

# SSSENSATIONAL SNAKES: OVERCOMING FEAR BY INSPIRING EMPATHY

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Ssensational Snakes presentation. Photo by Karina Altman

## INTRODUCTION

"Snakes - why'd it have to be snakes?" Indiana Jones' famous quote and his fearful behavior around snakes reflect many people's negative attitudes toward snakes. Animal phobias are the most persistent mental illness in the world (Polák et al., 2020), and snake phobia is the most prevalent animal fear in the United States (Cerfaco, 2012). Fright makes money in entertainment, and snakes capture human attention faster than other animals (Stanley, 2008), so snakes are often chosen to be sensationally portrayed as scary animals in media. Snake "attacks" and other snake bite statistics are often inaccurately reported (Liordos et al., 2018). Laypeople receive most of their scientific information from mass media sources (Dahlstrom, 2014), so the methods the media uses to present information have a strong impact on the way people understand and then respond to similar scenarios in their

lives (Kusmanoff et al., 2020). Once fear is learned, it is not easy to overcome (Liordos et al., 2018).

The historical persistence of myths, legends, and folklore about snakes has given them one of the worst reputations in the animal kingdom (Liordos et al., 2018). Negative social norms surrounding snakes often stem from beliefs that they threaten humans, spread disease, or conflict with living situations (Jerger et al., 2022). Therefore, the common belief that snakes are evil combined with the prevalent fear of snakes results in the magnitude of snake persecution seen today. Ceriaco's (2012) research demonstrated that belief in folklore increased people's propensity to persecute snakes. Consequently, there is little support for their conservation despite their beneficial ecological functions (da Silva et al., 2021).

Understanding the emotional component of conservation is key to garnering support for snake preservation (Castillo-Huitrón et al., 2020). Unfortunately, 21.1% of reptiles are threatened with extinction - a greater number than mammals or birds (Cox et al., 2022). Primary threats include habitat loss or fragmentation, invasive species and out-competition, pollution or poisoning, and climate change (Ceriaco, 2012). Unfortunately, studies show that snakes are the most aversive type of reptile when it comes to human perceptions and therefore face serious persecution and other anthropogenic threats (da Silva et al., 2021).

The Ararat Ridge Zoo at the Ark Encounter, located in Williamstown, Kentucky, is advocating for snake conservation. Zoo programs are responsible for building empathy and emotional connections with guests (Akerman, 2019). Live animal programs are more effective than print or video media in fostering connections with wildlife (Fuhrman & Ladewig,



Taiwan Beauty Snake. Photo by Channing Guest.

2008). They increase awareness of conservation initiatives, but also to eliminate myths about and emotional distance from wildlife (Jerger et al., 2022). This is particularly true with snakes, one of the most phobic animals in the world (Souchet & Aubret, 2016). However, live animal interactions can elicit positive emotions and reduce fear (Alfandre, 2022; Jerger et al., 2022). This challenge increases at a biblically-based attraction like the Ark Encounter, as many Christians view them as evil (as defined by the Bible as opposition to God and his commands) due to their connection with Satan in the Bible (Liordos et al., 2018).

The Sssensational Snakes show was created to debunk sensationalized myths about snakes while revealing sensational truths instead. This philosophy is in line with Ceriaco's (2012) recommendations that snake programs should focus on correcting wrong ideas about snake behavior and highlighting their usefulness to humans. Studies show that fear of snakes can be overcome, especially if a general empathy for nature is encouraged (Stanley, 2008). However, human behavior is not always rational and is instead affected by information, attitudes, beliefs, values, and social

norms (Jerger et al., 2022). Therefore, the show also aims to create empathy for and emotional connections with the snakes by allowing guests to touch them. While positive attitudes about snakes may increase when knowledge is increased, aversion is reduced and stronger emotional bonds are created when physical interaction is incorporated (Alfandre, 2022). For children especially, touch is the most important factor in creating interest in something (Kidd & Kidd, 1994). Additionally, the staff purposefully chose visually-appealing snakes for the collection, as aesthetically pleasing animals encourage attractiveness bias (Alfandre, 2022).

