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Instinctual and Learned Responses: Investigating Visual Sensitivity Towards Snake Stimuli in 10-Year-Old Children

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Abstract

Fear is a natural response for almost all living organisms. It's essential for survival. It's part of the fight-or-flight response to dangerous stimuli. Snake is a stimulus that often evoked fear to other animals, including primates and mammals. Research shows that mammals and primates, including humans, monkeys, and others, have a strong biological predisposition to fear snakes. Other animals, like birds, rodents, also show a kind of aversive behavior which may be evoked due to biological factors or by observation. This is due to evolutionary adaptation because snakes were a threat to these living organisms to survive. This study aims to examine the instinctual and learned fear responses in 10-year-old children towards snakes. The study comprises of qualitative research method. Ten participants of age 10 were taken as a sample, and later thematic analysis was used to assess the collected data. 5 themes were generated and findings show that human toddlers have both instinctual and learned fear responses to snakes more compared to other animals. Human toddlers have an aversion towards specifically snakes due to instinctual and learned components. This study thus paves the way for a better understanding of fear of snakes as well as for the treatment of Ophidiophobia.

Keywords: Instinctual fear, learned responses, Visual sensitivity, Snake, Children

INTRODUCTION

The term fear is regarded as the emotional response towards a perceived stimulus that may or may not be dangerous. It is one of the basic emotions proposed by Paul Ekman. According to Ekman, fear is a biological response to a stimulus. It is a universal emotion that is observed across different cultures. (Ekman, W.V.,&Ellsworth, P., 1972) There are generally two types of fears, namely, Innate and learned fear. Innate fears are those fears which are present instinctually. Thus, this fear is also termed as instinctual fear. Other type of fear is learned fear. Here, the emotional response is learned through knowledge and experience. When fear increases, it may begin to interfere with that person's daily activities. This phenomenon is referred to as a phobia. Some common phobias are acrophobia; fear of heights, claustrophobia; fear of confined places, ophidiophobia; fear of snakes et cetera.

Phobias can really affect daily life, but with the right treatment, like therapy and gradual exposure, people can learn to manage them.

The fear of snakes is also known as ophidiophobia, is one of the widely discussed topics in research. Ophi-

diophobia is a common phobia that is seen in human children as well as adults. Due to this specific reason, many studies were conducted in order to check the root cause of fear towards snakes in humans. These studies contributed to evolutionary perspectives as well as learned perspectives. According to Arne Ohman, fear of snakes has an evolutionary basis. Because, on seeing potential threats like snakes, humans tend to develop a rapid response mechanism which keeps them away from the threats rapidly. Thus, it was concluded that fear of snakes is an innate or instinctual response so that in order to be safe and survive (Ohman & Soares(1993,1994,1998). This was later supported by Poulton and Menzies through their research, where they found that fear of snakes or spiders might be more readily conditioned due to evolutionary preparedness (Poulton & Menzies, 2002).

In terms of learned fear response towards snakes, Susan Mineka's research findings lead to the concept that our fear responses to snakes can be developed through experience or by observing others encountering snakes in fear. This study was done in rhesus monkeys by Mineka. This study contributed that the fear of snakes is learned behavior i.e, learned through observing or experiencing (Öhman and Mineka, 2001). Another major breakthrough in this area was the research done by Van Le and colleagues. They found out that there are specific neurons in the pulvinar region of the brain that are highly sensitive to snake-like shapes. These neurons respond faster to this stimulus (snakes) than to others. This finding indicated that humans have developed a basic neurological instinct to quickly detect and be alert and react to snakes. (Van Le, Q., Isbell, L. A., Matsumoto, J., Nguyen, M., Hori, E., Maior, R. S., Tomaz, C., Tran, A. H., Ono, T., & Nishijo, H. (2013)).

Thus, a large number of studies conclude that snake is a special category of stimulus that both humans as well as non-human primates tend to avoid and find it dangerous. In the research done by Mineka, Rhesus monkeys quickly learn to fear snakes after being exposed to conspecific display snake fear. However, monkeys do not find it fearful towards flowers or rabbits after watching a similar fear display. Similarly, human adults strongly fear snakes and spiders rather than flowers and mushrooms with an aversive electric shock, as evidenced by slower extinction to this pairing (Ohman;1976). More recent works suggests that humans, adults as well as infants react very differently to snakes than those to other stimuluses.

