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Media Coverage of Predator Attacks

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Content Analysis of Media Reports on Predator Attacks on Humans: Toward an Understanding of Human Risk Perception and Predator Acceptance

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Public tolerance toward predators is fundamental in their conservation and is highly driven by people's perception of the risk they may pose. Although predator attacks on humans are rare, they create lasting media attention, and the way the media covers them might affect people's risk perception. Understanding how mass media presents attacks and how this can affect perception will provide insights into potential strategies to improve coexistence with these species. We collected media reports of predator attacks on humans and examined their content. Almost half (41.5%) of the analyzed reports contained graphic elements. Differences in framing between species groups or species were found, with sharks and leopards having the highest proportion of graphic reports, whereas canids and bears had the highest number of neutral reports. This bias in coverage, instead of providing insights into the causes of these incidents and possible remedies, may provoke fear and decrease support for predator conservation.

Keywords: human–wildlife conflicts, cognitive bias, cognitive illusion, media reports, attacks on humans

> The man who never looks into a newspaper is better informed than he who reads them; inasmuch as he who knows nothing is nearer to truth than he whose mind is filled with falsehoods and errors.
>
> (Thomas Jefferson, 14 June 1807, letter to John Norvell, in *The Works of Thomas Jefferson*, ed. Paul Leicester Ford, vol. 10, pp. 417–418)

In the last few decades, the number of attacks on humans by predators has been increasing in several regions around the world. Regardless of the variation in individual attack risk (Ferretti et al. 2015), this trend is true not only for large terrestrial carnivores (Packer et al. 2005, Conover 2008, Acharya et al. 2016, Penteriani et al. 2016) but also for other predators, such as sharks and crocodilians (Caldicott et al. 2005, McPhee 2014).

The increase in reported attacks may likely be attributed to several factors, such as the growth of both human and predator populations worldwide, which has led to increasing habitat overlap (Baruch-Mordo et al. 2008, Glikman et al. 2012, Bruskotter and Wilson 2014). In addition, the use of wilderness areas by humans for economic and recreational purposes has risen in recent years, which is likely to increase the probability of encounters with these species (Bruskotter et al. 2007, Conover 2008, Neff 2014, Penteriani et al. 2016).

Traditionally, threats by predators to humans have caused people to persecute them, resulting in the local extirpation of many species (Woodroffe 2000, Treves and Karanth 2003, Ripple et al. 2014), and these threats still have the potential to decrease human acceptance of predators and to consequently undermine the conservation of these species (Knopff et al. 2016). Indeed, because public opinion has become fundamental in political decisions and governments are more likely to protect what the public cares about rather than what is feared, management of human–wildlife conflict has become a political challenge (Crossley et al. 2014, Neff 2014, Frank et al. 2015).

Human tolerance is a crucial aspect of predator conservation and calls for greater understanding of the factors

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that enhance or inhibit such tolerance (Ripple et al. 2014). Generally, tolerance is lower when people associate large carnivores with high levels of risk (Treves and Karanth 2003, Eriksson et al. 2015, Knopff et al. 2016), and antipredator feelings can hamper conservation efforts and be deeply entrenched in human culture, sometimes lasting centuries after predators have been extirpated (Kellert et al. 1996).

