

PSYCHOLOGY STUDENTS' BELIEFS ABOUT ANIMALS AND ANIMAL EXPERIMENTATION

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Summary—This study set out to ascertain the beliefs and knowledge about animals and animal experimentation of over 200 students all applying to read psychology at University. The subjects completed a modified and extended version of the Furnham and Pinder (1990, *The Psychologists*, 10, 444–448) attitude to animals scale. They also indicated their knowledge about the amount and type of experimentation done in Great Britain. Finally they indicated what they believed that six groups of animals (rodents, cats, primates, insects, birds and dogs) were capable of, in terms of thought (e.g. 'what another animal is thinking'; 'what happened to them yesterday') emotion (e.g. 'happiness'; 'sadness'; 'joy') and behaviour (e.g. 'unselfishly'; 'dishonourably'). The results were similar to those reported by Furnham and Pinder (1990) but subjects' knowledge of experimentation was poor.

INTRODUCTION

What are the beliefs and knowledge of prospective students of psychology regarding the sorts of animals that are frequently used in experimentation? Are psychology students more or less naive than non-psychology students about animal studies and animal abilities? What demographic variables correlate with pro- or anti-attitudes to animal experimentation?

There is no shortage of literature in the mid to late 1980s on the topic of animal experimentation (Archer, 1986; Bateson, 1986; Calne, 1984; Coile & Miller, 1984; Gallup & Suarez, 1985; Gray, 1985, 1987). Archer (1986) noted the public disquiet about animal experimentation and argued that one cannot rely on animal researchers always to abide by voluntary guidelines. Yet, Gray (1987) argued that psychological experiments on animals are seen as undesirable for four reasons: they do not contribute to medical knowledge; more prestigious biological disciplines do not support psychological research; the aims, methods and findings of animal psychologists are little understood; and finally, liberationists have infiltrated the ranks of psychologists themselves. He pointed out the hypocrisy and inconsistency of anti-experimenters' attitude and claimed they do not have a coherent moral case. He also attacked them for the illiberal, undemocratic use of violence and complained that accusations of extreme gratuitous pain or suffering inflicted on animals are simply not true. He also argued that the charge that many experiments are scientifically worthless, done purely to gain academic prestige, is irrelevant or fallacious. Finally Gray (1987) cited many examples where the transfer of technology and theoretical principles from the animal laboratory to the human clinic have proved very successful in the treatment of human problems. Gray, (1987, 1991) however has his critics (Ryder, 1991; Singer, 1991).

The debate on both sides of the Atlantic has stimulated the development of procedures designed to overcome negative attitudes to animal experimentation (Devenport & Devenport, 1990; Shyan & Sanders, 1991) but there is little empirical data on lay people's attitude or beliefs. In a study of British adolescents' attitudes to animal experimentation, Furnham and Gunter (1989) asked two questions concerning the acceptability of using animals for testing cosmetics as opposed to medicines that would save human lives. They found 59% were against (and 15% in favour) of cosmetic testing and 37% against (and 44% in favour) of medical testing. They found sex differences, with males being more in favour of animal experimentation than females. Apart from this study however, there appears to be very little on attitudes to animal experimentation.

More recently, Furnham and Pinder (1990) asked over 250 young Britons (average age 20 years) to complete a questionnaire and to give various personal details (apart from their names).

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Ss seemed strongly against animals being used in product testing and in favour of stricter controls on laboratories using animals. The standard deviation in responses to each item was fairly high (nearly always over 1.5 on a 7 point scale) indicating a reasonable spread of responses.

The five highest scoring items in Furnham and Pinder's study (indicating strong agreement) were: 'Animals in danger of extinction should never be used in experimental tests'; 'All products should be legally bound to indicate if they used animals to test them'; 'Steps should be taken to prevent the commercial duplication of animal experiments by competing companies'; 'If I had a medical problem that would be terminal without the use of drugs that were tested on animals, I would take the drug'; 'All experiments using animals should be approved by a state government committee' and 'There is no justification for the use of animal experimentation in the testing of cosmetics'. On the other hand, the items with the lowest scores (indicating highest disagreement) were 'Experiments should be allowed on insects and reptiles but not mammals'; 'I would have no objection to working in a animal laboratory'; 'In many animal experimentation labs the animals have an easier time than they would in the wild'; 'I think that all animal experimentation will be stopped by the year 2000'; and 'Non-vegetarians who want to abolish animal experimentation are hypocrites'. Most young people did not feel inclined to join or support activist groups and they disagreed with the 'liberation' of animals from experimental labs, but disagreed with an item which stated that many claims made by animals activist groups are false, and agreed that they would not donate money to a charity that supported animal experimentation. The Ss seemed to believe that some benefits accrue from research on animals, but were against both research on cosmetics and non-applied research. A number of questions referred to government controls on animal experimentation. On some of these items the mean score indicated neither agreement nor disagreement, being close to the mean. 'As long as they have been registered by the Home Office, scientists should be allowed to do research on animals'; 'I think the government should discontinue giving research grants to animal experiments'; and the 'The excessive controls and strict legislation which surrounds experiments in animal labs often hinders their work'.

