

# The significance of cognitive learning over preparedness theory in the development of animal phobia

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Animal phobia is the most prevalent type of specific phobia (a lifetime prevalence of 3.8%) across a span of 22 countries and affects people of all ages. Research has suggested that this phobia exists in humans due to prepared learning, caused from the development of fight or flight responses after generations of evading potentially dangerous threats. Vicarious learning is a cognitive form of learning derived from observing experiences in others and has also been known to play a role in fear development. The present paper will provide evidence on cultural beliefs, verbal information, and modeling influences, suggesting that cognitive learning plays a much larger role than preparedness in the learning of fear. It will also reason why exposure therapy continues to be the most effective treatment and propose areas for future research.

Keywords: animal phobia; cognitive learning; fear; phobia; preparedness theory

Animal phobia is the most prevalent type of specific phobia (a lifetime prevalence of 3.8%) across a span of 22 countries (Wardenaar et al., 2017) and affects people of all ages. Overwhelming amounts of research have suggested that the reason this fear exists is due to evolutionary causes – that as humans evolved, we survived as a species because we had naturally developed a fear for potentially dangerous threats (Hooley et al., 2016). The skills required to evade these threats were retained for generations, and today we are still primed to exhibit these skills when we are faced with certain situations. According to Hooley et al. (2016), this prepared learning has been deemed responsible for our natural fight or flight responses. Fears to snakes and spiders have been suggested to exist due to preparedness (Seligman, 1971, as cited in Egliston & Rapee, 2007, p. 1874). It is believed that phobias with high levels of preparedness will be resistant to extinction during clinical treatment (Åhs et al., 2018).

On the other hand, cognitive forms such as fear conditioning or vicarious learning have also been known to play a role in fear development (Rachman, 1977, as cited in Reynolds et al., 2018, p. 1166). For example, cultural perceptions, beliefs, and values are acquired over generations through vicarious learning and may be why some groups of people view animals in a different light than others (Tsai et al., 2006). People in an area with a high prevalence of a certain species of invertebrates may have had traumatic experiences related to these species, resulting in feelings of apprehension once encountered; whereas other groups of people who live in another environment may be more familiar with a less dangerous species of the same animal and are therefore indifferent to such encounters (Prokop et al., 2010b). Culture can go on to shape educational curriculums within a region, and vice versa.

Regardless of the fear's aetiology, live exposure therapy remains the most beneficial method to treat specific phobias with reported response rates of up to 90% (Choy et al., 2007). The therapy involves exposing the individual to the phobia directly and allowing them to become more accustomed to the fear stimulus over time. This effective method of treatment leads one to question preparedness theory: how are fears, which are thought to be pre-wired to provoke a fight or flight response once encountered, capable of becoming unlearned with immense motivation and exposure? This suggests that although biological preparedness contributed to the initial development of animal phobia in our ancestors many years ago, other types of fear learning must have since been instrumental in maintaining the prevalence of this phobia over generations.

It is clinically important to recognise that fears with high levels of preparedness can indeed respond well to treatment. The present paper will provide evidence on cultural beliefs, verbal information, and modeling influences, suggesting that cognitive learning plays a much larger role than preparedness in the learning of fear. It will also reason why exposure therapy continues to be the most effective treatment and propose areas for future research.

### **Cultural attitudes**

An individual's cultural upbringing is composed of established values, views, ideas, and opinions of the world around them. They can also play a role in one's opinions of live organisms in their environment. For example, feelings of disgust and dangerousness were linked to disease prevalence in a study assessing perceptions of invertebrates in different regions. Prokop et al. (2010b) examined data from questionnaires provided to a total of 314 students, aged 8 to 15 years old, in Slovakia and Turkey. Turkish students were determined to have a higher prevalence of parasitic diseases than Slovakian students from epidemiological research. Using colour pictures of insects and parasites, the students were asked to provide their ratings of fear, disgust, and dangerousness for each photo. Results showed that Turkish students rated higher levels of fear, disgust, and dangerousness towards insects and parasites than Slovakian students.

