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The Social Representations of Zoo Goers toward Crocodiles and Turtles: Structural Analysis and Implications for Conservation

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Abstract: Zoos have changed dramatically over the last century and today attract millions of people worldwide, being places where visitors can closely watch wildlife and learn about the species on display. Although present at most zoos, reptiles are challenging animals in terms of visitor interest and engagement, as some species do not fit aesthetic standards from the human standpoint, have culturally negative perceptions or generate aversive emotions. By studying zoo visitors' social representations of crocodiles and turtles, we aimed to detail their structures, as well as identifying their prototypical elements that help to understand their emotional and cognitive framing. The findings show the crocodile's prototypical image as a big, fearsome predator with teeth as its main physical attribute. Male visitors showed a more emotional perception of this animal. The turtle's prototypical image is a slow, hard-shelled ancestral sea animal with a neutral-to-positive set of traits, with no particular differences between genders. Our results shed a more detailed light on some of the social constructs that make up the mental images of these animals, which can help the zoological community direct communication toward a more fluent conversation between stakeholders toward conservation.

Keywords: social representations; turtles; crocodiles; prototype; conservation

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1. Introduction

Over the last few decades, zoos have undergone major philosophical changes, moving from entertainment to conservation education places, with one of the main purposes being to make visitors more conservation-minded after their visit (Sampaio et al. 2020). Being one of the world's most demographically diverse educational leisure institutions (Bruni et al. 2008) and having an annual attendance reaching almost 10% of the world population (WAZA 2005), zoos have contributed to changing the public perception of animals, either by increasing feelings of caring and empathy or by raising awareness and knowledge of conservation issues (Staus 2019). In an attempt to validate this change in public perception, recent research has been increasingly focused on social sciences, studying a range of topics, from learning (e.g., Collins et al. 2020) to belief and attitudes (for a review, see Nygren and Ojalammi 2018). This change, however, still lacks a concrete quantification in order to understand the relative impact on society.

1.1. Gendered Perception of Animals

Among the many factors that influence public perception toward animals, the gender of the beholder is known to affect the way they are perceived and interacted with (Herzog 2007). Eagly's social role theory (Eagly and Wood 1991) explains how inherent physical differences between men and women lead to a division of labor and societal expectations based on stereotypes, i.e., expected behaviors common to a person's gender. These social and cultural differences between behaviors that we expect to see from men and

women influence the way we, individually, perceive our social world. From recent research, it is now known that women tend to be more concerned with the well-being of animals, attribute moral rights to them, defend their moral rights and show more positive attitudes toward them, as well as a stronger concern toward their conservation (see Herzog 2007; Amiot and Bastian 2015). Women are also considered to have socially developed a stronger fear of threatening animals, both for them (due to lower physical robustness) and for the children in their care (Prokop and Fančovičová 2010). In contrast, men have a more utilitarian view of animals, engage more in recreational hunting and show less concern for their conservation (Herzog 2007).

1.2. Reptiles on Display

Aside from specific demographic factors influencing public perception toward animals, zoo visitors are also subject to other factors intrinsic to each species on display. Consciously or not, animals' physical and behavioral characteristics influence our attitudes and behaviors, and some are more prone to engage visitors in learning about and acting on their conservation than others. Charisma (e.g., Albert et al. 2018), similarity to humans (e.g., Kellert 1997), phylogenetic closeness (e.g., Waldhorn 2019) and neotenic traits (e.g., Estren 2012) are some of the already known characteristics that positively affect visitors' preferences, with large mammals being at the top of their lists (Moss and Esson 2010; Brereton and Brereton 2020). Reptiles, generally speaking, do not fit the pattern of preferred species, either due to cultural backgrounds or simply because of their physical traits. If, in the past century, reptiles were displayed as strange and exotic animals, today, they are commonly presented with a stronger focus on their ecological relevance. However, even with this focus on conservation, reptiles are still underrepresented considering their diversity in the wild and conservation needs (Carr 2016). This trend was clearly observed by Conde and colleagues (2013), who found that reptiles represented only 11% of all terrestrial vertebrate species present in more than 800 zoos registered in the International Species Information System (ISIS). Birds, however, represent the largest group in those zoos, accounting for 58% of all terrestrial vertebrate species. Of the more than 11,000 reptile species known to date (Marshall et al. 2020; Uetz et al. 2021), only 445 species were found to be present in ISIS records (Conde et al. 2013), corresponding to 4% of the known biodiversity. However, aside from this underrepresentation, or perhaps even contributing to it, reptiles are challenging animals in terms of visitor interest and engagement. Some species lack aesthetic standards from the human standpoint (Estren 2012), some are culturally ingrained with a negative perception (e.g., Alves et al. 2012; Ceríaco 2012; Wake 2016; Ali et al. 2017), and some even generate aversive emotions (Janovcová et al. 2019), a set of characteristics that do not contribute to sound and engaging conservation messaging.