Antipredator sentiments can be exacerbated by an exaggerated perception of the risk associated with predator attacks on humans (Gore and Knuth 2009, Hathaway et al. 2017). Several models and theories have been developed to try explaining risk perception (e.g., psychometric model, Fischhoff et al. 1978; cultural theory, Douglas and Wildavsky 1982). Studies have shown that people are more likely to make judgements about risks based on their feelings and instinct rather than on analytic evaluation (Slovic and Peters 2006). This leads them to often overestimate events associated with dramatic and sensational items and to underestimate events that are unspectacular. Indeed, people significantly overestimate highly publicized causes of death, which are likely to lead people to be exceedingly fearful of statistically small risks (Sunstein 2002), as is the case for injury and death from predator attacks. The overestimation of risks associated with human safety is the result of a *cognitive bias* (or *cognitive illusion*), a systematic error in judgment common to all human beings that can be due to cognitive limitations and motivational factors (Wilke and Mata 2012). This occurs when rare but striking events are so impressed in our memory that we tend to overestimate their frequency (Kahneman and Tversky 1996). For example, people's risk judgments of low probability events are often inflated because of biased media coverage of natural catastrophes and accidents (Kasperson et al. 1988, Wilke and Mata 2012). In the specific case of attacks by predators on humans, this cognitive bias is likely to occur because even if attacks are rare, they create lasting media attention, which increases our perception of risk (Knopff et al. 2016). Indeed, fear of predators is easily provoked in humans because we have a long evolutionary history of conflictual coexistence with predators that produces a natural fear (Kruuk 2002). This cognitive illusion has obvious relevance when resource managers are asked to make probability judgments about outcomes for which they are responsible (Anderson 1998), as in the specific case of the management of human–predator conflicts. Risk perception and amplification, which involve intuitive judgments made by citizens, may then influence support for predator management and conservation, as well as public receptivity to educational messages (Gore et al. 2007, Bhatia et al. 2013).

Reading news on the Web has become a regular habit for many people, offering unlimited coverage of breaking news worldwide. The impact of the media on our perception of an event is well known and recognized, and different models exist that illustrate how mass media drive public perception (e.g., framing, priming and agenda setting; McCombs and Shaw 1972, Kasperson et al. 1988, Scheufele and Tewksbury 2007). In addition, the possible role of graphic information in risk perception and the acquisition of fear is now widely accepted (e.g., Altheide 1997, Burns and Crawford 1999, Harrell 2000, Field et al. 2001, Zillmann et al. 2004, Quillian and Pager 2010, Schafer 2011, Visser et al. 2013, Ruigrok et al. 2016). Indeed, we fear what is most readily available in our minds, and graphic texts and/or images of media reports may form indelible memories that help construct our intuitive rule of thumb for judging risks (Myers 2001). Some studies have showed that media coverage increased after a predator attack, suggesting that extensive coverage and the negative attitude of the media may lead to a decrease in public tolerance for predators (Gullo et al. 1997, Siemer et al., 2009, 2014, McCagh et al. 2015, Sabatier and Huveneers 2018). For example, Røskaft and colleagues (2003) reported that the increased negative attitude toward large carnivores in the Norwegian media may explain the increased fear of brown bears (*Ursus arctos*) in that country. This phenomenon reveals the important role played by mass media in emphasizing or not emphasizing attack events, ultimately influencing perceived risks and amplifying our fear of predators (Armfield 2007, Knopff et al. 2016).

Analysis of media reports of predator attacks on humans can provide insight into potential strategies for the coexistence of predators and humans: Most people will never encounter a predator in the wild, making depiction by the media a crucial factor in public perceptions about the risks (Jacobson et al. 2012). Because viewing negative media reports is associated with the greatest increases in anxiety and fear (e.g., Harrell 2000, Field et al. 2001, Visser et al. 2013), the main aim of this work is to analyze media reports of predator attacks on humans to (a) highlight how the media conveys information on predator attack events and, consequently, (b) understand how these media reports may affect human perception of risk and, as an end consequence, predator acceptance by the public.