Indeed, cultural beliefs can play a role when it comes to positive or negative emotional responses (Tsai et al., 2006). Perceptions of animals can vary from country to country partly due to the amount of education available to residents to generate these beliefs. Spider education, for example, is suggested to be the reason for varying attitudes towards them worldwide. Prokop et al. (2010a) explained that biology education in South Africa and Slovakia are taught differently.

The education curriculum in Slovakia focuses more on learning organisms in a systematic fashion, regardless of which ecosystem they tend to inhabit. South Africans will instead learn about the roles of different organisms in specific ecosystems. A total of 382 South African and 354 Slovakian high school students participated in a study to measure their views towards spiders.

Data was gathered from the participants to assess their negativistic (meaning fear or dislike of spiders), scientific, ecologicistic and naturalistic attitudes towards spiders. Analysis revealed that there was no significant difference in negativistic attitudes between countries. Furthermore, South African students had significantly higher scores in the scientific, ecologicistic and naturalistic dimensions. This means that they were more interested in learning more about spiders and understood their role in ecosystems.

Notably, South Africa has a history of poisonous spiders (Dippenaar-Schoeman & Jocqué, 1997, as cited in Prokop et al., 2010b, p. 1667). More analysis showed that a sample of indigenous South African students from Catholic schools displayed higher negativistic attitudes than Slovakian Catholic students, supporting the theory of prepared learning.

### **Verbal information and modelling**

The amygdala is in the temporal lobe of the brain and has been found to be involved in the neurocircuitry of fear learning (Mineka & Öhman, 2002). Immediately before, this structure's role in fear development was supported when Phelps et al., (2001) discovered that it was activated during verbal fear learning. In this study, subjects were told that they would be participating in a variety of trials composed of three conditions: rest, safe, and threat. They were told that they would receive at least one painless shock during the threat trials, but not when the shock would occur. Their skin conductance response was measured to confirm fear responses.

Each subject's amygdala was captured simultaneously using functional magnetic resonance imaging. No shocks were given during the experiment. Results showed that the left amygdala was significantly activated during the threat trials in 11 out of 12 subjects, suggesting a link between discussing potential threats and the development of anxiety and fear.

Vicarious fear learning is learning derived by observing another person's response to a fearful stimulus. It has been shown that when mothers behave in a positive manner towards a fearful stimulus, such as a toy spider, it can prevent subsequent fear of the stimulus in young children (Egliston & Rapee, 2007). Significant associations between lifetime specific phobia with a fear of animals and parental psychiatric history (e.g., mood disorders, anxiety disorders such as phobias) have been observed in previous research (Depla et al., 2008).

In the Netherlands, results were extracted from 7,076 randomly selected persons aged 18 to 64 over a period of three years. They found that, on average, participants began developing animal fears between the ages of 8 to 11. When they evaluated associated factors, they determined that 43.8% of those categorized as having specific phobia with a fear of animals reported that one or more parents had also suffered from psychiatric illness. This research suggests that children can derive anxieties, fears, and eventually phobias, from observing their parents at a young age.

### **Verbal information**

Another study involving 40 young boys and girls discovered that negative verbal information provided to the children about toy monsters significantly increased their fear towards the monsters once exposed (Field et al., 2001). This study compared the effects of both positive and negative vicarious and verbal information by showing the children videos or reading them stories about the monsters. The stories were read to the children by a teacher, an unknown adult, or another child. The children were then exposed to the stimulus. They were asked to complete questionnaires to gauge their fear beliefs. The researchers found that there was a significant shift in fear beliefs only when the children were given verbal information from an unknown adult, whether it was positive or negative. Negative information resulted in a much larger change in fear beliefs than positive information did. The videos presented did not yield a significant change in their fear beliefs.

