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Fear of animals: What is prepared?

Jamie Bennett-Levy and **Theresa Marteau**

The present study examines one aspect of the concept of preparedness: what characteristics of animals humans are prepared to fear. Group I subjects ($n = 64$) rated how fearful they were of 29 small, harmless animals. Group II subjects ($n = 49$) made ratings of the perceptual characteristics of these same animals. Fear ratings were found to be significantly correlated with animal characteristics' ratings. It was suggested that preparedness to fear certain animals (e.g. snakes) is not a function of the animals *per se* but of their fear-evoking perceptual properties and their discrepancy from the human form.

Both Gray (1971) and Seligman (1971) have proposed that humans are in some way biologically predisposed, or 'prepared' to fear certain animals (e.g. snakes). The assumption rests upon three main classes of evidence:

(i) the distribution of animal phobias is non-random (Marks, 1969);

(ii) there does not appear to be an equivalent distribution of traumatic experience with these animals (Marks, 1969; Murray & Foote, 1979; but see Ost & Hugdahl, 1981);

(iii) age of onset of animal problems is non-randomly distributed, reaching a peak around the age of 4 years (Gray, 1971).

Seligman postulated that fears which are 'prepared' involve stimuli which are of biological significance to the survival of the species. However, he did not specify how such a mechanism might operate. The present study represents a first attempt to shed light on this problem.

The suggestion that certain fears are innate has also been put forward to account for animals' fears of other dangerous animals (Hebb, 1946; Tinbergen, 1951). Hebb noted that a realistically painted snake elicited a stronger fear reaction in chimpanzees than all but one of the other test objects, but his chimpanzees were a mixture of wild and laboratory-reared animals which may have been previously exposed to snakes. Recently, Mineka *et al.* (1980) have found that while most wild-reared monkeys showed considerable fear of real, toy and model snakes, most of the laboratory-reared animals showed only very mild responses. The authors concluded that 'snake fear does not appear to be very common or pronounced in laboratory-reared monkeys', but neglected one other interesting aspect of their data – that on the four trials where laboratory-reared monkeys showed maximal response latencies, the 'real' snake showed a significant amount of movement. What Mineka *et al.* (1980) do clearly demonstrate is that chimpanzees (and, we assume, humans) do not have a 'prepared template' of snakes, possibly though it is snake-like movements, not snakes *per se* which monkeys (and humans?) are prepared to fear.

There are other indications in the literature on fear in animals that particular qualities of movement do indeed produce fear. Schneirla (1965) noted that certain stimulus configurations characteristically elicit withdrawal responses; these stimuli are generally abrupt, irregular in timing and of high magnitude. They are effective in the visual, auditory and tactile or proprioceptive modalities. For instance, large animals which move unpredictably and at great speed (towards the observer) should elicit maximal withdrawal responses.

Another class of stimuli which may give rise to fear in animals has been proposed by Hinde (1974). He argued that marked novelty and strangeness frequently evoke fearful

behaviour; similar dimensions seem to affect human infants' responsiveness to irregular face-like stimuli (Fantz & Nevis, 1967) and, perhaps, adult reactions to alien creatures in films. Hinde suggested that a large discrepancy between the stimulus and the organism's model of the world is the basis for this response.

The possibility that mechanisms similar to those proposed by Schneirla and Hinde might determine why human beings become fearful of certain animals, but not others, was suggested to us by our experience in treating patients with specific animal phobias. These patients' vivid descriptions of what it is that they fear about animals invariably focus upon the animal's perceptual characteristics. In Britain, these feared animals are almost all small and harmless. Though the patient may 'know' this, he or she nevertheless remains terrified by the sight, feel and thought of it.

The present study, therefore, investigates the hypothesis that human beings, like animals, are prepared to fear certain stimulus configurations, such as rapid or abrupt movement and stimuli which are discrepant from the human form. The hypothesis predicts that the perceptual characteristics of small, harmless animals should be meaningfully related to the distribution of ratings of fear and avoidance of these animals. The corollary of the hypothesis is that such a relationship might help to explain why the distribution of animal phobias is non-random, and why certain small harmless creatures, but not others, become the subject of fear.

Method

Subjects

Subjects ($n = 113$) attending a local health centre were asked to fill in one of two questionnaires, distributed in random order.