1.3. Crocodiles and Turtles

Among reptiles, crocodiles and turtles are well-represented in zoos and are also known to generate different emotions. Crocodiles are generally perceived as sources of danger, generating fearful emotions (Ware et al. 1994; Tucker and Bond 1997; Janovcová et al. 2019). Turtles often generate feelings of affinity and positive emotions (Frazier 2005, 2010; Janovcová et al. 2019; St. Peter et al. 2021), and some, such as sea turtles, are commonly used as flagship species (e.g., Frazier 2005; George et al. 2016). To the best of our knowledge, recent research on zoo goers' perceptions and attitudes toward crocodilians (the group of crocodiles, alligators, caimans and gharials) or turtles (here, comprising land turtles, sea turtles and terrapins) is still scarce (e.g., Tzuc-Salinas et al. 2020; Ogle and Devlin 2022). However, it is of fundamental importance to understand how visitors perceive these animals, from a psychological standpoint, if we wish to find ways to better engage zoo goers in conservation efforts.

1.4. Social Representations

Moscovici (1973, p. 13) first defined social representations (SRs) as "systems of values, ideas and practices with a dual function: first, to establish an order that allows individuals to orient themselves in their material and social world and to feel make yourself comfortable; second, to enable communication between members of a community by providing them with a code of social exchanges and a code of naming and classifying in an objective way the various aspects of their world and their individual and group history". SRs are sets of explanations, beliefs and ideas, elaborated from cultural and social models that provide frameworks for understanding and interpreting the world around us, which we call reality (Moscovici 1973). SRs are also considered, in a broader sense, as social thought and are essential in human relationships because they give an explanation and a meaning to reality (a function of knowledge). In addition, they act as behavioral regulators and guides (the guiding function), allowing individuals to communicate and understand each other (Moscovici 2001).

1.5. Functional Approach to SRs

For the creation of SRs, there are two fundamental processes, *Anchoring* and *Objectification*, by which the unknown becomes known. *Anchoring* involves assigning meaning to new phenomena—objects, relationships and experiences—through their integration into the collective memory so that they can be interpreted and compared to already known social objects (Sampaio et al. 2021). In this way, the threat posed by a strange and unknown object begins to be progressively diluted. For example, as Jaspal and Nerlich (2020) described, the SR of the unknown virus SARS-CoV-2 was anchored to something already known by the public, for instance, the HIV virus. In the *Objectification* process, something abstract is transformed into something almost concrete by removing the object from its context, allowing the construction of a scheme, a "figurative core", where the main elements of the object are organized (Abric 1996). The *Objectification* of the SARS-CoV-2 virus took place using visual and linguistic imagery easily accessible from the collective memory, such as "enemy", which we all needed to "combat" or "fight" (Jaspal and Nerlich 2020).

From a structural standpoint, SRs are internally organized into two systems—a central system and a peripheral system. The central core of a specific representation is composed of one (or several) element(s) that is (are) stable, coherent and resistant to change, being strongly marked by the system of norms of a group (Abric 1993). The meaning of the entire representation, including the peripheral elements, is less sensitive to changing social contexts. From a behavioral point of view, the central core plays a pivotal role in the organization of values, attitudes and behaviors (Abric 1993). Unlike the rigidity of the central core, the elements of the peripheral system are considered flexible, allowing the integration of individual experiences and stories and supporting variations and contradictions between individuals and subgroups over time (Flament 1994). It is a functional, grounding representation in reality, transforming it into concrete social behaviors and practices. Given this flexibility, it is the peripheral system that acts as a buffer, protecting the central core from circumstantial changes (Abric 1993). When new information and events challenge the main ideas of the representation, the peripheral system allows the integration of such elements, keeping them organized around the central core shared by the social group. Again, using the SARS-CoV-2 virus as an example, Coelho and colleagues (Coelho et al. 2021) explored the SR of COVID-19 among Brazilian assistant nurses. The authors found "Fear" and "Isolation" to be the main candidates for the central nucleus. These ideas were closely connected to "Death" as the first periphery. "Sadness", "Pain" and "uncertainty" made up the second periphery, and "Dyspnea", "Anguish" and "Pandemic" were found in the contrast zone. Thus, once the structure of the representation is known, it is possible to move on to a more contextualized picture of pre-existing attitudes and stereotypes, as well as helping to understand the cognitive and emotional factors in relation to the object.

1.6. SRs of Animals

Animals, as any other social object, have their own SRs and, with them, emotional and cognitive framing. In fact, the public perception of animals has been identified as one of the main enabling/inhibiting factors for their conservation. Understanding the underlying structure and content of their SRs is, therefore, crucial. Although the study of SRs in many areas of the social realm has gained some momentum in recent years, research on the SRs of animals is scarce. To the best of our knowledge, only a small number of animals have been subject to an SR analysis (e.g., wolves: (Figari and Skogen 2011; Theodorakea and von Essen 2016); donkeys: (Gameiro et al. 2021); sharks and dolphins: (Neves et al. 2021)).

1.7. Objectives of the Research

The purpose of this study is to explore and detail zoo visitors' structural perceptions of both crocodiles and turtles, aiming to broaden the knowledge of these reptiles from a psychological standpoint. For this, we set out to answer the following research questions: What is the crocodile's SR content? How is it structured? What is the turtle's SR content? How is it structured? Do the SRs of both animals differ in structure and emotional content depending on the visitor's gender? The resulting knowledge will hopefully help the zoo community direct communication toward a more fluent conversation between stakeholders.