### **Modelling**

Equally important is that there is research to support the association between fear development and modeling parental figures (Egliston & Rapee, 2007). Modeling occurs when a person reacts to a stimulus in front of an observational learner. Fear of animals tend to arise in young children and younger children have been shown to report a greater fear of animals compared to older children (Gullone, 2000). Furthermore, fear of animals has been found to be more common in women than in men (Curtis et al., 1998, as cited in Depla et al., 2008, p. 201).

To demonstrate the role mothers may play in the development of fear in their children, Egliston and Rapee (2007) studied how toddlers reacted to toy snakes and spiders after witnessing their mothers react to them in a positive manner. Toddlers were randomly placed into three groups: one without a phobic stimulus, one with the phobic stimulus but without any expression from the mother, and one with the phobic stimulus and positive expressions towards it from the mother. Positive expressions by the mother included cheerful facial appearances as well as positive vocal sounds and phrases. The toddlers in all three groups then witnessed the experimenter react negatively towards the toys. Results showed that toddlers who had observed their mothers' positive expressions exhibited greater positive emotional and behavioural responses towards the toys, even after witnessing the negative behaviour.

In another interesting study, positive vicarious learning was found to reduce existing fear beliefs in children who had initially developed the fear due to negative vicarious learning (Reynolds et al., 2018). 92 children ages 7 to 9 were presented with photos of an unknown marsupial. The photos were paired with photos of fearful faces. Children were then instructed to complete fear beliefs questionnaires and exercises to measure avoidance. Later, the animal photos were either presented next to happy faces for some children or paired with a recording of positive verbal information for others. A control group were presented with irrelevant photos as neutral stimuli. They were all assessed again after the procedure. Results showed that fear beliefs were equally and significantly reduced for children who received the positive information or vicarious learning and remained the same for those who did not. Although the effects of negative vicarious learning were decreased in this study, even greater effects can be observed with exposure therapy.

### **Exposure therapy**

Compared to other specific phobias, animal phobia is less likely to result in pronounced severity and impairment (Burstein et al., 2012). For those who seek treatment and for severe cases, live (in vivo) exposure therapy remains the most effective treatment method. Choy et al. (2007) reviewed different treatment methods for animal phobia and found that systematic desensitisation (combining gradual exposure with periods of relaxation) made participants feel less anxious around the phobic stimulus but did not alter their feelings of avoidance (Rosen et al., 1976, as cited in Choy et al., 2007, p. 269). In comparison, they found that in vivo exposure resulted in both decreased anxiety and avoidance levels when assessed using a behavioural approach test (Bandura et al., 1969, as cited in Choy et al., 2007, p. 270). The results were also sustained or better at long-term follow up anywhere between 6 to 14 months (Arntz & Lavy, 1993, as cited in Choy et al., 2007, p. 274). Although live exposure therapy is quite efficacious for treating animal phobia (Choy et al., 2007), it can sometimes lack effectiveness due to high dropout rates and a lack of motivation (Garcia-Palacios et al., 2001, as cited in Choy et al., 2007, p. 281).

Long-term data investigating the effectiveness of in vivo exposure is limited, although relapse has been shown to occur post-treatment when the stimulus was presented by a different therapist and in a different manner (Mineka et al., 1999, as cited in Choy et al., 2007, p. 282).

Lastly, single-person exposure therapy was found to decrease participants' excessive fear of spiders compared to group therapy. A group of 78 people in an auditorium were presented with psychoeducation, followed by modelled exposure (Wannemueller et al., 2016). The modelled exposure involved watching a modeling video then observing a volunteer participant do the same with a live spider. The participants spider fears were then assessed using questionnaires and a behavioural approach test involving a live spider. A second group of 30 people were treated individually with psychoeducation, gradual exposure, and modeling. Before therapy, participants in the large group approached live spiders closer than the participants in the single group. When compared to group therapy, single-person exposure therapy led to greater fear reductions in both the subjective questionnaires and approach tests.