Furnham and Pinder (1990) found that despite various factor analytic rotations, the results seemed to suggest that attitudes to animal experimentations are uni-dimensional (simple pro vs anti) as against multi-dimensional. These attitudes did correlate predictably with a number of demographic variables particularly sex, political orientation and whether people were vegetarians or not. Females more than males, left-wing more than right-wing, and vegetarians more than non-vegetarians were more strongly against animal experimentation.

This study set out specifically to examine the beliefs and knowledge of psychology students. It had a number of aims: to investigate the structure through factor analysis, of these beliefs; to examine various psychographic and demographic correlates of these beliefs; and to examine the relationship between students' attitudes to animal experimentation and both their beliefs about the capabilities of various groups of animals, and their knowledge of the conduct of animal research.

METHOD

Subjects

In all 209 Ss took part in this study of which 60 were males. They ranged in age from 17 to 61 the majority being 20 years old ($\bar{X} = 20.08$, $SD = 8.91$). They had been at school for an average of 13 years. Most (88%) were unmarried and did not have children. They were asked to rate themselves on a 7 point scale indicating how religious they were. Over 53% scored 1 or 2 (indicating no religious beliefs). They were also asked to indicate their political beliefs. A quarter (27.7%) voted (or would vote) conservative, a quarter labour (20.2%) and a quarter expressed no political influence or preference (24.5%). In all 52 (25.9%) were vegetarians and over 80% agreed that they liked domestic animals.

Questionnaire

The questionnaire was divided into 3 parts:

1. Questions (66 in total) on attitudes to animal experimentation based on Furnham and Pinder (1990)

2. Questions (4) on their knowledge about animal experimentation in Great Britain.
3. Questions (120) on the capabilities (cognitive, emotional and behavioural) of six groups of animals.

All questions can be seen in Tables 1, 2 and 3.

Procedure

Students attending interviews for a place to read psychology were given the questionnaires. They were told that they would be anonymous, that the study had nothing to do with selection and that it was not compulsory but if completed it was imperative that questions be answered honestly. In all 253 were distributed and 235 returned, but 26 were incomplete and were therefore discarded. Thus 209 (82%) were subject to analysis. Where possible *S*s were debriefed.

RESULTS AND DISCUSSION

Strong views

Table 1 shows the results from the first part of the questionnaire.

Table 1. Means, standard deviations and agreement code for each of the 66 questions 1.0–2.50 (Strongly Disagree) 2.51–4.00 D (Disagree) 4.01–5.50 A (Agree) 5.51–7.00 (Strongly Agree)