2. Materials and Methods

2.1. Participants

Zoo goers (N = 370; M(age) = 36.23; SD = 11.15) voluntarily participated in a free association recall task. This random sample was composed of 167 male participants (45%), 187 female participants (51%) and 16 participants who did not report their gender (see Table 1 for details on each stimulus word).

Table 1. Demographic details of participants (for each stimulus word).

		Crocodile (N = 185)	Turtle (N = 185)
M(age) (SD) *		35.2 (10.7)	36.5 (10.9)
Gender (% males)		51%	39%
M(age) (SD)	Males	35.9 (10.1)	39.8 (12.0)
	Females	34.5 (11.3)	37.8 (11.3)
Education	Up to 9th grade	6%	9%
	High school	25%	17%
	University	45%	52%
	Not reported	24%	22%
Profession	Higher managerial and professional occupation	10%	2%
	Lower managerial and intermediate occupation	47%	42%
	Routine and manual occupation	39%	53%
	Not reported	4%	3%
Nationality (% Portuguese)		49%	50%
Living in coastal areas		50%	48%

* including the 16 participants who did not report their gender.

The participants were also asked to report where they obtained their information from for each stimulus word. A total of 27% of the participants reported unspecified sources for the origin of their knowledge about crocodiles. Half (49%) of the participants did not specify the origin of their knowledge about turtles. Among the identified sources, the participants reported television/news, which accounted for almost one-third of the most common sources of information (crocodiles: 33%; turtles: 29%). Documentaries, at 14%, referring to crocodiles, and school, at 12%, in the case of turtles, were the second most

mentioned sources of information. Similarly, 11% of the participants attributed the origin of their knowledge about crocodiles to school. Documentaries were the third most mentioned source of information about turtles for the participants, at 8%. Zoos and aquariums were the fourth most mentioned sources of knowledge about animals, although they were only mentioned by 9% of the participants for the word "crocodile" and by only 1% of the participants for the word "turtle". Movies were only mentioned by the participants questioned about crocodiles (6%).

2.2. Data Collection

The study sample was collected at the entrance of Zoomarine Algarve, an oceanographic park in Southern Portugal. Randomization was guaranteed by selecting each participant from the entrance queue based on multiples of three in line. The participants were asked to write down the first words (up to ten words) that came to mind when presented with one stimulus word. Each participant addressed only one stimulus word, and the order was randomized. The stimulus words were "turtle" and "crocodile". Each participant had the time they needed to complete the task, with no forced timing. Participation was voluntary, and no identification was made. All participants were informed that they could stop the task at any time, without incurring any prejudice, and that all data would be treated holistically, respecting the ethical principles of confidentiality and anonymity. All procedures in this study were performed in accordance with the American Psychological Association (APA) ethical principles and the Portuguese regulation about data protection. This free association technique is commonly used to access the semantic content of SRs (e.g., Moscovici 1973; Abric 1994; Danermark et al. 2014) in an informal and spontaneous way, without social judgment constraints.

2.3. Data Analysis Strategies

Lexicographical analysis.

This analysis is aimed at identifying the elements that constitute the central nucleus and the peripheral system of SRs. All data were transcribed to a spreadsheet and then analyzed using the software EVOC 2000 (Scano et al. 2002), following Abric's theory of the central nucleus (Dany et al. 2015) and Scano and colleagues (Scano et al. 2002) recommendations. The software EVOC 2000 provides a double-entrance table indicating the central nucleus and the peripheral system (see Figure 1) by crossing the frequency of the evocation of the elements and their elicitation order (i.e., their rank of apparition in the evocation). The core or central nucleus is constituted by elements with a high frequency (i.e., evoked by a large number of participants) and a low rank (i.e., elements appear first). A low rank usually represents topics and ideas of high importance, since they are first retrieved from memory (Abric 2005). The first periphery (second quadrant) is composed of the highly frequent but late-recalled elements, thus comprising less important ideas. These ideas strongly influence social practices and situational evaluations (Monaco and Lheureux 2007). The contrast zone (third quadrant) is composed of elements with a low frequency (i.e., evoked by a restricted number of people) and a low rank (high importance). As the name implies, this area is characterized by tensions between content and stability, suggesting possible changes in the SRs or a minor subtype of a different representation stemming from a social subgroup (Abric 2005). Finally, the second periphery (fourth quadrant) is constituted by less-often and late-evoked elements.

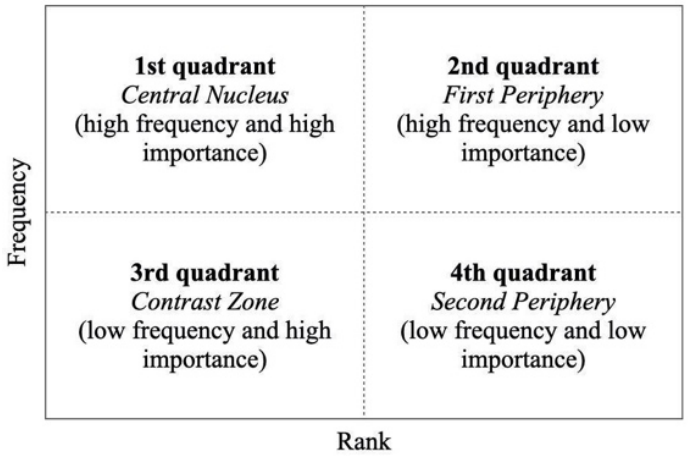

Figure 1. Distribution of the evocations as organized by Abric (2005).