## **DISCUSSION**

### **Cultural factors**

The heightened feelings of fear, disgust, and dangerousness noted towards parasites in Turkey may seem to be derived from evolutionary preparedness (Prokop et al., 2010b). To explore this further, it is important to appreciate that the country had relatively high rates of parasitic diseases at the time of the study. Comparatively, Slovakia had low rates of disease. It makes sense that people would be more fearful to insects and parasites in a country with higher rates of parasitic disease. These fears may have been social constructions established in response to the endemic illnesses that these pathogens were causing. These shared social views may have superseded any previous opinions towards insects and parasites Turkish

people may have had prior to the high levels of parasitic disease. For example, one would expect that inhabitants would have become familiarized to these small animals if they had always existed in the country.

At some point in history, parasitic diseases began to spread more frequently in Turkey. Once they were deemed responsible for death and disease, there may have been a sudden collective shift in fear beliefs. This would mean that it was the shared social views that caused the reported fearful feelings, and not biological preparedness. Historical research is recommended, although it would be challenging to determine exactly how these feelings emerged.

Another important social and cultural construct is how education is learned within a society. Interestingly, the research published by Prokop et al. (2010) showed no significant difference in negative views towards spiders amongst South African and Slovakian students. This is especially important as South Africa was noted to have a prevalence of dangerous spiders that could cause disease and death, whereas Slovakia did not (Dippenaar-Schoeman & Jocqué, 1997, as cited in Prokop et al., 2010b, p. 1667). These findings were not in line with the theory of preparedness; evolutionary prepared learning should have resulted in significantly greater fear beliefs in South African students. The results may be due to differences in biology curricula between the two countries or South Africans' familiarity of the spiders in the country.

The study later concluded that a sample of South African students had negative views towards spiders due to preparedness theory. As there was an apparent typo in the literature regarding the results of the South African and Slovakian students from Catholic schools (Prokop et al., 2010b, p. 1678), further clarification of this work is required. Nevertheless, another reason for their conclusion may involve differences in the curricula of spider education in those Catholic schools compared to the schools in the rest of the study sample. This means that animal fear development may be affected by shared social beliefs of pathogens linked to disease, or other social constructs such as education. These factors may have the ability to supplant prior prepared learning with new beliefs in some environments.

### **Verbal information**

Verbal information given to children by an unknown adult significantly modified their fear beliefs (Field et al., 2001). These findings support the role of cognitive learning over preparedness theory in fear acquisition. As video information did not play a major role in their beliefs of toy monsters, it can be concluded that information given to children directly is more effective than observing the same information on film. This is similar to the greater effects observed when treating phobias with in vivo exposure rather than on video. Although there have been advances in other forms of exposure therapy such as virtual reality (Hooley et al., 2016), the results above support the importance of applying more direct in-person approaches when modifying fear beliefs. Moreover, it was direct verbal information from an adult that changed their fear beliefs, not information presented by a teacher or peer. This suggests that the children may have confided in the words of an adult stranger more than the information provided by another child or an adult believed to be a teacher. One limitation of this study is that toys were used instead of live fear stimuli, although administering live phobic stimuli may not be feasible with this age group. It is important to note that this cognitive form of fear learning ties in with cultural attitudes, as each culture will have established opinions of invertebrates. These collective beliefs (possibly learned from unknown adults in their communities) may affect fear learning during childhood.

### **Modelling**

Shared cultural beliefs may also influence how a parent reacts to a fearful stimulus in front of their developing children. The innovative study investigating positive modeling on children's attitudes towards toy snakes and spiders clearly determined that modelling overwhelmed preparedness theory (Egliston & Rapee, 2007). Undoubtedly, any pre-wired ideas regarding snakes and spiders may have existed in the toddlers' minds prior to the study. Yet they did not come to fruition once the toddlers observed sufficient positive facial and vocal expressions in their mothers. Even after ample negativity towards the toys, the toddlers in the positive modeling group showed positive emotional responses and closer approach behaviour.