Methods

We reviewed media reports of predator attacks on humans from January 2005 to July 2016 by using the name of 13 species of predator or groups of predators combined with the word "attack." Specifically, we searched for media reports on attacks related to 10 large carnivores: both Eurasian and North American brown bears and grizzlies (*Ursus arctos* and *Ursus arctos horribilis*), black bears (*Ursus americanus*), sloth bears (*Melursus ursinus*), polar bears (*Ursus maritimus*), gray wolves (*Canis lupus*), coyotes (*Canis latrans*), cougars (*Puma concolor*), leopards (*Panthera pardus*), lions (*Panthera leo*), and tigers (*Panthera tigris*), as well as the generic words "alligator," "crocodile," and "shark." In fact, in most of the reported attacks by these latter three groups of predators, the exact species is unknown or rarely mentioned. We also tried to search for media reports using the words "maul" and "kill," but we got nearly the same news articles, so we only used the word "attack" followed by one of the years between 2005 and 2016 (e.g., "crocodile attack 2006" or "cougar

attack 2014"). These parameters determined a total of 156 search words combinations—that is, 12 years × (10 species + 3 species groups). By simulating Web searches of people looking at news on the Internet, we collected attack news on the first five pages of Google (when no more articles on attacks by a particular species were shown) or up to the tenth Google page if news about attacks on humans were still present on the fifth page.

For every media report, we scored the (a) title and (b) subheading (if any), as well as (if any) picture(s) and/or drawing(s) of (c) predators and (d) people (or elements such as canoes, paddles, and surfboards that were related with the attack scenario). These elements of a media report are the means through which news frames are made relevant (Zillmann et al. 2004). Scores were recorded as 0 for *neutral* content, 1 for *graphic* content, and 2 for *positive or safe* content. Examples of neutral versus graphic titles or subheadings include the following, respectively: (a) "Bear attacks leave at least three people dead in Siberia and far-east Russia" versus "Siberia: Bear buries woman alive so it can come back and eat her later"; (b) "Elderly Montana woman dies from rare black bear attack" versus "Human flesh found in stomach of bear shot after fatal attacks"; (c) "Wild leopard enters school and attacks six people" versus "Bloody brutal leopard attack in India"; (d) "Leopard attacks and kills girl in Mumbai suburb" versus "Man 'scalped' in deadly leopard attack in India"; (e) "Woman dies in WA shark attack" versus "Shark kills diver while daughter watches in horror"; (f) "Teen killed in shark attack" versus "Shark spotted with the body of a man in its jaws as witnesses look on in horror "; (g) "Wolves kill teacher in Alaska" versus "Wolf pack attacks Chinese villagers, tearing off victim's ear"; and (h) "Woman killed by crocodile near Bhitarkanika National Park in Odisha" versus "Human remains discovered inside crocodile during search for woman killed in attack."

In addition, we considered as graphic text those that included words such as "blood," "bloody," "badly," "gruesome," "eaten," "horror," "horrific," "man-eating," "nightmare," "scary," "terrifying," "terrorizes," and "jaws" (e.g., "…alligator snatched child in its jaws"), as well as explicit mention of the injured part of the body (e.g., "A great white shark ate my leg"). However, just specific mention of bodily injuries, such as "Boy sustains leg injuries in croc attack," was not considered as graphic.

We considered drawings and pictures as being graphic if images (a) explicitly showed predator "weapons," meaning teeth and claws; (b) showed the attack; and/or (c) included details of injured parts of the body or people clearly displaying their injuries, as well as dead people. Images of the animal in normal postures, such as a mother bear with cubs, a resting lion, a swimming shark, or a sleeping crocodile, were considered as neutral. As for pictures, the entire media report was considered to have graphic images even if only one image had explicit content having the potential to stimulate a feeling of fear in readers. Safe pictures or texts were those considered to convey the message that the predator has been trapped and/or killed, as well as pictures of fences, nets, and warning panels, which should reassure people that the situation is under control.