Sssensational Snakes is presented in narrative form, as Dahlstrom (2014) reveals that storytelling formats increase long-term comprehension, engagement, and interest in the topics. Staff also utilize gentle anthropomorphism within the show. While this practice tends to be considered taboo in the zoological world as there is a hesitancy to label what is not known for certain, studies show that humans relate more strongly to animals they perceive to be like themselves, and anthropomorphism creates connections between people and wildlife (Akerman,

2019). This show consistently receives the highest attendance among our multiple animal programs, and staff have often heard guests tell them about how their perceptions of snakes improved after watching the show. However, there were no solid data to prove that the Sssensational Snakes show was making a difference. The purpose of this study was to discover if the Ararat Ridge Zoo's Sssensational Snakes show is creating more pro-snake perceptions in Ark Encounter guests.

## METHODS

This study involved surveying Ark Encounter guests who watched the Ararat Ridge Zoo's Sssensational Snakes program both before and after the show to determine whether their perceptions of snakes changed after watching the performance. The survey questions were presented in a Google Form. The survey consisted of 15 questions answered before viewing the show and 15 questions answered after viewing the show. The incentive for guests to complete the survey was a free painting done by the zoo's snakes.

This study was conducted from 1 June 2023, through 5 July 2023, and covered 23 Sssensational Snakes shows. An informational poster advertising the survey to guests was placed in the

center of the stage 15 minutes before the start of the show, when zoo staff were setting up props. It contained a QR code linked to the survey and explained that those who complete the survey would receive a free painting done by the snakes upon proof of completion.

After the show was completed, zoo staff moved the poster back to center stage and reminded everyone who took the "before" survey to complete the "after" survey. The announcer would also inform the audience that those who showed proof of completion at the end of the survey would be able to choose a free painting done by the snakes.

All results were recorded within the Google Form and on a connected Google Sheet. If a guest had only completed the "after" survey but not the "before" survey, their response was removed from the analysis, as it did not provide the necessary comparative information.

Three questions related to snake perceptions in the "before" survey were repeated in the "after" survey so their responses could be compared for statistically significant differences. The questions were:

What is your perception of snakes? This was represented pictorially and the

ranks 1 (worst) through 5 (best) were labeled as 1=despise, 2=uncomfortable, 3=indifferent, 4=don't mind, and 5=like. Where would you feel most comfortable with snakes living? The ranks 1 (worst) through 5 (best) were labeled as 1=nowhere near me!, 2=far away, 3=in the area, 4=within visual range of my residence, and 5=anywhere!. How important do you think snakes are to their natural environment? The ranks 1 (worst) through 5 (best) were labeled as 1=unnecessary, 2=harmful, 3=not harmful or helpful, 4=helpful, and 5=necessary.

Mann-Whitney U-tests were run to see if there were significant differences in the "before" and "after" populations, and then the average change was calculated to see if that difference was positive or negative. Additionally, chi-square tests with and without the Yates correction were run to show whether there were significant differences in the number of guests ranking their views as 5 (best) before and after the show.

Ten questions in the before survey and ten questions in the after survey were related to demographics, explanations of responses (such as why they ranked their perceptions of snakes the way they did), and show feedback. These were analyzed to find possible connections between perceptions and demographics, determine the main reasons for people's liking or disliking of snakes, and improve the show for the future.

## RESULTS

A total of 349 people who viewed the Sssensational Snakes show at the Ararat Ridge Zoo completed the surveys to the standard needed for proper analysis. People from 38 U.S. states plus Ontario, Canada, completed the survey.

Comparisons of guest perceptions of snakes before and after viewing Sssensational Snakes can be seen in Figure 1.

