Fear and Disgust Toward Arthropods in Children and Adults

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Abstract

The responses of adult (18+ years) and child (under 10 years) visitors to the World of the Insect exhibit at the Cincinnati Zoo were observed. Reactions to the arthropods on display were categorized as positive (interest and enjoyment) or negative (fear and disgust). Adults showed a nearly equal distribution of positive and negative reactions, while children had many more positive reactions than negative reactions. These data support existing literature that found that children do not begin to develop specific fears until 10 to 13 years of age.

Keywords: Fear, disgust, arthropods, insects, arachnids, psychology, child psychology

Fear and Disgust Toward Arthropods in Children and Adults

Insects, arachnids, and other arthropods are integral parts of almost every ecosystem, but they are also a great source of fear and disgust for many people. Fears of painful bites and stings, as well as the spread of disease and filth or destruction of property, have given arthropods a bad reputation. Most arthropods are completely harmless to humans, and the ones that can hurt us do not actually want to (Vetter & Visscher, 1998). With the exception of certain hematophagous organisms (e.g. mosquitoes, ticks, bed bugs, etc.), the organisms many people worry about biting them do not have a taste for human flesh, and therefore have no reason to seek us out (Vetter & Visscher, 1998). Similarly, the ones that can sting do not gain any advantage from doing so, as many species die after delivering a sting and therefore only sting to defend the nest during an attack by a mammal (Hermann, 1971). In fact, most bees are extremely docile (Vetter & Visscher, 1998), and honeybees can often be easily handled by professional beekeepers without protective clothing (Osborne, 2017). Most human-arthropod conflicts arise when one of these organisms is accidentally squished or swatted, the arthropod misconstrues the action as a threat, and reacts defensively (Vetter & Visscher, 1998). Regardless of this reality, there is a long and ongoing history of humans reacting destructively towards things, organisms, and, indeed, people that they fear because they do not fully understand them (Lee, 2016). Because insects and other arthropods play vital roles in maintaining a healthy planet, it would serve everyone's best interests to live peacefully alongside them, rather than resort to swatting and spraying them on sight.

A substantial body of research exists regarding why we fear certain things. Some research points to fear and disgust of potentially dangerous animals or items as being inherited, carried down from those of our ancestors who were wise enough to avoid danger and, as a result, survived to pass on their DNA (Reynolds & Askew, 2018). If this is the case for arthropods, then it would stand to reason that children would show the same rate of entomophobia as adults. However, an equally large body of research has shown that fears are learned. Children look up to their parents and older peers, and in seeking to fit into social or family groups, absorb the expressed fears of those individuals (Reynolds, Field, & Askew, 2015). If this is the case for arthropods, then we would expect young children to show less aversion to arthropods than adults

who have already learned these fears. This study examined the latter of the two potential explanations by observing the reactions of child and adult visitors to the World of the Insect exhibit at the Cincinnati Zoo and Botanical Garden, and whether children or adults showed more fear and disgust reactions to the arthropods on display.

Methods

Location and Time

One of the easiest locations to observe human reactions to large quantities and varieties of arthropods is the World of the Insect exhibit at the Cincinnati Zoo and Botanical Garden. Visitors to the exhibit can safely observe live insects, arachnids, and other arthropods from all over the world from behind glass. The study was conducted on two consecutive weekend days, at 12:00 PM on Saturday, November 10 and at 11:30 AM on Sunday, November 11, 2018. A weekend was chosen as children would likely be in school during the week, and a more even distribution of children and adults was more likely on a weekend. I spent thirty-minute periods in each of the main sections of the exhibit (entrance area, giant jumping stick area, and main leafcutter ant area), walking around that section and looking at the specimens in order to avoid rousing suspicions amongst visitors. I carefully observed each visitor's remarks and reactions to the arthropods on display, assessing whether they were positive or negative, and avoiding recording the same individuals twice; if the same individual was encountered again at another area of the exhibit, their response was not counted again.

Assessments and Measures

A basic table (Fig. 1) was used to tally the number of positive and negative responses from children and adults. Weems and Costa (2005) found that children do not begin to develop fears of specific dangers until age ten to thirteen, so a "child" was defined as any individual under ten years of age. Without interviewing visitors, I could not ask for exact ages; therefore, children were those individuals roughly under four feet tall, and adults were defined as those approximately eighteen years of age or older. I excluded the middle teens due to the extreme complexities of the mental and emotional growth that takes place during those years (Jovanovic et al., 2014), which may have led to less accurate or honest reactions.

A set of parameters was referenced to determine whether the reactions of visitors showed positive or negative opinions of arthropods (Fig. 2). Each response was then tallied in the appropriate category of the data collection table: positive child response, positive adult response, negative child response, or negative adult response.

Positive reactions	**Negative reactions**
Positive words such as "cool, awesome, interesting, pretty, I like it, I want one"	Negative words such as "eww, gross, scary, disgusting, I hate it, get it away"
Body language such as moving closer to the exhibit for a better look, smiling, laughing	Avoidant behavior, backing away from the exhibit, covering eyes, grimacing, crying

Figure 2. Parameters for classifying visitor reactions.