To verify whether the criteria we used to score the different elements of media reports were generalizable, we prepared and distributed an online survey with the aim of estimating the rate of agreement between the respondents and our score for the same elements. In the survey, we presented a total of 40 elements of media reports (i.e., 10 titles, 10 subheadings, 10 pictures of the predator, and 10 pictures of the human or elements related to the attack scenario) randomly chosen from the media reports we had previously collected and scored for the study, and we asked people to assign a score to each element based on their personal opinion. The possible scores were the same as those that we used (i.e., 0 for *neutral*, 1 for *graphic*, and 2 for *positive*), and we received 47 responses (supplemental file S3). The age range of the respondents was 23–49 years old. Twenty-one of the people surveyed were students or hold a degree in biology-related fields, whereas 26 of the people have other kinds of background. Twenty-seven of the respondents were females, and 20 were males. For each element presented, we calculated the percentages of people who agreed with our score: On average, 78.9% of those surveyed agreed with our scores for graphic contents, whereas 57.7% and 33.1% agreed with our evaluation of neutral and safe contents, respectively. The low agreement for neutral and safe contents is mainly due to people who classified these two categories as graphic (51.6%). This means that the respondents' perceptions of the media reports were even more negative than our perception when we classified the attack reports. That is, our results might underestimate the negative impact of the contents of media reports on predator attacks on humans.

As an additional parameter of the way in which the media conveys information on attacks on humans, we calculated an overall score for each media report. The *overall score* defined in a global manner the content of each media report, based on the rule that the presence of even only one graphic element in a media report (i.e., a minimum of one element of the report with a score equal to 1) classified the report as graphic (i.e., overall score equal to 1), even if elements with a score of 0 or 2 were also present in the report. Once we assigned the overall scores equal to 1, the remaining media reports were classified as safe or positive (i.e., overall score equal to 2) if they contained at least one safe or positive element (even if a 0 score was present), whereas the rest were classified as neutral (i.e., overall score equal to 0). Our results are presented per group of species (i.e., bears, including black, brown, polar and sloth bears; canids, including coyotes and gray wolves; reptiles, including crocodiles and alligators; felids, including cougars, leopards, lions, and tigers; and sharks), as well as for each of the above-mentioned species, except for sharks and reptiles, which are only presented as groups of species (supplemental files S1 and S2).