Some stimulus words produce a great number of evoked elements (i.e., high heterogeneousness) while others produce less elements (higher homogeneousness). The minimum frequency is the point where the elements' frequencies change from many words and a very low evocation rank to few words and a higher evocation rank.

2.4. Similitude Analysis

A lexicographical analysis determines the elements that belong to the central nucleus and the peripheral system of the SR, but it does not provide any information about how the elements are interconnected. To explore how the elements relate to one another, a similitude analysis (Rouquette and Rateau 1998) was conducted using the software SIMI 2000 (Junique et al. 2002). To reduce the number of evocations to a maximum of 30, all evocations with an average regency above 5 were excluded. This criterion, applied to all outputs, allowed for the problem of excess categories of the first periphery to be overcome. Maximum spanning trees were then graphically drawn for the evocations of each stimulus word. Each word is connected to the one(s) more related to it. Thicker lines symbolize a stronger relationship between ideas.

3. Results

3.1. Lexicographical Analysis

A total of 277 different words composed the lexicon for the stimulus word "crocodile", of which 151 words were mentioned only once, corresponding to 55% of the total lexicon. The participants evoked, on average, 6.8 (SD = 2.08) words. The minimum frequency considered was 4, and the mean frequency considered was 8. Figure 2 shows the candidates in the central nucleus and peripheries (for a detailed description, see Table S1 in Supplementary Materials).

Danger is the only item that constitutes the central nucleus (first quadrant). The elements of the first periphery (second quadrant) create a more detailed vision of crocodiles. Coherent with the central nucleus, crocodiles are portrayed as fearful animals (Fear and Fierce) with behavioral traits (Evil, Aggressive, Fast, Strong and Wild) and consequences (Bite and Death). They are also perceived as ancient animals (Ancestral and Dinosaur) and are described with a focus on identifiable anatomical traits (Teeth, Big, Skin, Eyes, Scale, Mouth, Tail and Color). There is also an association with their environment (Water), aesthetics (Ugly), taxonomy (Reptiles), behavior (Predator, Slippery, Lively) and the source of information (Movies). Although having some negative associations, most attributions are neutral. The second periphery and the contrast zone generally express content that is characterized by lower frequencies and ranks and that complete the first periphery. Although some items fall into the categories identified in the first periphery, positive attributions are also found here (Beautiful and Intelligent).

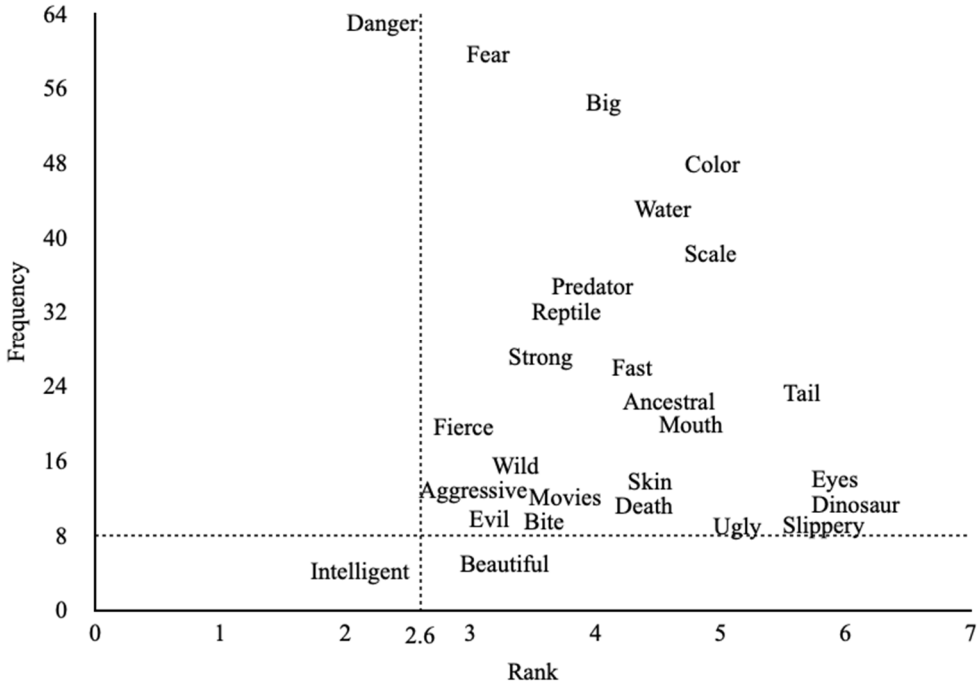

Figure 2. Scatterplot with words evoked for stimulus word "crocodile". Cut-off points are represented by broken lines (rank = 2.6; frequency = 8). For a better read, the evoked word "teeth" is not represented due to its high frequency (114) (second quadrant).

The lexicon for the stimulus word "turtle" was composed of 209 different words, counting 111 unique words (53% of the total lexicon). The participants evoked, on average, 6.12 (*SD* = 2.03) words. The minimum frequency considered was 4, and the mean frequency considered was 9. Figure 3 shows the candidates in the central nucleus and peripheries (for a detailed description, see Table S2 in Supplementary Materials).