Group I subjects ($n = 64$, F 34, M 30), completed Questionnaire 1 (see below). Their mean age was 35·5 years, SD = 16·9.

Group II subjects ($n = 49$, F 25, M 24) completed Questionnaire 2. Their mean age was 35·1 years SD = 16·4.

Materials

Questionnaire 1. This was designed to measure the self-reported fear and avoidance of a number of small harmless animals and insects. The rationale for inclusion of 'harmless' animals was dictated by the stimulus configuration hypothesis, which suggests that certain perceptual characteristics of animals should be meaningfully related to aversion and fear ratings even among harmless animals 'of no biological significance to the survival of the species'. Twenty-nine animals and insects were listed on the questionnaire. Where the animals might have been thought of as harmful (e.g. grass snakes, jellyfish), the instruction '*not* harmful' was included, and subjects were asked to rate them as harmless. Subjects rated these animals on two scales.

1. *Fear scale.* Subjects were asked to rate how afraid they were of animals, using a three-point scale (1 = not afraid; 2 = quite afraid; 3 = very afraid).

2. *A five-point rating scale of nearness.* Subjects were asked how near they would go to the animals. The rating scales consisted of the following points: 1 = enjoy picking it up; 2 = would pick it up, but unpleasant; 3 = touch it or go to within six inches; 4 = stand one to six feet away; 5 = move further than six feet away. Subjects were instructed that 'as some animals and insects are difficult to pick up in the wild, imagine that they have been injured in some way. For instance, the birds have a broken wing, or the squirrel a broken foot, etc.'.

This scale was included because it was thought that subjects would be only 'quite afraid' or 'very afraid' of a small percentage of the animals.

Behavioural and physiological dimensions of fear were not assessed in the current study, for reasons of expediency. Given the individual desynchrony between different indices of fear (Lang, 1968), it cannot necessarily be assumed that the four stimulus dimensions under study will affect behavioural and physiological indices of fear in a similar fashion.

Questionnaire 2. This was designed to measure subjects' ratings of the same 29 animals and insects, as in Questionnaire 1, along four perceptual dimensions. The following instructions were given: 'We would like you to consider how UGLY, SLIMY and SPEEDY the animals are, and how SUDDENLY they appear to MOVE'. A three-point rating scale (1 = not; 2 = quite; 3 = very) was used.

Table 1. Mean ratings of animal characteristics, fear and nearness ratings

	Ugly	Slimy	Speedy	Moves suddenly	Fear	Nearness
Rat	2·24	1·10	2·35	2·53	2·08	3·90
Cockroach	2·53	1·20	1·96	2·04	1·58	3·25
Jellyfish (*not* harmful)	2·00	2·47	1·39	1·51	1·81	2·95
Spider	2·43	1·06	2·25	2·52	1·64	2·88
Slug	2·63	2·90	1·04	1·02	1·19	2·84
Grass snake (*not* harmful)	1·80	1·78	2·12	2·42	1·55	2·78
Beetle	2·10	1·18	1·55	1·57	1·33	2·50
Lizard	1·88	1·54	2·53	2·78	1·25	2·45
Worm	2·18	2·45	1·14	1·20	1·16	2·39
Frog	1·88	2·24	1·80	2·31	1·17	2·28
Moth	1·53	1·09	2·04	2·32	1·25	2·27
Ant	1·86	1·04	2·04	2·14	1·14	2·22
Crow	1·67	1·02	2·02	2·08	1·22	2·14
Mouse	1·35	1·02	2·35	2·56	1·27	2·13
Grasshopper	1·76	1·12	2·48	2·77	1·16	2·06
Squirrel	1·02	1·02	2·44	2·71	1·11	2·03
Caterpillar	1·65	1·24	1·14	1·12	1·05	1·84
Baby seal	1·06	1·42	1·50	1·48	1·03	1·63
Blackbird	1·10	1·00	2·04	2·20	1·08	1·59
Hamster	1·02	1·00	1·98	2·23	1·00	1·50
Baby chimpanzee	1·33	1·00	1·63	1·73	1·09	1·48
Butterfly	1·06	1·02	2·08	2·36	1·00	1·33
Spaniel (dog)	1·08	1·02	2·06	1·84	1·08	1·31
Tortoise	1·41	1·08	1·08	1·06	1·00	1·31
Robin	1·02	1·00	2·10	2·29	1·00	1·31
Lamb	1·02	1·00	1·61	1·90	1·00	1·16
Cat	1·02	1·00	2·17	2·31	1·03	1·14
Ladybird	1·10	1·00	1·71	1·88	1·02	1·14
Rabbit	1·04	1·00	2·35	2·65	1·02	1·13