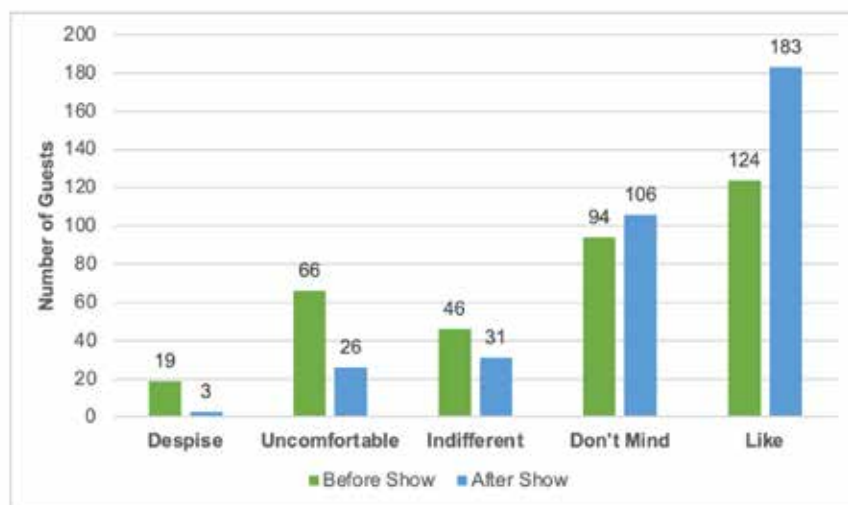


Figure 1. Comparison of Ararat Ridge Zoo guest perceptions of snakes before and after viewing the Sssensational Snakes Show

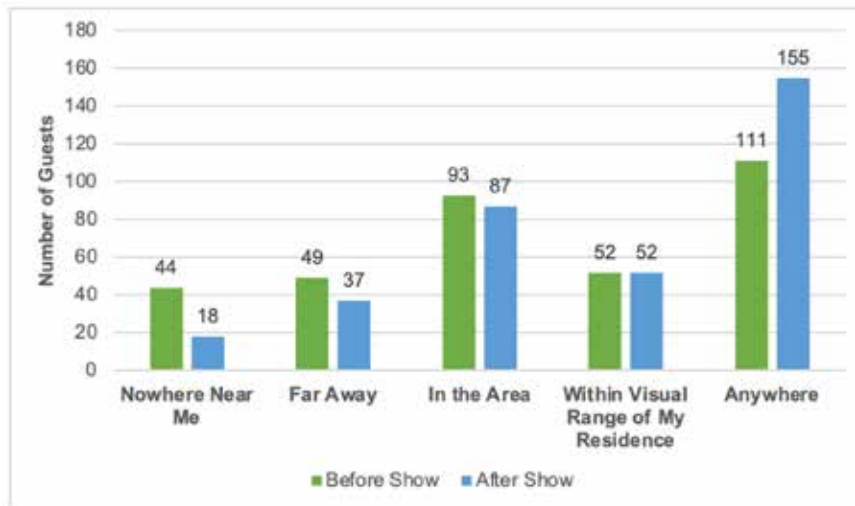


Figure 2. Comparison of where Ararat Ridge Zoo guests would feel most comfortable with snakes living before and after viewing the Ssensational Snakes Show

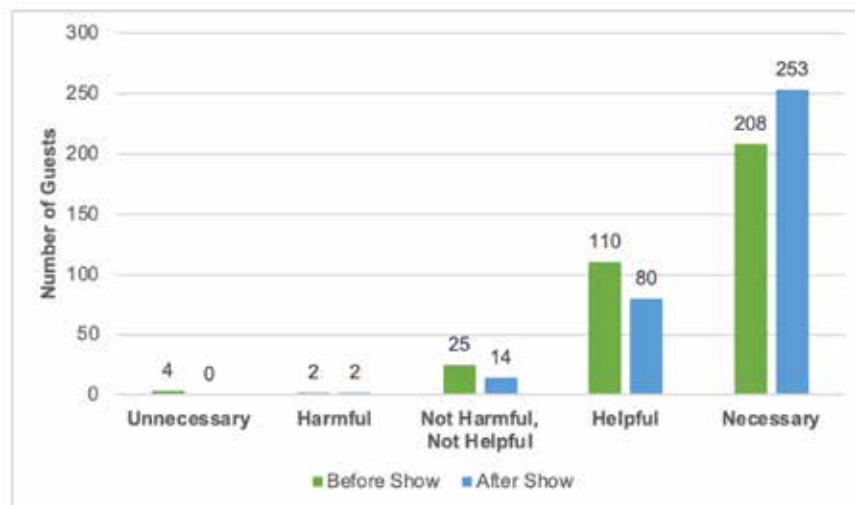


Figure 3. Comparison of how important Ararat Ridge Zoo guests think snakes are for the environment before and after viewing the Ssensational Snakes Show