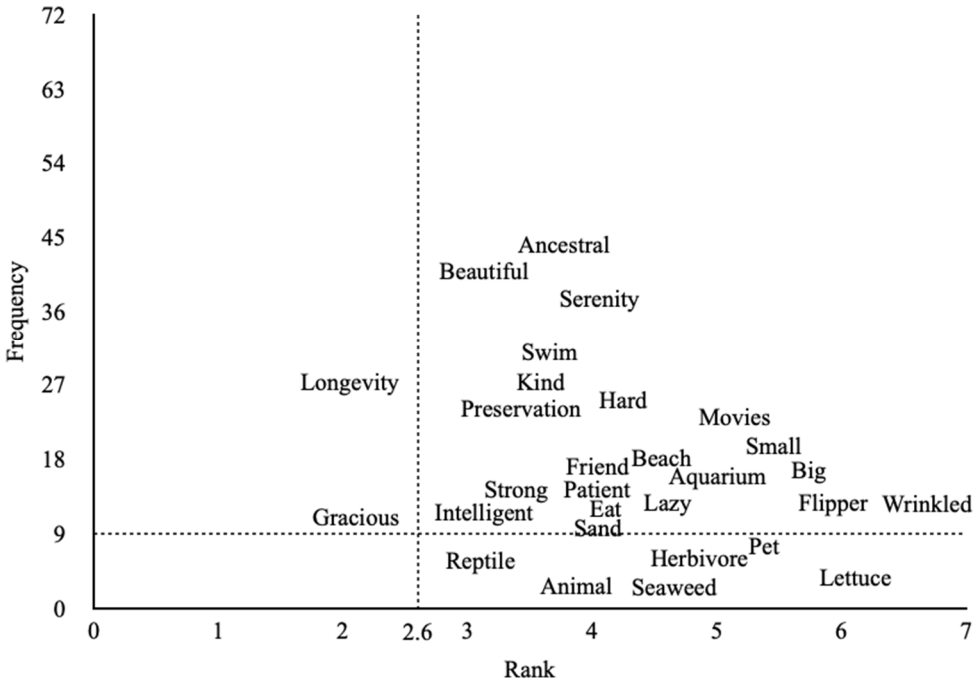

Figure 3. Scatterplot with words evoked for stimulus word "turtle". Cut-off points are represented by broken lines. For a better read, the evoked words "shell", "slow" and "sea" are not represented due to their high frequencies (116, 102 and 79, respectively) (second quadrant).

The candidates for the central nucleus of the turtle's SR are Longevity and Gracious. Similar to the stimulus word "crocodile", the first periphery portrays the turtle as an ancient animal (Ancestral) and includes identifying "personality" traits (Kind, Friend, Intelligent, Patient and Lazy), aesthetics (Beautiful) and behavior (Swim and Slow). It also includes anatomical characteristics (Shell, Color, Flipper, Hard, Small, Big, Wrinkled and Strong) and the emotions it generates (Serenity), as well as information on its living environment (Sea, Beach and Sand), conservation awareness (Preservation) and, similar to crocodiles, reference to sources of information (Movies). There is also an association with Aquariums and sources of food (Eat).

The second periphery reinforces the categories found in the first periphery, with added references to diet, taxonomy and ownership. No item was found in the contrast zone.

3.2. Similitude Analysis

Figure 4 shows the interconnectedness of the elements that compose the representation of the crocodile.

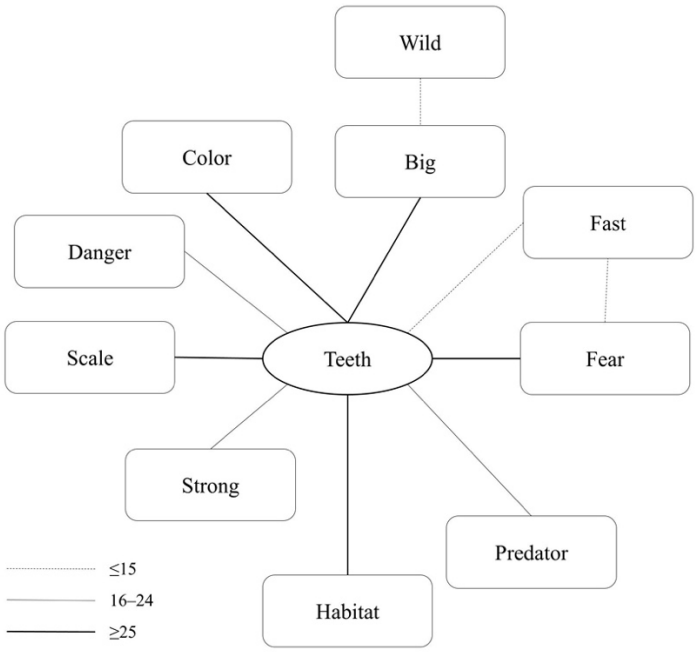

Figure 4. Tree with the elements of the social representation of crocodile (total sample).

Teeth was found to be the main organizing element of the stimulus word "crocodile"; all other ideas and meanings stemmed from it (Figure 4). Words describing insecurities and threats (i.e., Fear, Predator and Danger), physical characteristics (Big) and behaviors (Fast and Strong), covering more than half of the first node's connections, were easily observed. The only second node connection was found associating Big with Wild.