	Mean	SD	Agreement
1. As long as they are qualified and legally registered, scientists should be allowed to do research on animals.	3.46	1.79	D
2. It is wrong to make animals thirsty.	4.70	1.83	A
3. Ordinary laymen are at least as well qualified to make ethical judgements about animal experiments as are scientists.	4.36	2.17	A
4. Only people who are rather strange and unpleasant could perform experiments on animals.	2.29	1.61	SD
5. Scientists are the people who are best qualified to make ethical judgements about animal experiments.	2.84	1.82	D
6. Animal experiments are an effective and cost-effective way to gather information.	3.82	1.72	D
7. Psychologists don't know any more about the thoughts and feelings of animals than do ordinary laymen.	3.16	1.80	D
8. It is wrong to deprive animals of sleep.	4.90	1.71	A
9. Scientists don't know any more about the thoughts and feelings of animals than do ordinary laymen.	3.58	1.81	D
10. Thousands of pounds are wasted yearly in animal experimentation; much more than in other areas of science.	4.00	1.42	A
11. Legislation regarding animal experiments in Britain allows untrained, unsupervised personnel to administer potentially painful treatment to animals.	3.50	1.75	D
12. I agree with the 'liberation' of animals from experimental laboratories.	3.85	1.86	D
13. Research from animal labs produces great benefits in the lives of both animals and people.	4.85	1.72	A
14. Like people, animals need to live in light, airy conditions in order to thrive.	5.16	1.88	A
15. Many claims made by animal activist groups are false.	3.79	1.55	D
16. Legislation regarding animal experimentation is too lax.	5.31	1.38	A
17. Animals that look like humans are more likely than other animals to suffer when they are used in experiments.	2.22	1.68	SD
18. Scientists should not be allowed to treat an animal in a way that they would not allow themselves to be treated.	4.78	2.03	A
19. I would have no objections to working in an animal lab.	2.82	1.87	D
20. Using laboratory animals in observational studies (to study social groupings, territory, imprinting, etc.) is fine.	5.58	1.59	SA
21. It would be wrong to breed animals just so that they could be used in experiments, even if they did not suffer in the course of their lives.	3.99	2.00	D
22. It is wrong to kill animals, even if the method is painless.	4.38	2.10	A
23. Every animal that is used in an experiment suffers in one way or another.	4.20	1.92	A
24. All methods of killing animals make them suffer.	3.39	2.00	D
25. It is wrong to make animals hungry.	4.72	1.81	A
26. I would be willing to join the National Anti-Vivisection Society or another similar group.	3.64	2.04	D
27. Although animal experimentation provides scientific information, it is not worth the suffering the animals must endure.	3.98	1.85	D
28. Animals are invariably unhappy when they are living under unnatural conditions.	4.43	1.72	A
29. I approve of animal experimentation that reveals basic facts about psychological processes (e.g. learning and thinking).	4.53	1.78	A
30. I approve of animal experimentation that reveals basic facts about biological processes (e.g. respiration and digestion).	4.38	1.76	A
31. I approve of animal experimentation that leads to the development of effective treatments for mental diseases afflicting humans.	4.86	1.67	A
32. I would be willing to join an animal welfare group that condones violence.	3.25	2.84	D
33. It is wrong to use animals for any purpose—food, clothing, transport or experimentation.	2.84	1.43	D
34. I approve of animal experimentation that helps to ensure that cosmetics are safe for people to use.	1.84	1.39	SD

Continued overleaf

Table 1—*continued*

	Mean	SD	Agreement
35. More neglect, abuse and cruelty occurs to farm and pet animals than in research facilities.	3.75	1.39	D
36. It is wrong to keep animals in unnatural conditions.	4.60	1.69	A
37. I approve of animal experimentation that leads to the development of effective treatments for physical diseases afflicting humans.	5.00	1.59	A
38. It is wrong to schedule animal feeding; animals should have continuous access to food.	3.22	1.64	D
39. I approve of animal experimentation that helps to ensure that household cleaners are safe for people to use.	2.49	1.63	SD
40. All manufacturers should be legally bound to indicate whether animals were used to test their products so shoppers could avoid purchasing these items.	6.23	1.56	SA
41. I support the attacks on shops selling furs.	3.88	2.88	D
42. I believe in total abolition of animal experiments.	2.91	1.91	D
43. I approve of animal experimentation that helps to ensure that foods are safe for people to eat.	3.75	1.85	D
44. I am very concerned about the use of animals in laboratory experiments.	4.76	1.65	A
45. Stray animals that have to be put down might as well be used in experiments that could provide valuable information.	3.51	1.96	D
46. Under certain circumstances, experiments involving dogs are justifiable.	3.94	1.87	D
47. I approve of animal experimentation that contributes to the education and training of people.	3.66	1.70	D
48. Under certain circumstances, experiments involving rodents (e.g. rats and mice) are justifiable.	4.40	1.72	A
49. Using animals for testing is more morally acceptable than using them for food and clothing (fur, leather) goods because these can be obtained from other sources.	4.17	1.82	A
50. All animal experimentation is morally incorrect.	3.28	1.96	D
51. Under certain circumstances, experiments involving primates (monkeys and apes) are justifiable.	4.24	1.80	A
52. We need to continue animal laboratory experiments.	4.21	1.82	A
53. If you oppose animal experiments about learning, then you must also oppose horse and dog racing, sea world shows (dolphins, etc.) and guide dogs for the blind.	3.47	1.99	D
54. Under certain circumstances, experiments involving cats are justifiable.	3.91	1.91	D
55. Nearly all animal liberationists are crackpots and 'nutters'.	2.18	1.52	SD
56. Painful experiments on animals should not be prevented because they can provide knowledge about, and relief from, human suffering.	3.25	1.80	D
57. The short life span of animals allows hereditary and long-term individual effects to become visible very quickly: this is a valid reason to allow animal testing.	3.71	1.75	D
58. Under certain circumstances, experiments involving birds are justifiable.	4.06	1.78	A
59. I would not donate money to a charity that supported animal experimentation.	4.70	2.05	A
60. If I had a medical problem that would be terminal without the use of drugs that were tested on animals I would take the drug.	5.94	1.43	SA
61. Some experiments cannot be done without animals.	5.20	1.64	A
62. People who have experimented on animals should be prosecuted for cruelty.	2.71	1.54	D
63. Under certain circumstances, experiments involving insects are justifiable.	4.56	1.80	A
64. Studies in animal labs use unnecessarily large numbers of animals.	4.76	1.62	A
65. I have not given much thought to the animal experimentation issue.	3.04	1.70	D
66. Animals have 'rights'?	5.68	1.52	SA