A Mann-Whitney U-test on guest snake perceptions before and after the show using a 95% level of confidence ( $\alpha = .05$ ) revealed a U statistic of 45683.5. The  $p$ -value is 1.11075E-08, making the results significant at  $p < 0.05$ . The average change in perception between the before and after populations is +0.573065903, meaning there is a significant increase in overall guest snake perceptions following the show. To reveal whether there was a significant difference in the number of people who ranked their perception of

snakes as the most favorable (5 - like) after viewing the show, a chi-square test using a 95% level of confidence ( $\alpha = .05$ ) gave a chi-square statistic of 20.2416. The  $p$ -value is <0.00001, making the results significant at  $p < 0.05$ . Also, a chi-square test with the Yates correction using a 95% level of confidence ( $\alpha = .05$ ) gave a chi-square statistic of 19.5612. The  $p$ -value is <0.00001, making the results significant at  $p < 0.05$ .

Comparisons of how comfortable guests feel around snakes before and after

viewing Ssensational Snakes can be seen in Figure 2 .

A Mann-Whitney U-test on guest snake proximity comfort before and after the show using a 95% level of confidence ( $\alpha = .05$ ) revealed a U statistic of 50211.5. The  $p$ -value is 5.99648E-05, making the results significant at  $p < 0.05$ . The average change in comfort level with snake proximity between the before and after populations is +0.438395415, meaning there is a significant increase in overall guest snake proximity comfort following the show. To see whether there was a significant difference in the number of people who ranked their comfort around snakes as the most favorable (5 - anywhere) after viewing the show, a chi-square test using a 95% level of confidence ( $\alpha = .05$ ) gave a chi-square statistic of 11.7597. The  $p$ -value is 0.000605, making the results significant at  $p < 0.05$ . Also, a chi-square test with the Yates correction using a 95% level of confidence ( $\alpha = .05$ ) gave a chi-square statistic of 11.2312. The  $p$ -value is 0.000804, making the results significant at  $p < 0.05$ .

Comparisons of how important guests think snakes are for the environment before and after viewing Ssensational Snakes can be viewed in Figure 3.

A Mann-Whitney U-test on how important guests think snakes are for the environment before and after the show using a 95% level of confidence ( $\alpha = .05$ ) revealed a U statistic of 52668. The  $p$ -value is 0.001997, making the results significant at  $p < 0.05$ . The average change in belief in snake importance to the environment between the before and after populations is +0.191977077, meaning there is a significant increase in overall guest perception of snake environmental roles following the show. To determine whether there was a significant difference in the number of people who ranked the importance of snakes as the most favorable (5 - necessary) after viewing the show, a chi-square test





Carpet Python. Photo by Channing Guest.



California Kingsnake. Photo by Channing Guest.

using a 95% level of confidence ( $\alpha = .05$ ) gave a chi-square statistic of 12.9369. The  $p$ -value is 0.000332, making the results significant at  $p < 0.05$ . Also, a chi-square test with the Yates correction using a 95% level of confidence ( $\alpha = .05$ ) gave a chi-square statistic of 12.3683. The  $p$ -value is 0.000437, making the results significant at  $p < 0.05$ .

Following the program, 67.3 % (235) of guests took photos of the snakes. Feelings when photographing the snakes are reflected in Figure 4.

Additionally, after the show, 49% of respondents (171) said that they touched one of the snakes. Feelings when touching the snakes are reflected in Figure 5.

## DISCUSSION

According to Morgan & Gramann (1989), to be considered successful, educational animal programs should result in positive changes in the audience's perceptions and knowledge of wildlife. The Sssensational Snakes show at the Ararat Ridge Zoo can therefore be considered a success, as

it is making significant improvements in Ark Encounter guest perceptions of snakes. Guests are significantly more comfortable around snakes and display significantly more appreciation for their role in the environment after watching the program. The data reveal that even though snakes are one of the most feared and misunderstood creatures in the animal kingdom (Alfandre, 2022), zoos can change people's perceptions of them (Stanley, 2008).