Interestingly, the stronger associations with the central idea mostly describe the main physical descriptors of the crocodile (Habitat, Scale, Color and Big) and an aversive emotion (Fear).

Gender differences are common when addressing perceptions and attitudes toward animals (Kellert 1997). Therefore, the SR of crocodiles was also analyzed according to the participants' genders (see Figure 5).

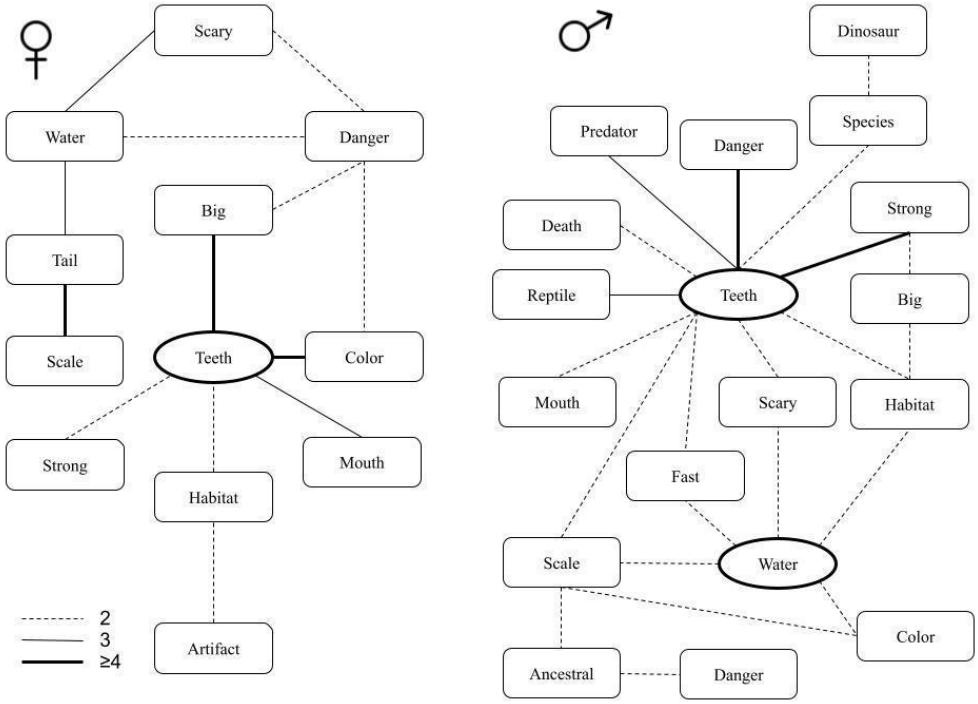

Figure 5. Tree with the elements of the social representation of crocodile (female vs. male participants).

The female participants' SR has a strong similarity to the general one. Teeth are also the core element from which most of the other ideas stem, although it is possible to observe a stronger set of nodes branching out from the main ideas. The first nodes describe the animal from a physical perspective (Mouth, Strong, Big and Color). The stronger associations (Big and Color) branch out to fearful emotions (Danger and Scary) but also to habitat (Water) and physical traits (Tail and Scales). Similarly, the male participants' SR is similar to the female participants' SR, but it goes deeper in detail. Instead of one central node, the male participants' SR shows two central ideas (Teeth and Water), spawning a large number of first-node ideas. Threatening emotions (Danger, Death and Scary), alongside behavioral traits (Fast, Strong and Predator), are directly connected to, at least, one central node. The stronger associations come from each of these domains (Strong and Danger).

The SR of the turtle (see Figure 6) is structured around two direct and strongly interconnected main nodes: Slow and Shell. Slow branches out more strongly with Ancestral, which, in turn, connects to Communication. Positive emotions (Serenity) and positive "personality" traits (Kind and Friend) are also associated with this main node. The second main node (Shell) relates strongly to Color, and all other ideas stem from habitat (Beach, Sea and Sand), behavior (Swim), aesthetics (Beautiful) and, finally, conservation (Preservation). In sum, its SR is organized around ideas of positive or neutral emotions.

The female and male participants' SRs of turtles are somewhat similar to the main one (Figure 7). The female participants' SR draws on both central nodes (Slow and Shell) with similar ideas branching from them. Positive emotions (Serenity) branch further to "personality" traits (Kind and Patient), and Water is the common idea shared between the two central ideas. Reproduction (Egg) and Movies are now present. The male participants' SR adds an extra main node (Sea) but, overall, is described in less detail. Similar aesthetics, behavior and "personality" traits are present.

