in addition to the construction of meaning by families. We also found that visitors did not establish anthropomorphic solid associations with birds, in contrast to another study conducted by this research group [see: Massarani, in press]. More pronounced associations were observed in the latter case, particularly with monkeys and fish. We intend to investigate this topic in more depth in our future research. In general, visitors seemed emotionally involved with the birds available, with statements indicating that they were paying attention to every detail, which may support memories of their experience in a future opportunity.

It is also worth highlighting that Parque das Aves proved to be a place where families can express their pre-existing emotions concerning animals based on their cultural and personal history, building emotions during the experience and contributing to what they will remember after their visit. Given that people prefer the most attractive and emblematic species, such as macaws, the Park could raise awareness and develop strategies to support endangered species, thus contributing to improving people's attitudes towards them in the long term.

Finally, we emphasise that visitor experiences, particularly those focused on emotions, are still challenging to investigate and not widely known. Therefore, studies that expand research methodologies on the experience of visitors and their expressed emotions are increasingly necessary for a more holistic approach to the experience of museum visitors. As this research was carried out in a single zoo, the data cannot be generalised, representing a limitation of this study. Nonetheless, we have the potential to enhance our understanding of families' emotional responses toward a specific taxonomic group, namely, birds.

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