The data was compiled in a Google spreadsheet and totaled for the two days of observation, then analyzed using a chi-square test for independence (Stangroom, 2018a) to determine whether there was any statistical difference between the reactions of children and adults. A chi-square test for goodness of fit (Stangroom, 2018b) was also run for the child group and the adult group individually to see if there was a statistical difference between positive and negative responses for each age group.

Results

Over the two days of study, a total of 100 adults and 50 children were observed. A chi-square test for goodness of fit was conducted on each age group to determine whether the differences within each group were statistically meaningful. The adults showed a fairly even distribution of positive and negative reactions (49% and 51%, respectively, $p = 0.841$), whereas children showed many more positive reactions than negative reactions (66% and 34%, respectively, $p = 0.023$) (Fig. 3). A chi-square test for independence was conducted using an alpha level of 0.05 to determine that there was a statistical difference between adult and child responses ($p = 0.049$).

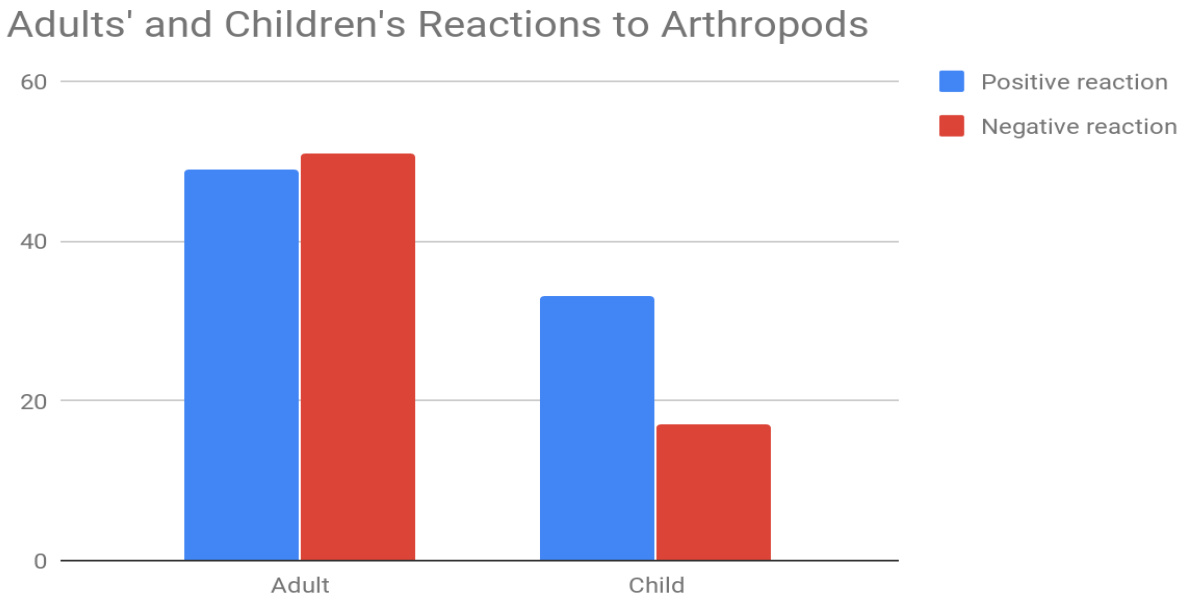

Figure 3. Adults' and children's reactions to arthropods. While adults showed more or less an equal distribution of positive (49%) and negative (51%) reactions, children showed many more positive (66%) than negative (34%) reactions.

Discussion

At the World of the Insect exhibit at the Cincinnati Zoo, adults showed a higher rate of negative reactions to arthropods than did children. This supports the prediction that children would have a greater proportion of positive reactions.

One potentially confounding variable in this project was the fact that visitors to the World of the Insect entered willingly, which meant that their fear of arthropods could not have been so great that they were not comfortable entering the building. That being said, there were still plenty of negative reactions that did not necessarily constitute true entomophobia, but perhaps an overall negative opinion of arthropods.

While collecting data, a large number of both adults and children expressed a strong desire to see the butterflies. These included individuals who had previously expressed fear or disgust toward other arthropods. For this reason, I did not collect data inside the butterfly exhibit, as butterflies are often seen as beautiful and harmless, and responses to them could potentially skew results toward the positive. However, including these organisms in future research may reveal unexpected trends.

This research will help inform future projects regarding fear of arthropods. Knowing now that entomophobia seems to have a large learned component rather than being strictly evolutionary, I intend to investigate the mechanisms by which people acquire these fears. I also plan to conduct a study to determine what aspects of arthropods inspire the most fear and disgust, as well as whether people's aversion to arthropods is generally more fear-based or disgust-based.