Detection threshold is the base for this research. It is tge lowest level of stimuli that a human can perceive and detect. Based on the detection threshold, the author can compare and study snake stimulus detection. The author studies whether humans have a threat detection mechanism in order to detect and avoid threats, which is crucial for human survival. This can be concluded by observing the saturation point of each subject.

visual sensitivity is the ability of our visual system to detect stimuli presented before us. It refers to the child's ability to detect and react to the stimulus presented before him/her. Their ability to detect the snake stimulus is measured here. Children of age 10 are taken here as subject category. They are at the concrete operational stage as proposed by Piaget in his cognitive development theory. So, they can process and understand the stimulus and give an appropriate reaction to the study. This study holds significant value in understanding instinctive and learned fears towards snakes. This will be a great contribution towards evolutionary psychology and will also help in deriving the treatment of snake phobias.

METHOD

Objectives

1. To explore the instinctual and learned responses of 10-year-old children toward visual snake stimuli.

2. To examine gender differences in the detection and response to snake stimuli.
3. To provide a basis for developing interventions for snake phobia in children.

Sample: The study used purposive sampling. Ten-year-old students were selected specifically based on their age criterion from Thrissur, Kerala. Participants self-volunteered to be part of the research.

Inclusion criteria

- Students who are exactly 10 years old
- Students who do not have any kind of intellectual disability.
- Students who are willing to participate in this study.

Exclusion criteria

- Students who are below or above 10 years old
- Students who have intellectual disability.

Tools

Semi-structured Interviews were used to understand the participants' prior experiences with snakes and their fear towards them. Open-ended Questions were asked to children to describe their fear of snakes freely. Observations were recorded to examine whether children responded differently when seeing or discussing snakes compared to other animals. Visual Stimuli were presented to assess children's instinctive reactions and visual threshold. Personal data sheet was also used in order to assess the participants' demographic details, i.e, name, age, gender, class, place, family members, academic performance, and occupation of parents.

Procedure: The participants were contacted through their school, Vimal Jyothy Central School, during school hours. After getting consent from the respective authorities, rapport was established with each child of class 5 who was willing to participate in the study. They were shown images of an elephant, snake, cat, and dog, with each animal represented across five pages of increasing opacity. There was a total of 20 pages. The first image was barely visible, and the next corresponding image will be somewhat visible, gradually images become clearer (increasing opacity setup). This method helped the author determine the visual threshold for different animals separately. Approximately 15 minutes were taken for each child. There was a total of 10 participants. Later, thematic analysis was used to analyze the data.