The items that the *Ss* most strongly agreed with were: 40 (All manufacturers should be legally bound to indicate whether animals were used to test their products so shoppers could avoid purchasing these items; $\bar{X} = 6.29$; $SD = 1.50$), 60 (If I had a medical problem that would be terminal without the use of drugs that were tested on animals I would take the drug; $\bar{X} = 5.94$; $SD = 1.43$), 66 (Animals have 'rights'; $\bar{X} = 5.68$; $SD = 1.52$) and 20 (Using laboratory animals in observational studies is fine; $\bar{X} = 5.58$; $SD = 1.59$). On the other hand the *Ss* disagreed or strongly disagreed with 5 items: 34 (I approve of animal experimentation that helps to ensure that cosmetics are safe for people to use; $\bar{X} = 1.84$, $SD = 1.39$), 55 (Nearly all animal liberationists are crackpots and 'nutters'; $\bar{X} = 2.18$, $SD = 1.52$), 17 (Animals that look like humans are more likely than other animals to suffer when they are used in experiments; $\bar{X} = 2.22$, $SD = 1.68$), 4 (Only people who are rather strange and unpleasant could perform experiments on animals; $\bar{X} = 2.29$, $SD = 1.61$) and 39 (I approve of animal experimentation that helps to ensure that household cleaners are safe for people to use; $\bar{X} = 2.49$, $SD = 1.63$).

Dimensional structure and correlates

In order to ascertain the factor structure of the 64-item questionnaire it was subject to an orthogonal factor analysis (VARIMAX) in order to determine the underlying structure of unrelated factors following Furnham and Pinder (1990). Four factors emerged with eigenvalues of 2 or above. The first factor which accounted for 33.1% of the variance (Eigenvalue 21.83) had 25 items loaded on it at 0.35 or above. All the items that loaded positively on this one major factor arising from the analysis indicated that given certain checks and precautions *Ss* were in favour of

animal experimentation. Three other minor factors emerged. The second factor, which accounted for 4.1% of the variance (Eigenvalue 2.70), had five items loading on it, all concerned with animal suffering. The third factor, which accounted for 3.9% of the variance (Eigenvalue 3.3), had six items loading on it, all anti-experimentation oriented. Finally, the fourth factor which only accounted for 3.1% of the variance (Eigenvalue, 2.15) was bi-polar, with five items loading positively (all anti-experimentation, pro-animal rights) and three loading negatively (all in support of the view that animal experimentation can provide scientifically useful data). It is clear from this factor analysis that, just as Furnham and Pinder (1990) found, attitudes to animal experimentation are uni, rather than multi-dimensional.

As shown in Table 2, items were combined on the four factors arithmetically to form four factor scores which were correlated with various demographic factors.

The results, shown in Table 3, indicated that females were less in favour of experimentation than males. Left wing political sympathizers and cat and dog lovers tended to be less pro- and more anti-animal experimentations, while non-vegetarians and graduates held the opposite views.