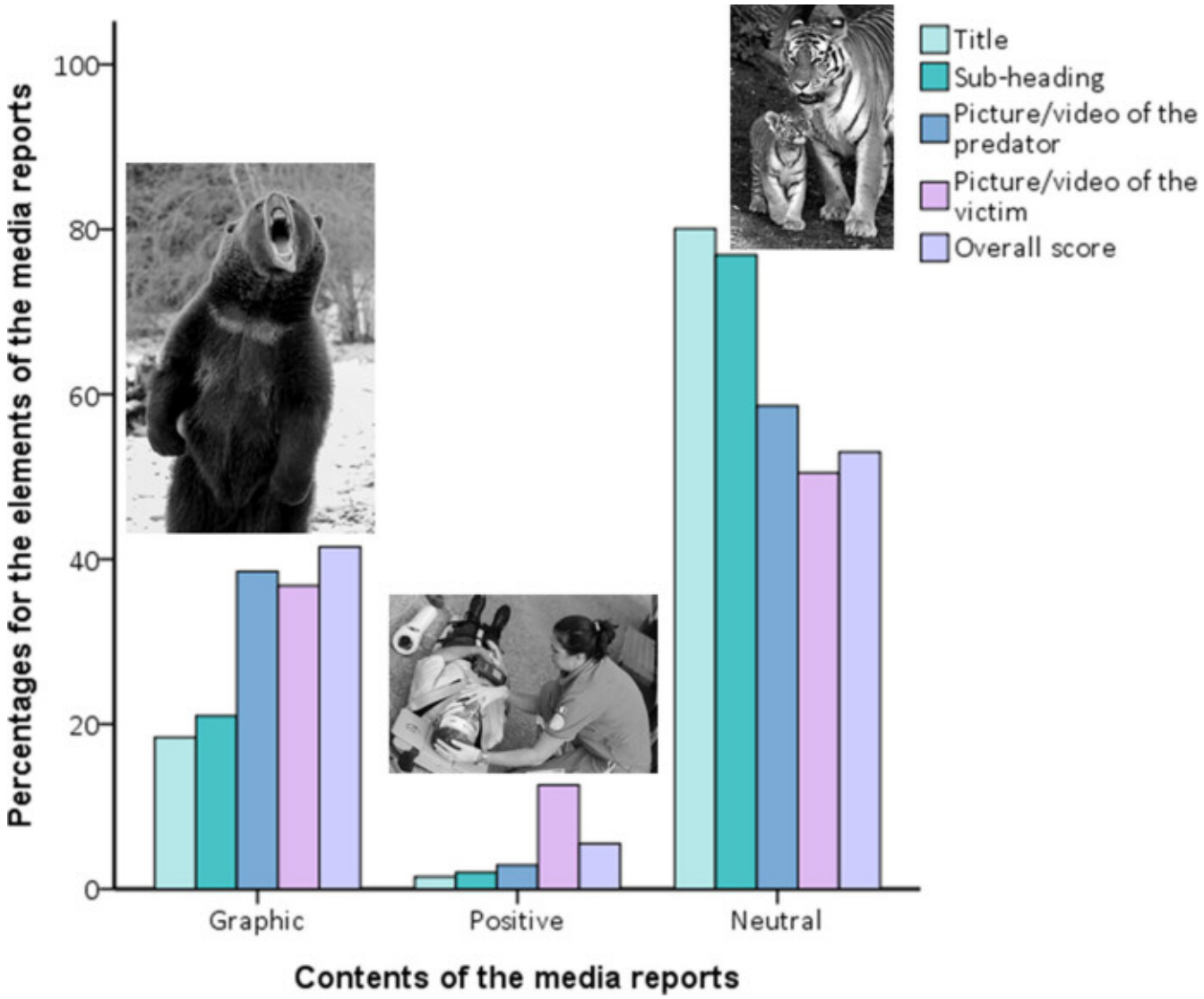

Figure 1. The percentages for each score category (graphic, positive or safe, and neutral) of the different elements of media reports (n = 1584; from January 2005 to July 2016) on attacks on humans by 10 large carnivore species, reptiles and sharks. The following elements were taken into account within each media report: (a) title (n = 1584), (b) subheading (n = 642), (c) picture or video of the predator (n = 780), (d) picture or video of the human (n = 657), and (e) the overall score (see the Methods section for more details; n = 1584). (Photograph credits: all the photographs were downloaded from www.123rf.com, Image ID no. 49,214,234, action sports (brown bear); no. 22,164,614, William Perugini (rescue team); and no. 31,900,112, Dennis Jacobsen (tiger).

Results: Overall view

From January 2005 to July 2016, the Web search resulted in a total of 1584 media reports for all the species and groups of species pooled (supplemental file S4). The media reports principally focused on bears (30.1%, n = 477), reptiles (24.6%, n = 389) and felids (23.4%, n = 371), followed by sharks (11.7%, n = 185) and canids (10.2%, n = 162). In particular, (a) 14.0% (n = 221) of media reports concerned attacks by brown bears, 10.4% (n = 164) by black bears, 4.3% (n = 68) by polar bears, and 1.5% (n = 24) by sloth bears; (b) 11.2% (n = 177) reported attacks by leopards, 5.7% (n = 90) by cougars, 4.6% (n = 73) by lions, and 2.0% (n = 31) by tigers; and (c) 6.4% (n = 101) reported attacks by coyotes and 3.9% (n = 61) wolves.

Half of the media reports showed graphic content

Pictures of predators and people displayed graphic content (38.5% and 36.8%, respectively) more frequently than titles and subheadings, which were prevalently neutral (figure 1). Based on the overall score, almost half (41.5%; n = 657) of the examined media reports were classified as having graphic content, whereas 53% (n = 840) of the media reports were classified as neutral (only 5.5% of the media reports showed positive or safe elements; n = 87).