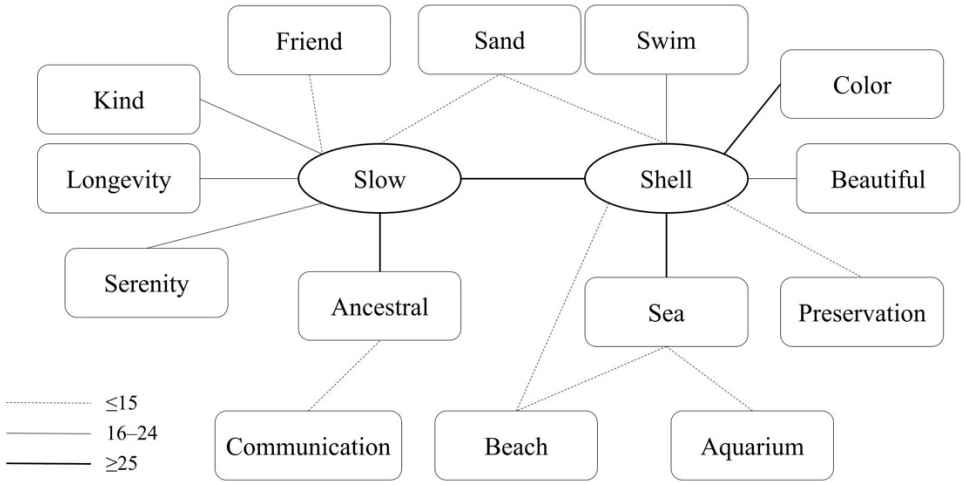

Figure 6. Tree with the elements of the social representation of turtles (total sample).

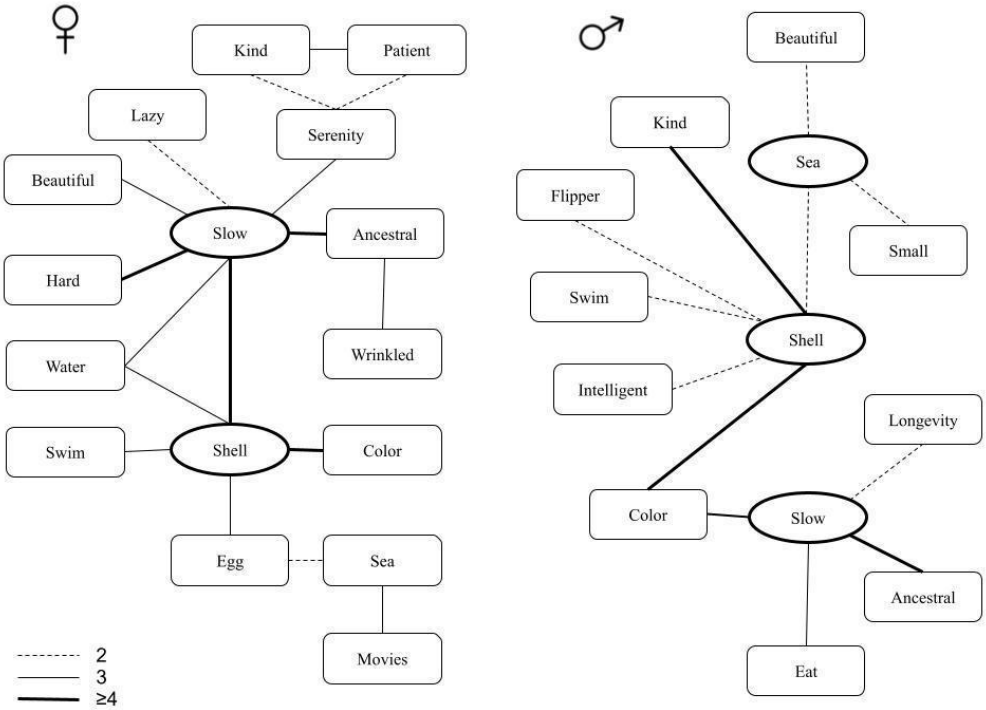

Figure 7. Tree with the elements of the social representations of turtles (female vs. male participants).

4. Discussion

The aim of this study was to explore and detail the structure of zoo visitors' social representations (SRs) of both crocodiles and turtles, thus helping to identify some of the prototypical elements that make up the mental representation of these two animals.

4.1. Crocodile's Social Representation

The results show that the content of the SR of crocodiles was mostly related to ideas that can generate aversive emotions (such as Fear and Danger) (see Figures 2 and 4). The findings also point to a prototypical image of the crocodile as a big, fearsome predator, with Danger as its core identity and teeth as its main physical attribute (central node in Figures 4–6). Putting these results in perspective, the combination of social threats (e.g., Danger and Aggressive) and cognitive traits, such as Intelligence (present in the contrast zone, which mediates the central nucleus and the first periphery), are known to generate attitudes that may result in prejudice and that lead to discriminatory behaviors toward

animals (Sevillano and Fiske 2016). This is coherent with the idea that crocodiles, once perceived as dangerous by owning a set of physical characteristics (e.g., Strong, Fast and Teeth) and having the ability (Intelligent) to act with harmful intent, may induce aversion and fear behaviors, resulting in low attitudes toward their conservation, especially in the case of human–crocodile conflict (e.g., Pooley 2016; Khan et al. 2020). This, in turn, creates negative feedback on conservation attitudes, supporting the idea that crocodiles, although belonging to the 20 most charismatic animals (Albert et al. 2018), are not a preferential animal to protect. In fact, according to these same authors, the crocodile is perceived as the most scary and impressive, even when compared to other animals such as sharks. The same was found by the authors (submitted) when asking about the donation preference for conservation efforts. These authors found crocodiles, within a selection of four animals, to be the least preferred.