Table 2. Factor loading for the first four factors

13. Research from animal labs produces great benefits in the lives of both animals and people.	0.45
15. Many claims made by animal activist groups are false.	0.35
18. Scientists should not be allowed to treat an animal in a way that they would not allow themselves to be treated.	-0.36
19. I would have no objections to working in an animal lab.	0.37
20. Using laboratory animals in observational studies (to study social groupings, territory, imprinting, etc.) is fine.	0.41
27. Although animal experimentation provides scientific information, it is not worth the suffering the animals must endure.	-0.39
29. I approve of animal experimentation that reveals basic facts about psychological processes (e.g. learning and thinking).	0.43
30. I approve of animal experimentation that reveals basic facts about biological processes (e.g. respiration and digestion).	0.48
31. I approve of animal experimentation that leads to the development of effective treatments for mental diseases afflicting humans.	0.43
37. I approve of animal experimentation that leads to the development of effective treatments for physical diseases afflicting humans.	0.49
42. I believe in total abolition of animal experiments.	-0.54
46. Under certain circumstances, experiments involving dogs are justifiable.	0.79
47. I approve of animal experimentation that contributes to the education and training of people.	0.39
48. Under certain circumstances, experiments involving rodents (e.g. rats and mice) are justifiable.	0.80
50. All animal experimentation is morally incorrect.	-0.45
51. Under certain circumstances, experiments involving primates (monkeys and apes) are justifiable.	0.79
52. We need to continue animal laboratory experiments.	0.67
54. Under certain circumstances, experiments involving cats are justifiable.	0.85
56. Painful experiments on animals should not be prevented because they can provide knowledge about, and relief from, human suffering.	0.36
57. The short life span of animals allows hereditary and long-term individual effects to become visible very quickly: this is a valid reason to allow animal testing.	0.52
58. Under certain circumstances, experiments involving birds are justifiable.	0.87
59. I would not donate money to a charity that supported animal experimentation.	-0.40
60. If I had a medical problem that would be terminal without the use of drugs that were tested on animals I would take the drug.	0.44
61. Some experiments cannot be done without animals.	0.41
63. Under certain circumstances, experiments involving insects are justifiable.	0.78
2. It is wrong to make animals thirsty.	0.83
8. It is wrong to deprive animals of sleep.	0.76
21. It would be wrong to breed animals just so that they could be used in experiments, even if they did not suffer in the course of their lives.	0.37
25. It is wrong to make animals hungry.	0.76
36. It is wrong to keep animals in unnatural conditions.	0.46
12. I agree with the 'liberation' of animals from experimental laboratories.	0.55
15. Many claims made by animal activist groups are false.	-0.64
26. I would be willing to join the National Anti-Vivisection Society or another similar group.	0.56
41. I support the attacks on shops selling furs.	0.48
42. I believe in total abolition of animal experiments.	0.34
44. I am very concerned about the use of animals in laboratory experiments.	0.50
50. All animal experimentation is morally incorrect.	0.36
16. Legislation regarding animal experimentation is too lax.	0.50
18. Scientists should not be allowed to treat an animal in a way that they would not allow themselves to be treated.	0.43
27. Although animal experimentation provides scientific information, it is not worth the suffering the animals must endure.	0.39
33. It is wrong to use animals for any purpose—food, clothing, transport or experimentation.	0.39
43. I approve of animal experimentation that helps to ensure that foods are safe for people to eat.	-0.38
45. Stray animals that have to be put down might as well be used in experiments that could provide valuable information.	-0.35
56. Painful experiments on animals should not be prevented because they can provide knowledge about, and relief from, human suffering.	-0.38
66. Animals have 'rights'?	-0.71

Table 3. Demographic correlates of the four factors

Individual differences	Factors			
	1 Pro	2 Anti	3 Anti	4 Anti
Sex: 1 Male, 2 Female	-0.20**	0.15**	0.13*	0.18**
Biology A Level: 1 Yes, 2 No	0.03	-0.05	0.00	-0.07
University degree: 1 Yes, 2 No	-0.12*	0.00	0.03	0.13*
Religious: 0 Not at all, 7 Very	0.06	0.04	-0.13*	-0.12*
Politics: 1 Right Wing, 5 Left Wing	-0.20**	0.12*	0.19**	0.17**
Vegetarian: 1 Yes, 2 No	-0.33***	-0.10	0.31***	0.40***
Cat lover: 1 Yes, 2 No	-0.19**	0.26***	0.17**	0.25***
Dog lover: 1 Yes, 2 No	-0.22**	0.23**	0.21**	0.25***

*** $P < 0.001$; ** $P < 0.01$; * $P < 0.05$.

Psychological research on animals

As a group, this sample expressed a modest degree of approval of animal experimentation that 'reveals basic facts about psychological processes' (Item 29: $\bar{X} = 4.53$; $SD = 1.78$); and that 'leads to the development of effective treatments or mental diseases afflicting humans' (Item 31: $\bar{X} = 4.86$; $SD = 1.67$). However, they apparently esteem animal research into *physical* diseases (Item 37: $\bar{X} = 5.00$; $SD = 1.59$) more highly than that investigating mental disorders; and they do not approve of animal experimentation that 'contributes to the education and training of people' (Item 47: $\bar{X} = 3.66$; $SD = 1.7$). This may indicate that they would be ill-disposed toward applied animal research on learning, or toward the use of animal experiments in technical and scientific training courses.