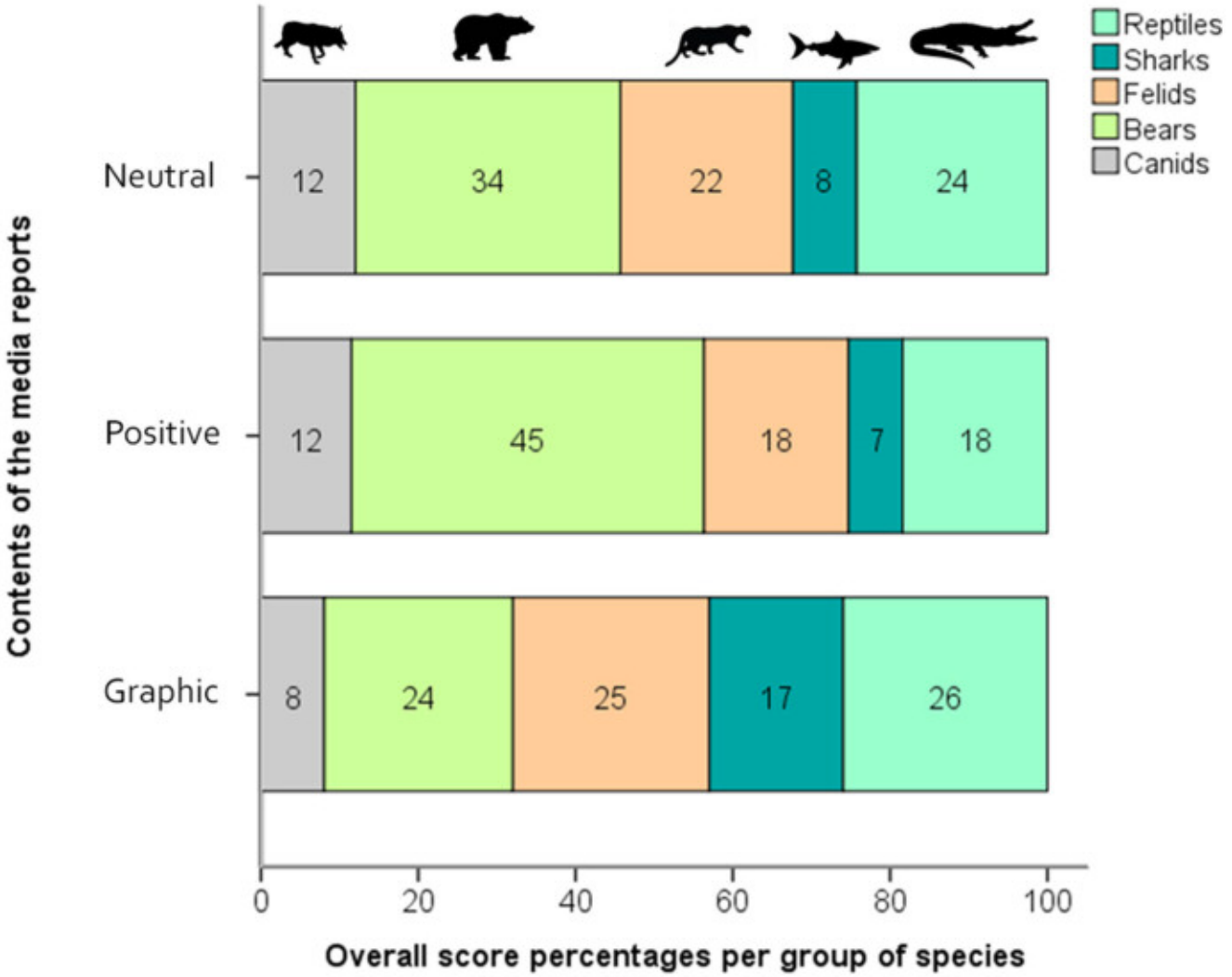

Figure 2. The percentages of the different categories (graphic, positive or safe, and neutral) obtained from the overall scores for the different groups of predators. The overall score defined in a global manner the content of each media report, based on the rule that the presence of even only one graphic element in a media report (i.e., a minimum of one element of the report with a score equal to 1) classified the report as graphic (i.e., overall score equal to 1), even if elements with scores of 0 or 2 were also present in the report. Once we assigned the overall scores equal to 1, the remaining media reports were classified as safe or positive (i.e., overall score equal to 2) if they contained at least one safe or positive element (even if a 0 score was present), whereas the rest were classified as neutral (i.e., overall score equal to 0).