Results and discussion

Figure 1

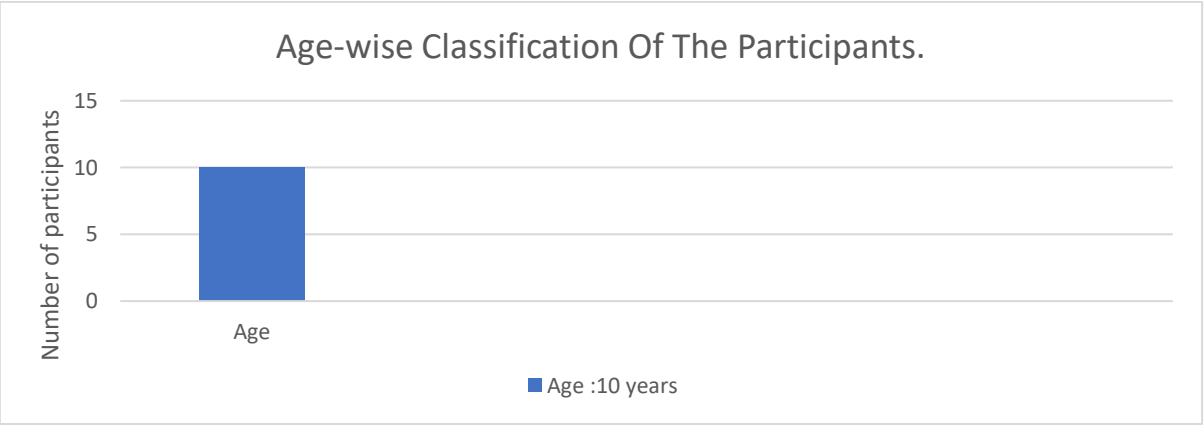

Figure 2

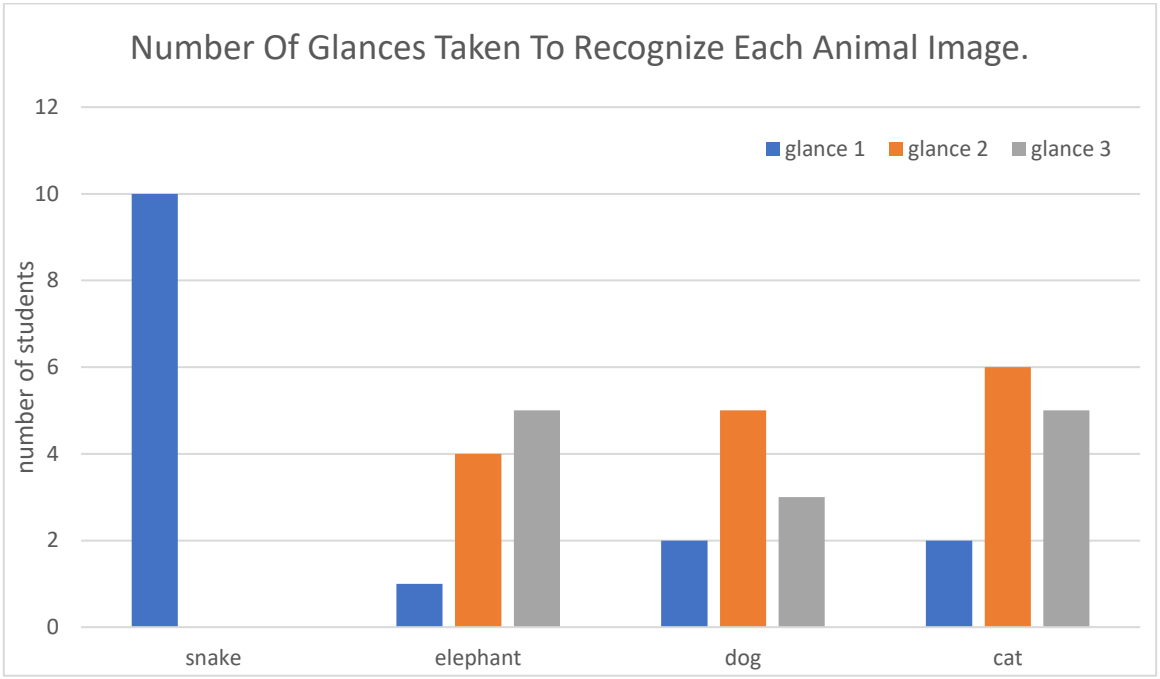

Table 1:Participant characteristics

characteristics	category	Frequency	Percentage
Total participants	students	10	100%
Age(years)	10 years old	10	100%
Gender	Male	5	100%
	female	5	100%
Class	5th standard	10	100%
Residential area	Urban	2	20%
	rural	8	80%
Academic performance	Below average	1	10%
	Average	2	20%
	Above average	7	70%
Previous bad exposure or negative knowledge about snakes	Yes	10	100%
	no	0	0

Table 2:Themes

Themes	Subthemes	Codes
Learned fear through external influences	Religious influence on fear towards snakes	Snakes as evil or the devil in religious beliefs

	Prior negative experiences	Witnessed a snake bite, heard frightening snake stories
	Social learning	Parents or elders warning about snakes, social learning
Behavioral reactions to encountering a snake	Escape response	Running away (6 children)
	Aggressive response	Killing/beating the snake (3 children)
	Curiosity-based response	Observing the snake (1 child)
Unique fear response to snakes	Selective fear towards snakes	Fear only towards snakes, comparatively very little fear towards elephants, cats, and dogs.
Enhanced visual sensitivity to snakes	Rapid detection of snakes	All children detected snakes in the first stimulus presentation.
	Delayed detection of other animals	Elephants, cats, and dogs took one or more than one presentation to be detected.

Thematic analysis of the data identified 4 main themes, namely; Learned fear through external influences, Behavioral reactions to encountering a snake, Unique fear response to snakes, and Enhanced visual sensitivity to snakes.

Theme 1:Learned Fear Through External Influences

This theme reveals that the children's fear of snakes is not completely instinctive but the fear is also shaped by external influences. This learned fear is classified into three subthemes: religious influence, prior negative experiences, and social learning.

Religious Influence on Fear Towards Snakes

Two children specifically say that snakes are considered evil or bad in their religion. These children associated snakes with danger or demonic representations. This indicates that the religious teachings and beliefs strongly contribute to their fear. Another child referenced a religious story portraying snakes as harmful or deceptive creatures. These religious stories influence perception of the children and thus make snakes seem more dangerous than other animals, even in the absence of direct encounters.