Results

Table 1 shows the mean scores for the 29 animals on the four dimensions rated by Group II subjects (ugly, slimy, speedy, suddenness of movement) and the fear and nearness ratings of Group I. The mean ratings show that subjects were disproportionately more fearful of rats than of the other animals. Informal questioning revealed that this was almost certainly because rats were perceived as potentially harmful, unlike the other animals. Clearly, our attempt to remove the effects of perceived harmfulness from the questionnaire failed in this specific instance.

An analysis of sex differences in ratings of nearness showed that females rated themselves as significantly less willing to approach or pick up 10 of the animals than males.

These were, in descending order: jellyfish, cockroach, ant and moth ($F = 7{\cdot}08$; $P < 0{\cdot}01$); and crow, worm, beetle, slug, mouse and spider ($F = 4{\cdot}00$, $P < 0{\cdot}05$). Similar sex differences were found on the fear ratings. In contrast, there were no sex differences in ratings of ugliness, sliminesss, speediness and suddenness of movement. Although Group I men generally rated themselves as less fearful than women, as found in other studies (e.g. Geer, 1965), both sexes were evidently responsive to the same characteristics of the animals. The rank order correlation between nearness ratings of animals in men and women was ($r = 0{\cdot}96$, $P < 0{\cdot}001$).

Table 2. Correlation matrix of animal characteristics, fear and nearness measures

	Ugly	Slimy	Speedy	Moves suddenly	Fear	Nearness
Ugly						
Slimy	0·75*					
Speedy	−0·20	−0·29				
Moves suddenly	−0·16	−0·21	0·95*			
Fear	0·82*	0·61*	0·17	0·20		
Nearness	0·87*	0·77*	−0·02	0·05	0·90*	

* $P < 0{\cdot}001$.

Table 2 shows the Spearman intercorrelations between the measures listed in Table 1. Ratings of ugliness and sliminess were significantly correlated with nearness and fear measures. Ratings of speediness and suddenness of movement were highly correlated with each other, but initially not with fear and nearness measures. However, when ugliness was partialled out, suddenness of movement was significantly correlated with nearness ($r = 0{\cdot}61$, $P < 0{\cdot}001$); and when sliminess was partialled out, the correlations with these measures were 0·33 (n.s.) and 0·48 ($P < 0{\cdot}01$).

Similar partial correlations were found between speediness and the fear and nearness measures. Thus, fear and nearness ratings are related to quality of movement as well as to the qualities of sliminess and ugliness.

In sum, each of the four ratings of the perceptual characteristics is significantly related to both fear and nearness ratings as predicted. Ugliness and sliminess predominate in these relationships, but when their effects are partialled out, speediness and suddenness of movement are both seen to exert a significant influence. The hypothesis that the perceptual characteristics of the animals rated by one group of subjects should be related to the fear and nearness ratings of a second group is clearly supported.

Discussion

The results of the study suggest that the perceptual characteristics of animals are of some importance in determining their positive or negative appraisal by humans. Evidence has been presented to show that ugly, slimy, speedy or sudden-moving animals are experienced as less approachable and more fear-provoking than animals without these qualities. The results also indicate that, in spite of efforts to remove the effects of anticipated harm from the ratings by inclusion of '*not* harmful' instructions, this characteristic is clearly important, and possibly an overriding influence in the genesis of phobias; rats were, by a considerable margin, rated as the most feared animal, almost certainly because they were perceived as potentially harmful.

However, while potential harmfulness is undoubtedly important, many phobias are of

common animals, which can do little or no actual harm, and the term 'phobia' is used to denote the apparent irrationality and intensity of the fear response. The present study has thus focused on small, harmless animals to determine why some become the object of phobias, while others do not.

One problem in interpreting the results is to determine to what extent these perceptual characteristics may be implicated in the genesis of clinical phobias. This is a difficult issue. Subjects in this study registered little fear on the fear scale for the vast majority of animals (the ratings might, however, have been enhanced if instructions to imagine specific stituations had been included). There was rather more variation on the nearness scale, but the population as a whole is clearly non-phobic. It may be concluded that the rank orderings of animal characteristics and ratings of aversion (if not fear) are highly related in a normal population.