Patterns of media reports for species groups

When we compared the different groups of species, graphic titles were found more frequently in those news articles reporting attacks by reptiles, bears, and felids, whereas graphic subheadings were primarily used for sharks, followed by reptiles and bears (supplemental file S1). Graphic images of the predator were most frequent in cases of felid and reptile attacks, whereas graphic victim pictures and videos were more common in those media reports related to attacks by felids, bears, and sharks (supplemental file S1). Consequently, when comparing the overall score between species groups, reptiles, felids, and bears had the highest percentage of graphic reports (figure 2).

When comparing the overall score within groups (supplemental file S1), we found that sharks, canids, and bears showed the highest difference in the overall score. Indeed, reports on shark attacks were mostly graphic (60%), whereas reports on canids and bears were mainly neutral (62% and 59%, respectively).

Patterns of media reports for species

When we compared patterns between species (supplemental file S2), graphic titles were found more frequently in those news articles reporting attacks by leopards, brown bears, and polar bears. Graphic subheadings were primarily used for polar bears and leopards. Graphic images of the predator

were most frequent for leopards and brown bears, whereas graphic victim pictures and videos were more common in those media reports related to attacks by leopards and brown bears.

Patterns within species show that leopards, wolves, and black bears present the highest difference in the overall score. Specifically, reports on leopard attacks were mostly graphic (63%), whereas reports on wolves and black bears were mainly neutral (72% and 67%, respectively).

Discussion

Even if in most of the reports and for several groups of species neutral elements were dominant, we found that nearly half (41.5%) of the media reports analyzed, dating from 2005 to 2016, contained graphic contents. Moreover, we found differences in framing between groups or species, which could be due to distinct cultural and social factors associated with the different species. Specifically, sharks and leopards were the groups or species with the highest proportion of graphic reports (60% and 63%, respectively, of graphic reports calculated on the total of reports for the group or species considered). On the other hand, canids and bears were the groups with the highest proportion of neutral reports (62% and 59%, respectively, of neutral reports calculated on the total of reports for the group). Given the large number of reports and species considered, as well as the power that graphic content has on viewers' perceptions, 41.5% represents a relatively high proportion of graphic reports. Memory for graphic elements in media reports, indeed, has been shown to be stronger than memory for nongraphic ones, especially when supported by visual images (Harrell 2000). Indeed, viewers who watch negative-news reports tend to remember a higher percentage of the stories they watched than do positive-news viewers.

In addition, most people can live their entire lives without seeing a predator outside of a zoo or an aquarium and therefore rely on the media to form their opinion about them. By carefully framing the graphic images of the stories of personal injury and death, media reports may persuade the audience that a predator is a threat (Schafer 2011) and elicit a cognitive illusion about a phenomenon that, in reality, is extremely rare (Penteriani et al. 2016). This may generate fear that can lead not only to significant public resistance toward predator conservation efforts (Jacobson et al. 2012) but also to increased support for lethal management actions toward predators (Thompson et al. 2003, Meeuwig and Ferreira 2014, Shiffman 2014). By provoking unnecessary fears through graphic contents, reports on predator attacks do not help to accurately inform people about how to correctly behave when in a landscape inhabited by predators, although it has been shown that appropriate behaviors may help significantly reduce the number of attacks (Penteriani et al. 2016). Instead, by providing accurate information about the attacks and how to avoid them, the media has the potential to promote both carnivore conservation and human safety. To this aim, constant engagement of carnivore experts with the media, aimed at providing correct knowledge about carnivores, might lead to a positive change in how human–carnivore conflicts are covered. For instance, a recent study by Hathaway and colleagues (2017) showed that sensitization workshops held for local reporters in India had a positive effect on the quality of media reports regarding human–leopard interactions.