Prior Negative Experiences

Several children reported hearing stories of snake bites and people dying due to snake bites. None of them had personally witnessed a snake bite; however, they are aware of people they knew who had been bitten or had near encounters with snakes. Some children also stated that they had been told frightening snake stories by elders, which reinforced their fear. Others stated that their parents warned them to stay away from snakes, which made them perceive that snakes are deadly creatures. Even though these children never directly experienced a snake attack, i.e negative experience directly, the knowledge passed down through family and community increased their fear towards snakes.

Social Learning

Social learning also plays a crucial role in shaping children's fear of snakes. Many children stated that they had been repeatedly told by parents, elders, and community members that snakes are dangerous. One child recalled being taught in school that some snakes are venomous and can cause death. This contributed to a general fear of all snakes, including non-venomous ones. Another child mentioned that their friends expressed fear of snakes, which further reinforced their own.

Theme 2: Behavioural Reactions to Encountering a Snake

When children were asked how they would react if a snake were near them, their responses were different. Three distinct behavioural patterns were observed: escape response, aggressive response, and curiosity-based response.

Escape Response

The majority of the children (6 out of 10) said that their first instinct would be to run away as soon as they saw a snake. These children stated that they would move away as soon as possible and avoid any interaction with the snake. These responses suggest that fear-driven avoidance is a dominant reaction that can be seen in children when encountering snakes. One child mentioned, "I will run away immediately because snakes are dangerous." Another told that, "If I see a snake, I won't wait, I will just go away fast." Such statements show an instinctive aversion towards snakes due to biological caution and learned caution.

Aggressive Response

Three children (boys) reported that they would react aggressively by killing or beating the snake. Their responses included statements like, "I will hit the snake with a stick so it doesn't bite me," and "If I see a snake, I will kill it before it comes near me."

Interestingly, no girls expressed a similar reaction. This suggests that gender may play a role in how children react to potential threats. The aggressive response may be influenced by cultural and social factors since boys are more encouraged to deal with threats rather than avoid them.

Curiosity-Based Response

One child (a girl) showed an observational approach toward encountering a snake. She stated that, "I will first watch the snake, and will decide what to do". This response is a more thoughtful reaction. This could be due to differences in personality traits or a lack of fear conditioning from social influences.

Theme 3: Unique Fear Response to Snakes

The children's responses showed an increased fear response, specifically toward snakes. All 10 children reported experiencing fear, a reaction not observed with elephants, dogs, or cats when they were asked about their feelings toward snakes . When the author asked to describe the first word that came to mind when thinking of each animal, the responses for snakes were overwhelmingly negative. In contrast, the responses for other animals were more varied, ranging from neutral to positive.

Selective Fear Response to Snakes

When asked how they would feel if they encountered a snake, every child reported fear. When they were asked to think of an elephant, dog, or cat, their responses were diverse and not fear-dominated. This indicates that children perceive snakes as an inherent threat, whereas for other animals, a mix of neutral, positive, and occasional cautious responses was seen. One child stated, "If I see a snake, I'll feel fear" . Another mentioned, "Snakes are dangerous and can bite, so I would be very scared." These statements were almost consistent across all participants.

Negative Associations with Snakes

When children were asked what first came to mind when they think of a snake, nearly all of them used fear-related words. Their responses included: Danger (3 children), Bite (4 children), Devil (1 child), Venomous (1 child), Indifferent (1 child) These results suggest that snakes are uniquely associated with danger, pain, and negativity.

Comparison with Other Animals

To further explore whether this fear was specific to snakes, children were asked the same question about

elephants, dogs, and cats. Their responses showed an obvious contrast. They gave neutral or even positive words for other animals. Elephants were associated with cultural and physical attributes, such as "big," "festival," and "good-hearted." Dogs had mixed responses, with some children mentioning "playing" and "cute," while a few referenced "bite" and "rabies". Cats were perceived as mostly affectionate, with responses like "cute," "cuddle buddy," and "beautiful," though some children mentioned "scratch." The key difference is that snakes trigger a universal fear response. Other animals evoked a wider emotional range. Even though some children associated dogs with biting, the overall perception of dogs was not one of overwhelming fear. In contrast, snakes were mostly linked to fear and danger.

Theme 4: increased Visual Sensitivity to Snakes

These findings revealed that when children are presented with images of varying opacity levels, they detect snakes faster than they detect other animals. This shows that snakes trigger increased visual sensitivity, which allows for rapid detection, even when it is in reduced visibility. Visual Stimuli and Experimental Setup were done in a way that each child was presented with a series of four images per animal (snake, elephant, dog, and cat). These images were not transparent but consisted of line drawings of the animals on a white background. Each presented series consisted of four images of the same drawing(any one animal), with increasing opacity to examine the threshold at which children can detect each animal. The first image in each series was faint and barely visible, while the following images gradually became more visible.