When asked about a range of specific procedures used commonly in psychological experiments on animals, the students expressed agreement with the view that it is wrong 'to make animals thirsty' (Item 2: $\bar{X} = 4.70$; $SD = 1.83$), 'to make animals hungry' (Item 25: $\bar{X} = 4.72$; $SD = 1.81$), 'to deprive animals of sleep' (Item 8: $\bar{X} = 4.90$; $SD = 1.71$), 'to keep animals in unnatural conditions' (Item 36: $\bar{X} = 4.60$; $SD = 1.69$) and 'to kill animals, even if the method is painless' (Item 22: $\bar{X} = 4.38$; $SD = 2.10$). The wide range of responses to the latter item may have been due to doubts about the existence of painless methods of killing. While the group as a whole disagreed with the view that 'All methods of killing animals make them suffer' (Item 24: $\bar{X} = 3.39$; $SD = 2.00$), 31.2% scored 5, 6 or 7 on this item, indicating that they agreed with the statement. The significance that students assign to the maintenance of animals under 'natural' conditions was underlined by their agreement with the view that 'Animals are invariably unhappy when they are living under unnatural conditions' (Item 28: $\bar{X} = 4.43$; $SD = 1.72$). However, their appreciation of what constitutes natural conditions for various animals (e.g. those that are nocturnal or which live underground) must be questioned in the light of the *Ss*' agreement with the statement that 'Like people, animals need to live in light, airy conditions in order to thrive' (Item 14: $\bar{X} = 5.16$; $SD = 1.88$). Finally with respect to procedures used in psychological research, the data suggest that students' attitudes maybe more positive when treatments are described in more specific terms. In order to make animals hungry, researchers schedule their feeding, and the students expressed *disagreement* with the view that 'It is wrong to schedule animal feeding' (Item 38: $\bar{X} = 3.22$; $SD = 1.64$). Over 66% of *Ss* disagreed with this view more than with the statement that 'It is wrong to make animals hungry'.

Six items investigated students attitudes toward the use for research of six groups of animals studied by psychologists. They agreed that research on rodents (Item 48: $\bar{X} = 4.40$; $SD = 1.72$), primates (Item 51: $\bar{X} = 4.24$; $SD = 1.80$), birds (Item 58: $\bar{X} = 4.06$; $SD = 1.78$) and insects (Item 63: $\bar{X} = 4.56$; $SD = 1.80$) is justifiable under certain circumstances, and did *not* agree that it is justifiable in the case of dogs (Item 46: $\bar{X} = 3.94$; $SD = 1.87$) and cats (Item 54: $\bar{X} = 3.91$; $SD = 1.91$).

Item categorization

Some of the items in Part 1 of the questionnaire were assigned to categories on an *a priori* basis to facilitate investigation of the relationship between students' attitudes to animal experimentation and both their knowledge of animal research (Part 2 of the questionnaire) and their beliefs about

the capabilities of various groups of animals (Part 3). In all, four different attitudinal clusters were formed:

- (1) *Activism*: for each *S*, scores on items 15, 19, 52 and 60 were subtracted from those on items 12, 16, 18, 26, 32, 40, 42, 59, 62 to provide a measure of the extent to which individual and collective action to restrict animal experimentation is supported (Alpha = 0.37).
- (2) *Effectiveness*: the score on item 10 was subtracted from those on items 6, 13, 52, 56, 61 and 64 to measure how effective, in terms of financial costs and human benefits, animal experiments are judged to be (Alpha = 0.61).
- (3) *Opposition to the use of specified procedures*: summation of scores on items 2, 8, 14, 21, 22, 24, 25, 28 and 36 yielded a measure of the extent to which the treatment of animals in specified ways, used by psychologists, (e.g. making them hungry; depriving them of sleep) was judged to be wrong (Alpha = 0.63).
- (4) *Confidence in professional judgement*: scores on items 3, 7 and 9 were subtracted from those on items 1 and 5 to measure confidence in the judgement of 'scientists' and 'psychologists', rather than 'laymen', about the capabilities of animals and the ethics of animal experimentation (Alpha = 0.51).

Although factor analysis (orthogonal or oblique) did not totally support this *a priori* categorization, it was justified by the meaning of the questions. Furthermore the alphas for each of the four categories, although not particularly high, did indicate that questions in each grouping were tapping into similar attitudes.

Knowledge of animal research

Four items were designed to assess *Ss*' knowledge of the conduct of animal research in Britain. The first of these measured the extent to which *Ss* agreed with the false statement that 'Legislation regarding animal experiments in Britain allows untrained, unsupervised personnel to administer potentially painful treatment to animals'. As a group, the *Ss* disagreed with this statement (Item 11: $\bar{X} = 3.50$, $SD = 1.75$) suggesting that they knew that it is not true. Agreement with the statement was associated with: the view that animal experimentation is ineffective (Effectiveness: $r = 0.24$, $P = 0.001$), support for action against animal experimentation (Activism: $r = -0.25$; $P = 0.001$), opposition to the use of specified procedures ($r = -0.14$; $P = 0.01$), and lack of confidence in professional judgement about the capabilities of animals and the ethics of animal experimentation ($r = 0.19$; $P = 0.01$). These *Ss*, who falsely believed that the law allows untrained, unsupervised personnel to administer potentially painful treatments, also tended not to have studied biology to an advanced level.