Young children may have the ability to model positive behaviours towards phobic stimuli, which can subsequently affect their behaviour in the future. To reduce bias and increase accuracy, the negative behaviour could have been performed by someone other than the experimenter. A recommended next step would be a long-term follow up to assess whether the toddlers' views towards snakes and spiders changed over time.

Meanwhile, it appears to be beneficial for positive information and vicarious learning to occur even after the negative fear learning has been completed. Recently acquired fear beliefs were reduced using positive information and vicarious learning, supporting their importance over preparedness theory (Reynolds et al., 2018). This study demonstrates that fear beliefs in children can be modified by immediately providing positive affect and without administering direct exposure therapy. These positive emotions may give the individual the opportunity to engage cognitively and challenge their fear beliefs. This is an important clinical finding, although it is difficult to determine whether the results of the study would translate if the animals were presented in person. Long-term follow up is recommended for future research.

### **Exposure therapy**

Fears can manifest due to observed experiences. As noted earlier, they can be maintained by culture through negative information and vicarious learning. Fears can also be defeated to survive in an environment. The ones that still exist in an individual may need to be directly and positively observed through exposure for the beliefs to fade. The high success rate of exposure therapy reviewed by Choy et. al. (2007) supports the concept of fear modification. This treatment method is used for fears that are extreme or those derived from prepared learning. The reason behind this success may be due to individuals ultimately overcoming their internal conflicts.

Exposure therapy can provide an opportunity for a person to access this resilience (Relajo-Howell, 2020), allowing them to break free of certain fear beliefs. Surely, people have differing levels of resilience. This could explain the observed dropout rates (Garcia-Palacios et al., 2001, as cited in Choy et al., 2007, p. 281). The reported extinction relapse after successful in vivo exposure therapy (Mineka et al., 1999, as cited in Choy et al., 2007, p. 282) may be due to observed negative information or vicarious learning of the fear stimulus prior to follow up. Further research should focus on investigating ways to reduce dropout rates and increase motivation for greater effectiveness.

Finally, it is worth noting the effects of administering exposure therapy individually rather than in groups. Findings support the notion of overcoming fear beliefs as an individual process, as treatment of spider fear was highly effective when administered alone (Wannemueller et al., 2016). Single person sessions may provide the direct attention and exposure a person needs to modify their internal fear beliefs. This environment may not be attainable in groups. Certain settings and cognitive processes may therefore be crucial in the unlearning of fear.

### **CONCLUSION**

In those ages 65 and over, the estimated 1-year prevalence of specific phobia is 4.7% (Gum et al., 2009, as cited in Grenier et al., 2011, p. 457). Phobias are coupled with significant anxiety, which can become distressing and lower an individual's quality of life. As fear development is bound to occur throughout life, health professionals need to acknowledge that fears can be modified. Preparedness theory can be a dangerous concept if one concludes that they have no control over managing fears.

The findings presented in this paper provide examples of how factors other than prepared learning have played roles in animal fear development. Over time, these types of learning may have replaced preparedness in fear acquisition. Collective ideas within a group of people become a part of their culture, including fear beliefs. Information provided in institutions, such as education, can also affect these shared cultural attitudes. Verbal information significantly modified fear beliefs and was most impactful when direct and in-person. As animal fear has been found to be more common in women than in men, fear responses in mothers are central to future research. Positive modeling during childhood is a method that needs to be studied further as it may have the ability to reduce fear development later in life. Long-term cognitive learning studies are encouraged to assess permanent fear extinction. Exposure therapy is noteworthy because it draws attention to the internal struggles one may have with fear. In the right environment and state of mind, an individual can acquire the strength to overcome their fears. Determining the underlying reasons behind this can then be used to motivate others.

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