Rapid Detection of Snakes

All 10 children detected the snake in the first stimulus presentation itself, even if it's barely visible. This indicates that snakes are detected faster than other animals. This supports the hypothesis that humans are biologically wired to quickly recognize potential threats like snakes.

Delayed Detection of Other Animals

In contrast to snakes, children needed multiple stimulus presentations to detect elephants, cats, and dogs at the same opacity level. However, the number of images needed for recognition varied: Children needed 2 to 3 images to recognize the elephant. Children required 1 to 3 images to identify the cat. Detection ranged from 1 to 3 images for dogs.

Unlike snakes, none of the children detected these animals immediately in the first stimulus, indicating that snake detection occurs with greater efficiency than detection of other animals.

Discussion

The aim of this study was to investigate the instinctive and learned responses towards snakes in children. This study focuses on their verbal descriptions, behavioral reactions, and visual sensitivity towards snakes. This study also aimed to determine whether the fear of snakes is innate or is influenced by external factors like culture, religion, and prior experiences. There were a total of 10 participants, all of whom were 10 years old.

Thematic analysis was used to analyze the data. Major findings are mentioned below.

90% of children associated snakes with fear and danger and used words like "venomous," "devil," "bite," and "danger" to describe them. None of the children described snakes in a positive manner. Seligman (1971) proposed the preparedness theory of phobias in which he suggests that humans have an innate fear response for those stimuli that may or may have threaten our existence. (Phobias and preparedness, 1971). This data supports this theory.

Some children associated snakes with evil or bad omens due to religious beliefs. Others developed fear through stories of snake bites and parental warnings. This suggests that fear of snakes is not solely instinctive but can also be acquired through social and cultural influences. Albert Bandura, through his social learning theory, supports this evidence i.e, fears can be acquired through observations or by verbal instructions from parents. Behavioral Reactions towards encountering a Snake and other animals differed.6 out of 10 children showed an escape response. They reported that they would run away if they saw a snake.3 out of 10 children showed Aggressive Response (3 boys). They stated that they would kill or beat the snake, whereas interestingly, no girls showed an aggressive reaction. This suggests that boys were more likely to respond aggressively, while girls tended to avoid confrontation. This indicates a possible gender-based difference in fear response. When children were asked what came to mind when they think of elephants, cats, and dogs, their responses were neutral or positive. However, consistent fear-based responses were seen for snakes. This suggests a selective and heightened fear response can be seen toward snakes compared to other animals. Another important finding is that when children were presented with faint, low-opacity images, all children identified the snake in the first stimulus, while they needed multiple attempts to recognize elephants, dogs, and cats. This supports the idea that humans may have an evolutionary advantage in detecting snakes quickly. In 2006, Lynne Isbell proposed a theory which supports this finding. According to the snake detection theory by Lynne Isbell, primates evolved specialized neurological and perceptual mechanisms to detect and avoid snakes, which maybe once crucial for our survival.

Implications

This study confirms that there is an instinctual response towards snake stimuli, which confirms various evolutionary theories. Since there are only a few studies based on evolutionary snake fear, this study aims to get a better understanding about snake fear from an evolutionary perspective as well as a learned perspective. These findings may also pave the way to help in detecting early warning cues towards snake phobia by assessing the snake detection pattern. This may also help in developing treatments for snake phobia. Results also show that children instinctively fear all snakes irrespective of venomous or non-venomous, thus schools should address between dangerous and safe snakes in order to prevent unnecessary fear.

Limitations

The study was conducted with only 10 children, which may not fully represent broader populations. The study was conducted in Thrissur, Kerala, where beliefs about snakes may differ from those in other regions. So, cultural bias can occur. The line-drawing method used in the visual sensitivity test may not fully replicate real-life snake encounters, where factors like movement and texture could influence detection.

Suggestions for future research

Future studies could explore whether these findings hold true across different populations. Real-Life Fear Reactions can also be done, observing children's actual responses when exposed to live or artificial snake stimuli. Further research can be done into why boys exhibited more aggression toward snakes compared to girls.

Conclusion

The present study was undertaken to investigate whether the fear of snakes is instinctual or learned. This study provides strong evidence that children exhibit a unique, selective fear response to snakes. This is both instinctive and socially reinforced. The increased visual sensitivity to snakes suggests that humans are adapted to detect snakes quickly, likely as a survival mechanism. However, cultural influences and learned experiences also play a role in shaping fear responses.

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