Table 4 shows the results of the second part of the questionnaire which contained the remaining items assessing *Ss*' knowledge of animal experimentation. The second such item asked *Ss* to select

Table 4. Results from 3 of the knowledge questions

The number of animals used in experiments in Britain each year is, approximately:	
1000	0.0%
10,000	14.5%
100,000	26.3%
1,000,000	36.0%
100,000,000	5.6%
10,000,000	17.2%
The Government body that regulates animal experimentation in Britain is:	
Ministry of Agriculture	22.7%
Home Office	28.6%
Foreign Office	0.5%
Inland Revenue	1.1%
Ministry of the Environment	46.5%
The animals used most often in experiments in Britain are:	
Cats	0.6%
Rodents	92.4%
Dogs	1.8%
Primates	1.2%
Other	4.1%

one of six figures as the approximate number of animals used in experiments each year in Britain. The correct figure is approx. 3,000,000 (Home Office, 1989). A majority of Ss (53.2%) showed themselves to be well-informed, or good guessers, by identifying either 1,000,000 or 10,000,000 as the correct figure. The remaining Ss erred by at least an order of magnitude, 40.8% below the true figure and 5.6% above. Accuracy on this item was not related to any of the demographic and attitudinal variables measured.

Concerning the third item: only 28.6% of Ss knew that the Home Office is 'The government body that regulates animal experimentation in Britain'. Those who did not know were less likely than the others to approve of action against animal experimentation (Activism: $r = -0.14$; $P = 0.05$).

The final item in this group assessed Ss' knowledge of 'The animals most often used in experiments in Britain'. 92.4% of Ss gave the correct answer, rodents. Answering incorrectly was associated with: opposition to the use of specified procedures ($r = -0.21$; $P = 0.01$); lack of confidence in professional judgement about animals and animal experimentation ($r = 0.15$; $P = 0.05$); and higher assessment of the emotional capacities of animals (see below). In addition, these Ss, who wrongly identified primates, cats, dogs, or 'other' animals to be those most commonly used in experiments, were less likely than the Ss who gave the correct answer to have studied biology or psychology to an advanced level.

Taken together, Ss' responses to the first and fourth of these items suggest that a negative attitude toward animal experimentation is associated with misapprehension of both legislation governing animal experiments and the group of animals most commonly studied.

Beliefs about animals' psychological capabilities

Table 5 shows the results of the third part of the questionnaire which investigated Ss' beliefs about the psychological capabilities of animals. The Ss indicated whether they believed that rodents, cats, primates, insects, birds and dogs are 'Definitely capable', 'Possibly' or 'Not capable' of experiencing specified emotions (e.g. anxiety, sadness), thinking about certain things (e.g. injustice, what happened to them yesterday), and behaving in particular ways (e.g. viciously, honourably). Although the second and third groups of items could both be regarded as assessing beliefs about animal 'cognition', for convenience they were analysed separately and the results are described below as pertaining to the 'emotional', 'cognitive' and 'behavioural' capabilities of animals.

With respect to emotions, the Ss almost unanimously agreed that rodents, cats, primates, birds and dogs are definitely capable of experiencing pain. The only invertebrate group listed, insects, were believed to be definitely capable of experiencing pain by 59.6% of Ss, and as possibly capable by 31.0%. The other/true emotions, were more commonly attributed to some animals than to

Table 5. Results from the 3 sections looking into Ss perceptions of the capabilities of animals

	Rodents	Cats	Primates	Insects	Birds	Dogs
<i>To what extent are the following animals capable of thinking about the things listed?</i>						
What another animal is thinking	1.94	2.37	2.55	1.61	1.95	2.43
What happened to them yesterday	1.81	2.25	2.48	1.39	1.79	2.33
Another animal that is not present	1.86	2.34	2.52	1.51	1.95	2.45
Death	1.64	1.80	2.16	1.42	1.64	1.88
What another animal is feeling	1.78	2.21	2.51	1.42	1.78	2.34
Injustice	1.40	1.69	2.05	1.27	1.46	1.86
What will happen to them tomorrow	1.45	1.62	2.04	1.26	1.45	1.76
<i>To what extent are the following 5 sorts of animals capable of experiencing the following emotions?</i>						
Happiness	2.18	2.82	2.80	1.57	2.26	2.88
Pain	2.96	2.99	2.96	2.50	2.93	2.98
Sadness	2.04	2.62	2.77	1.48	2.16	2.80
Joy	1.98	2.45	2.66	1.46	2.06	2.63
Resentment	1.82	2.43	2.59	1.41	1.96	2.55
Anxiety	2.37	2.67	2.73	1.80	2.34	2.77
Rage	2.40	2.70	2.77	1.77	2.27	2.70
Unselfishly	1.65	1.91	2.38	1.52	1.81	2.18
Honourably	1.40	1.76	2.17	1.32	1.51	2.02
Viciously	2.72	2.81	2.82	2.28	2.58	2.89
Deviously	2.09	2.54	2.58	1.63	1.98	2.50
Dishonourably	1.57	1.82	2.13	1.38	1.54	1.92