A more direct way to determine whether perceptual characteristics are implicated in the genesis of clinical phobias might be to test clinical patients directly. However, the inherent problems of bias and selectivity are such that the researchers rejected this option. Clinical patients already have one or more specific animal phobias. Their animal fear ratings will therefore be systematically biased by their feared animal(s), and their ratings of that animal's characteristics may be exaggerated and distorted (Landau, 1980). 'Objective' ratings of the perceptual characteristics of animals by normal subjects were considered necessary if their contribution to the non-random distribution of phobias was to be adequately determined. Data from clinical patients would afford interesting insights into the perceptions of these patients (e.g. do they perceive feared animals as uglier, or more sudden moving, than non-phobics?), but would not answer the question about aetiology, and non-random distribution.

There are, thus, two ways to investigate this problem. One, the strategy used here, is to compare animal characteristics and fear ratings in the general population. The other is to relate the ratings of animal characteristics to epidemiological data, concerning the clinical referral rate of phobias of different animals. We would predict a strong correspondence between these two measures.

Both Gray (1971) and Seligman (1971) proposed that humans have innate tendencies to fear certain animals. It has been the aim of this study to specify the mechanism of these prepared fears. To do this, two concepts have been borrowed from the animal behaviour literature. The first, the discrepancy principle (Hinde, 1974), may plausibly account for the very strong relationship between ratings of ugliness and sliminess, and the fear and nearness ratings. Though ratings of ugliness are essentially subjective, it is noteworthy that, unlike the fear measures, there was no sex difference, which suggests that there was a shared construct of ugliness across sexes. Subjects reported that their judgements of ugliness incorporated elements of sliminess, hairiness, colour of animal, perceived dirtiness, number of limbs and antennae projecting from the body, compactness of body, and relation of eyes to the head. It seems likely that these judgements were based on the extent to which the animals were discrepant with the human, mammalian form.

The second concept taken from the animal behaviour literature was the concept of aversive stimulus configurations (Schneirla, 1965). In the concept of the range of animals included in the questionnaire, the aversive stimulus configurations of speed and suddenness of movement were not as strongly related to the fear and nearness ratings as ratings of ugliness and sliminess (cf. slugs). However, once the effects of these latter variables were partialled out, both speed and suddenness of movement became significantly correlated with fear ratings. Subjects' reports indicated that tactile and auditory as well as visual cues were an integral part of their perceptions of the movement of these animals. A number of the respondents noted that the feel of spiders was particularly unpleasant. Typical of their

comments were: 'spiders can run very fast and I couldn't stand the thought of one running up my leg'; 'they have long hairy legs that can grab you'. Other respondents drew attention to the auditory properties of the animals: 'cockroaches, the noise they make, and their quick unpredictable actions'; 'the hissing of snakes, the darting movements of their tongue...'. Further studies in this area should endeavour to assess perception of the tactile and auditory as well as the visual qualities of feared animals.

These findings may well have implications for the clinical treatment of animal phobias. They suggest a model in which fear responses should be desensitized to specific perceptual characteristics. For instance, where patients are extremely fearful of slimy animals, treatment might start with the presentation of slimy inanimate objects (e.g. wet soap, porridge), before proceeding to the graduated presentation of the animal, in imagination or '*in vivo*'.

In conclusion, the present study represents a first attempt to investigate the postulate that certain fears of animals are innate or prepared and that this in part accounts for the non-random distribution of animal phobias (Gray, 1971; Seligman, 1971). A template theory of specific animal fears was discussed and rejected in favour of a 'perceptual characteristics' hypothesis. The results from the study indicated that humans are probably not prepared specifically to fear animals 'of biological significance to the species'. Rather, the degree to which humans are prepared to approach or fear an animal depends not only on its objective harmfulness, but also on the presence of certain fear-evoking perceptual properties, and its discrepancy from the human form.

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Requests for reprints should be addressed to Theresa Marteau, University Department of Paediatrics, John Radcliffe Hospital, Oxford, UK.

Jamie Bennett-Levy is now at the Psychology Department, Lidcombe Hospital, Lidcombe, NSW 2141, Australia.