While arthropods may not be as noticeable as larger threatened species, they play integral roles in the environment. Bees and wasps are important pollinators that help our crops produce fruit; ants and carrion beetles clean up dead organisms that would otherwise litter the landscape; even spiders can make our lives a little easier by eating pest insects like flies and mosquitoes. Determining the causes and mechanisms of fear, disgust, and general misunderstanding can lead to targeted education to help combat human-animal confrontations, even with those as small as arthropods.

Action Component and Reflection

While I would have preferred to collect more data, I feel that a sample size of 150 is a good first step in a series of projects on this topic. During my data collection, I made observations regarding the types of arthropods that inspired the most fear and disgust; while arachnids and cockroaches were unsurprisingly the most fear-inducing, I was surprised by the amount of negative reactions to beetles, as I had not suspected that they would be so widely regarded as "gross." The one exception to this trend was that many visitors thought the tin foil beetles were "pretty," even after previously expressing their disdain for other beetles and arthropods. These beetles were a bright metallic green, giving them an aesthetically pleasing iridescent sheen which may have offset the kneejerk "yuck" response. I plan to use this information in future projects exploring what aspects of arthropods make people fearful or disgusted.

I also paid attention to the genders of visitors, and whether females and males generally responded differently. It is no secret that women are generally seen as being more squeamish, especially around arthropods, and I was curious to see if that would be the case in the World of the Insect. I cannot draw any conclusions from these observations at this time, as I did not officially record any numbers on this aspect of the visitors' reactions, but I intend to take this

anecdotal information under consideration for future studies. I noticed a general tendency of adult women to show more fear or disgust, although it was not a huge difference, as there were also several men who expressed discomfort around the exhibits. This discrepancy seemed much less consistent amongst children, although there was still a slight trend toward girls being more squeamish than boys. Something I found interesting was that while females generally showed strong reactions in one direction or the other, males tended to have more neutral reactions. I witnessed this phenomenon with several couples and family groups over the two days of observation. While I have read plenty about the difference in intensity of emotional expression between men and women, I think that looking further into this trend in relation to arthropods specifically could help tailor education efforts towards abolishing these stereotypes.

Figure 4. Caterpillar "mascot" for use in educational graphics.

As for this project, the results of my study have inspired me to continue a pet project I began working on last year. I am developing a series of graphics dispelling some of the most common myths about arthropods in hopes of improving the reputations of important but misunderstood critters. These include misunderstandings about the frequency and severity of spider bites and wasp and bee stings; how to differentiate between bees, wasps, and Hymenoptera mimics; and which arthropods are beneficial to the garden, and therefore should be spared when considering pest control measures outside the house. This will be accomplished through a combination of arthropod facts, photographs of actual arthropods, and cartoon arthropod "mascots" (Fig. 4). After seeing how many visitors responded negatively to beetles, I will be adding a graphic about the important roles of beetles in the environment, as well as try to make them more visually appealing with a cartoon beetle mascot. Now that I have seen the increase in negative reactions in adults, I know to focus on desensitizing adults to their misplaced fears and misconceptions, to prevent them from spreading those fears to the children in their lives. I could tailor some graphics to be attractive to both children and adults, perhaps appealing

to parents' buried childhood curiosity and encouraging them to view arthropods through the eyes of their children.

I have contacted the Cincinnati Zoo about potentially turning these graphics into signs to be placed in and around the World of the Insect building, as well as in the garden spaces where wild insects are more likely to be present. While it is not guaranteed that this will happen, the Zoo's head of signage has assured me that she will consider it for next year. I also plan to contact the Cincinnati Nature Center about including the graphics at their visitor center locations, or for use in their educational outreach efforts. Should both of these options fall through, I will certainly explore other educational institutions; however, I also have distant plans for social media outreach in the future, perhaps in the form of a blog or vlog, and I can hold onto the graphics for use there.

Conclusion

Based on existing literature on vicariously learned fears, this study aimed to determine whether adults or children would show more negative reactions to arthropods. The present data support the prediction that adults would have more negative reactions, a possible indication that children under 10 years of age are too young to have developed a serious aversion to arthropods. While arthropods are important parts of any ecosystem, and are certainly worthy of conservation efforts, this research has potential applications in other realms of ecology and conservation.

Arthropods are not the only organisms that inspire fear or disgust in humans. Snakes, coyotes, sharks, lions, and myriad other perceived dangerous animals are all the targets of fear-based violence. Some completely harmless animals are also persecuted due to cultural perceptions and superstitions. "Unsightly" weeds that are important food sources for many animals are often chemically suppressed out of disgust in favor of a uniform lawn. By learning more about patterns of fear and disgust, this research could lead to better conservation education and public outreach programs tailored toward the audiences that most need the information.

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Appendix

	Positive Response	Negative Response
Adult		
Child		

Figure 1. Data collection table.

Link to raw data:
https://docs.google.com/spreadsheets/d/1a7y1VcaP7NeFYSqk2LJRp73XeePgTMdqPEYN5dLE9k4/edit?usp=sharing