Many respondents mentioned that touching snakes themselves, even if they remained afraid, made a huge difference in their ideas of snakes. We determined that 88% (249) of the people who touched the snakes experienced positive feelings. This may be because informational messages or exposure alone have little effect on fear, but even snake-phobic people have significantly more positive attitudes about snakes after direct contact (Morgan & Gramann, 1989). Physical interaction continues to be one of the most effective methods in changing people's minds about snakes (Morgan & Gramann, 1989). Additionally, many guests said that watching the handlers' calm behavior

around the snakes made a big difference in their perceptions. This coincides with Fuhrman & Ladewig's (2008) findings that models with non-fearful behavior around feared animals can significantly improve people's feelings towards them. The Sssensational Snakes show's method of combining exposure, information, modeling, and direct contact seems to be an ideal approach to combating negative snake stereotypes.

Examination of the reasons why people chose the initial ranking of their perceptions of snakes proved intriguing, as they are consistent with explanations for snake fear in literature. While there are components of snake fear that may be innate, studies reveal it is often a learned behavior (Stanley, 2008). Attitudes, biases, and perceptions about animals are mostly developed during childhood and are a strong indicator of adulthood behavior (Jerger et al., 2022). Infants and young children are not usually afraid of snakes, but they are adept at detecting them quickly (Souchet & Aubret, 2016). However, if they have a bad experience or are shown negative media portrayals of

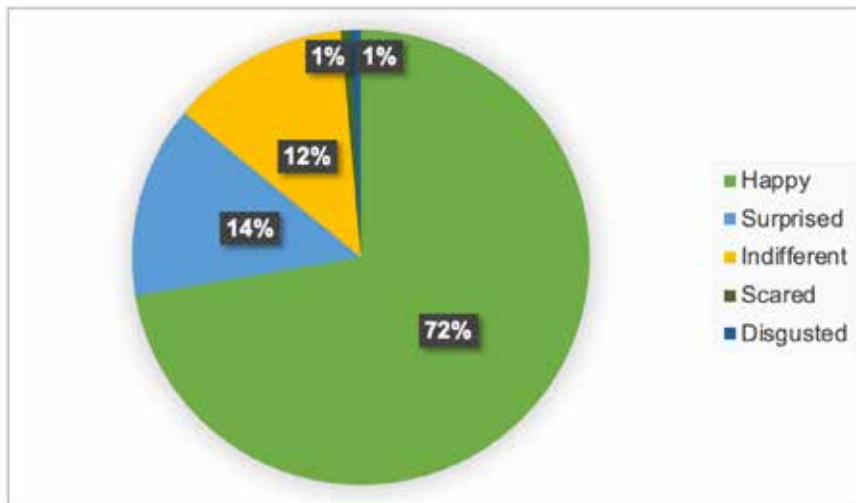


Figure 4. Guest feelings while taking photographs of Ararat Ridge Zoo snakes after viewing the Sssensational Snakes Show

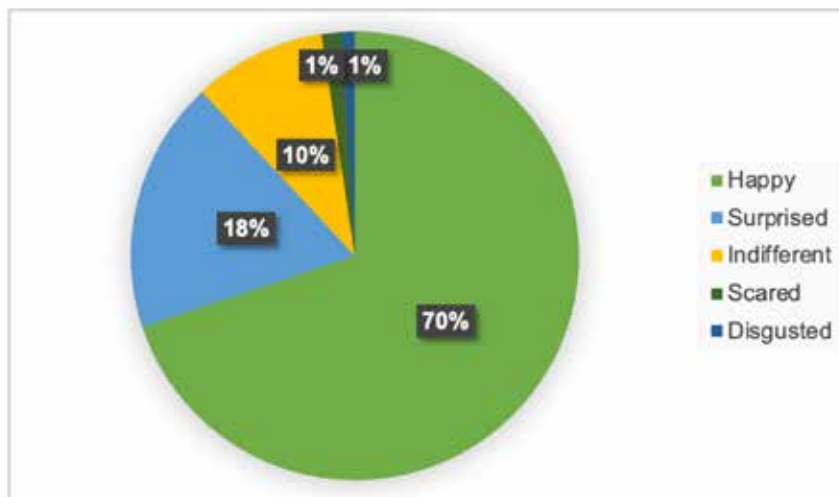


Figure 5. Guest feelings while touching Ararat Ridge Zoo snakes after viewing the Sssensational Snakes Show