Today, the media landscape is characterized by an increasing number of media outlets that compete for the attention of readers, leading to a form of journalism that is heavily market oriented (Ruigrok et al. 2016). The human-impact angle is commonly used in media reports, and the saying "if it bleeds, it leads" has been professed as the motto under which much American journalism operates (Zillmann et al. 2004). This commercialization and fierce competition dictate that editors and journalists focus on more attractive news stories with impressive titles and images that are likely to attract large audiences and advertisers (Zillmann et al. 2004). For example, after each shooting incident in the United States, various media outlets flood the public with shocking accounts, such as through sensationalistic media reports of select horrific incidents (Burns and Crawford 1999), and in online news media, the coverage of youth crime is exaggerated compared with the facts (Ruigrok et al. 2016). This is similar to what happens for predators: A frequently biased coverage of predator attacks on humans may reinforce the existing feeling of insecurity rather than provide insights into the causes of these incidents and possible remedies, and this way of covering attacks on humans may contribute to the feeling that a fear of predators reigns in human communities and that repressive measures are needed. A considerable amount of research has been conducted on the effects of the framing of news reports (Zillmann et al. 2004). In the case of predator attacks and conflicts, studies have analyzed media coverage and suggested how changes in public perception and tolerance toward predators might be driven by the media (Thompson et al. 2003, Muter et al. 2013, Siemer et al. 2014, Crown and Doubleday 2017).

Fear of potential dangers during outdoor activities in areas inhabited by predators may encourage people to stay indoors, where they watch more media reports that tell them things that in turn reinforce their fears (Altheide 1997). Current trends in graphic media reports might contribute to shaping attitudes toward predators, leading to an increase in negative perceptions, mainly in those areas where predator populations are recovering. Therefore, predator–human conflicts are expected to increase (Penteriani et al. 2016) and, consequently, to generate an increasing number of graphic media reports. Moreover, the magnitude of negative perceptions and phobias toward predators can also spread relatively fast. Indeed, a number of studies have shown that there is a familial aggregation of animal phobias, suggesting that there may be a familial transmission process involving either genetic or learning mechanisms (Torgersen 1979, Wing et al. 1982). Furthermore, human attitudes, which can seem to be resistant to change, may also change rapidly when

human attitudes and feelings are challenged by new information or experiences (Zaller 1992, Olson and Zanna 1993, Eriksson et al. 2015). Schafer (2011) posed the following question: Are we fearful of predators because of our ancestors, our direct experience, or the media telling us that we should be scared? The question as to whether media reports are the cause or the effect of public fears remains unresolved (Altheide 1997).

Conclusions

Human tolerance represents a fundamental component of predator conservation, and the most important limitation to tolerance is the threat (real and perceived) predators pose to people and goods—more than a lack of wilderness or protected areas (Knopff et al. 2016, López-Bao et al. 2017). With our work, we have highlighted that a relatively highly proportion of graphic contents is present in media reports concerning predator attacks on humans, with different groups or species being differently framed by the media. Because mass media is likely to have an important impact on such tolerance, reducing the still-high number of graphic elements in media reports concerning predator attacks on humans may help avoid creating unnecessary fears. In further research, media reports at local scales could be analyzed, and/or potential differences in the media framing of one or more groups or species between different geographical areas of the world could be explored. In addition to decreased graphic contents, the inclusion of science-based knowledge on large carnivore habits and useful information on how to avoid conflicts may prove to enhance human safety and facilitate coexistence with predators.

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Supplemental material

Supplementary data are available at *BIOSCI* online.

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