4.2. Turtle's Social Representation

Contrary to the crocodile, the turtle was depicted with mostly neutral (longevity) and positive (gracious) attributes. The prototypical image of the turtle is somewhat neutral, being a slow, hard-shelled ancestral sea animal. This is probably not surprising, as many participants did report television as the main source of their knowledge about turtles, and there are plenty of animated movie characters that fit this prototype (e.g., Finding Nemo, A Turtle's Tale and Finding Dory). For example, the movie characters "Squirt" and "Crush", both sea turtles in Finding Nemo (Stanton and Unkrich 2003), fit well in the overall SR (e.g., Wisdom, Calm, Tranquility and Friendship). Cumulatively, by not having negative ideas within the SR, the results are coherent with sea turtles being good flagship species for conservation projects (Frazier 2005; George et al. 2016). As with the crocodile, in another study by the authors (submitted), turtles were rated as the second choice in the donation preference for conservation, just after dolphins. It is also important to mention the reference to Pet, which was only found in the turtle SR. Generally, to be considered a pet, an animal must comply with some specific positive traits, such as the absence of threat and the presence of social support characteristics, thus belonging to the protective stereotype as described by Sevillano and Fiske (2016). According to these authors, the protective stereotype is related to positive evaluations and emotions of love and affection and, as the classification implies, behaviors of protection and cooperation.

4.3. Gender-Related Differences

To answer our third research question, the male and female visitors' SRs of both animals were compared. The results do show differences between the male and female visitors' SRs of the two animals, although sharing most of the common traits that make up the general SR of each animal. Female visitors showed a wider range of elements and content characteristics with regard to turtles, with a general positive and more emotion-based perception. Interestingly, only the female visitors' SR included the idea of Movies, which connects to the thought expressed earlier. Male visitors described turtles in less detail but using a similar positive approach. The structure and content of the male visitors' SR followed the expected traditional gender role, portraying men with a more naturalistic and utilitarian approach, i.e., with a stronger focus on cognition.

The male visitors' SR of crocodiles did show something different. Contrary to our expectation, male visitors showed a much greater diversity of elements and content, mostly focusing on negative/danger traits (emotional component). Women, however, described the crocodile in less detail, with fewer negative elements and with stronger cognition-based ideas (e.g., anatomical traits). As the crocodile's prototype fits the idea of a dangerous animal, we expected men to have a more utilitarian perception and, thus, a stronger focus on cognition rather than emotion. The results show otherwise and, through the lens of the social role theory, the crocodile's SR seems here to be gender-reversed. So, why did men describe crocodiles with a higher emotional content? One possible explanation may lie in the absence of the salience of this animal in the everyday lives of the sampled participants.

Crocodiles do not have a natural distribution in Europe, and most visitors are, in fact, Europeans; furthermore, crocodiles are not common television characters in everyday programming. Thus, without salience, women do not need to worry about their safety, and men, taking a more utilitarian and dominionistic approach, express ideas of threat as if they acknowledge the ability of these animals to enact their agency. Males are also known to show a higher interest in less popular animals (Bjerke and Østdahl 2004), which can lead to a stronger interest in acknowledging the animal's threatening traits in greater detail.

5. Conclusions

Around 20% of all known reptiles are already threatened with extinction (Böhm et al. 2013; United Nations Office on Drugs and Crime 2016). Of the 27 species of extant crocodilians, almost half are threatened with extinction (CSG 2022). A similar pattern is found within the group of turtles (and tortoises), with about 52% of all known species being threatened with extinction (Rhodin et al. 2018). Despite this somewhat grim scenario, crocodiles and turtles, when compared to other megafauna, have not been preferential taxa for captive display, to some extent, due to their lack of aesthetic attractiveness (e.g., Carr 2016) and associated emotions (e.g., Janovcová et al. 2019). The results described here allow us to more clearly understand the social representation of these two animals in the minds of zoo goers and, with it, envision some lines of communication when building content for education programs or conservation campaigns. Outlining the mental prototypes of crocodiles and turtles helps us to better understand some of the emotion and cognition behind the perceptions of these animals and how we can leverage communication one step further. A possible strategy to adopt could be to align the content of reptile-related education programs with the main topics shown in Figures 4 and 6. Knowledge associated with gender can also be favorable in the design and evaluation of programs that respond more assertively to the needs and perceptions of different visitors. For example, considering how gender influences the perception of these animals can be important in the design of messages and communication strategies. This is especially important when information about the nature of associated conservation challenges is presented, as is usual in a zoo setting, and for information about the best behavioral choices to assume. Gender differences can, for example, signal different priorities and behavioral intentions for conservation, with the notion that the social role theory is constantly at play. A practical implication of this finding is that some crocodile-focused programs may be framed in terms of male-oriented (threat) perceptions, causing some women to self-exclude as they are not "tuned in" to that narrative. However, men and women conveyed very similar and positive ideas about turtles. These similarities in perceptions can be useful for engaging visitors in conservation actions. The multiple congruent ideas between men and women related to positive emotions and traits point to opportunities for better involvement in conservation education and action.

Supplementary Materials: The following supporting information can be downloaded at: https://www.mdpi.com/article/10.3390/socsci11120571/s1, Table S1: Candidates for the central nucleus and 1st periphery for the stimulus word "crocodile"; Table S2: Candidates for the central nucleus and 1st periphery for the stimulus word "turtle".

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