snakes, they become predisposed to exhibiting fear responses (Souchet & Aubret, 2016). One of the respondents specifically listed the *Indiana Jones* movies as the reason she despised snakes. Children's attitudes towards snakes are often learned from their parents and can be developed without any snake experience of their own (Ware et al., 1994). Educational programs have the potential to improve children's perceptions of animals and increase their desire to live in harmony with them (Jerger et al., 2022). Several guests admitted that they were raised

or taught to fear snakes, but that seeing the zoo's snakes and their behavior for themselves changed their perceptions of them.

One of the primary reasons listed in the surveys for initial dislike of snakes was the belief they were slimy. This corresponds with Ware et al.'s (1994) disgust-avoidance model, which discovered that people tend to fear animals they find disgusting to protect them from becoming sick. The false perception of snakes being slimy leads to a reaction of disgust and therefore

fear (Ware et al., 1994). When people learned that snakes are not slimy, their ideas about them changed.

Similarly, others referenced other facets of snake anatomy as the reason for their fear. Some mentioned their lack of legs was disconcerting; others mentioned their scales. Several guests mentioned they were bothered by slithering. Interestingly, babies only associate snakes with fear in videos, not photos, which points to snakes' unique movement as a component of fear (Polák et al., 2020). The more different animals are from humans, the more they are feared (Castillo-Huitrón, 2020). Aposematic signals were also mentioned as a reason for concern, which coincides with Souchet & Aubret's (2016) study showing youth did not rank images of snakes as "mean" unless they had aposematic signals like sharp teeth, triangular heads, or zig-zag dorsal patterns. Further knowledge about the purpose of snake design soothed fears about them per Liordos et al.'s (2018) findings.

Another common misconception that led to snake fear was the lack of knowledge about and the inability to identify venomous snakes. The Sssensational Snakes show has an entire scene that focuses on snake behavior, the truth about venomous snakes, and snake identification. Respondents felt much more secure around snakes armed with this knowledge. Liordos et al. (2018) also determined that increased awareness of snake biology and attack behaviors greatly increases snake tolerance, attitudes, and conservation-minded behavior.

Some respondents inevitably mentioned the serpent's role in the Fall of Creation in Scripture as a reason for disliking snakes or believing them to be evil. Because this is a common argument among Christians, the Sssensational Snakes show has an entire portion dedicated to explaining snakes through the lens of the Bible. Staff informs the



***The incorporation of animal contact also seems to have made a strong impression on guests, even those who were fearful of snakes.***

audience that God created snakes and declared them very good. It was Satan, not a snake, that tempted Adam and Eve into disobedience. Snakes are incapable of evil because they are not moral beings made in the image of God like humans. While snakes are associated with Satan several times in Scripture, they are also associated with salvation. In the book of Numbers, God commanded Moses to raise a statue of a snake among the Israelites, and whoever looked upon it was healed. This was a foreshadowing of Christ's sacrifice on the cross (Stanley, 2008). Many respondents mentioned this portion of the show being the reason they improved their perceptions of snakes.

### CONCLUSION

While snake fear is one of the most prevalent phobias, educational zoo programs can improve people's attitudes toward snakes. The Ssensational Snakes show at the Ark Encounter's Ararat Ridge Zoo significantly improves people's perceptions of, comfort around, and care for snakes. The incorporation

of animal contact also seems to have made a strong impression on guests, even those who were fearful of snakes. Not only did guest perceptions, comfort level, and environmental awareness of snakes significantly increase due to Ssensational Snakes, but many also reflected positive emotions after viewing the show. Most respondents indicated that they experienced happiness or surprise when photographing or touching the snakes. This study demonstrates that people's minds can be changed in favor of uncharismatic animals, which consequently leads to more conservation-minded behavior.

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Rainbow Boa. Photo by Sarah Borman.



Boa Constrictor. Photo by Karina Altman



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Hognose Snake. Photo by Karl Rebenstorff.