3 = Definitely capable; 2 = possibly; 1 = Not capable.

others. Across all items relating to not only the emotional, but also the cognitive and behavioural capabilities of animals, primates, dogs and cats were most often judged to be capable; rodents and birds less often; and insects least often. However, the animals within each group were more commonly judged to be capable of anxiety and rage than of joy, resentment and love; and more commonly ascribed the capacity for happiness than for sadness. The combination of these two findings suggests that the *Ss* were not merely more inclined to attribute positive or desirable emotions to animals.

Females rated the emotional capabilities of animals more highly than did males ($r = 0.15$, $P = 0.05$), and lower ratings were given by *Ss* who had studied psychology at an advanced level ($r = -0.13$, $P = 0.05$), and by those who knew which animals are used most commonly in experiments in Britain ($r = -0.22$, $P = 0.01$).

The animals in each group were most commonly believed to be capable of thinking about 'Another animal that is not present', and about 'What another animal is thinking'. Animals were relatively seldom ascribed the capacity to think about 'What will happen tomorrow', 'Death' and 'Injustice' but, with respect to the latter, the results indicate that an appreciable minority of students see no obstacle to the ascription of sociocultural concepts to animals. Primates, dogs and cats were said to be definitely capable of thinking about injustice by 31, 28 and 13% of *Ss*, respectively. This suggests that some students may not only believe that animals have 'rights' (Item 66: "Animals have 'rights'"; $\bar{X} = 5.68$; $SD = 1.52$), but also that they understand themselves to have those rights.

Ratings of cognitive ability were not related to any of the demographic variables measured.

With respect to behaviour: the capacity to behave 'Viciously' was most commonly attributed to the members of each animal group, and the capacity to behave 'Deviously' was attributed with a relatively high frequency to primates, cats, dogs and rodents. The abilities to behave 'Honourably' and 'Dishonourably' were both relatively seldom ascribed, but animals were consistently more often judged to be capable of the latter than of the former. Taken together, these results suggest that compared with professional comparative psychologists, psychology students have a relatively high opinion of the emotional and cognitive capabilities of animals, but that they do not have a romantic view of their motives for action.

High ratings of the emotional, cognitive and behavioural capabilities of animals were each associated with: support for action to restrict animal experimentation ($r = 0.17$, $P = 0.01$); the view that animal experimentation is ineffective ($r = -0.18$, $P = 0.01$), opposition to the use of specified procedures ($r = 0.23$; $P = 0.001$), and lack of confidence in professional judgement of the capacities of animals and the ethics of animal experimentation ($r = -0.166$, $P = 0.01$). The inverse relationship between ratings of the capabilities of animals and the effectiveness of animal experiments is particularly interesting. It is commonly assumed by psychologists that the potential utility of research on animals is directly related to the degree to which animals share emotional, cognitive and behavioural capabilities with humans. These results raise the possibility that students of psychology either do not share this assumption (in which case, we must ask what they *do* take to be necessary in order to make animal experiments effective), or they do not readily distinguish questions concerning the effectiveness and the ethics of animal experimentation. The latter possibility is perplexing since nearly all parties to the animal experimentation debate assume that it is necessary to make a dispassionate assessment of the practical consequences of such research in order to arrive at principled judgements about its moral status.

Older *Ss* rated behavioural capacities more highly than did younger *Ss* ($r = 0.20$, $P = 0.01$), and people who had studied biology to an advanced level rated them lower than did other *Ss* ($r = -0.12$, $P = 0.05$).

Emotional capabilities were less often scored as 'possibly' present in cats, dogs and primates than emotional capabilities in rodents, birds and insects, and cognitive and behavioural capabilities in all animal groups. This suggests that students are relatively confident that they know about the emotional experiences of cats, dogs and primates.

CONCLUSION

These results show that prospective students of psychology hold mixed and somewhat ill-informed views about the nature of animals and animal experimentation. Compared to other

people of a similar age these *S*s were no doubt better educated (and hopefully more intelligent), yet they seemed to have rather anthropomorphic views on the psychological capabilities of animals.

Many seemed in favour of properly supervised, scientific and applied animal research. Indeed, one may argue that social desirability pressures, combined with the fact that they had chosen to read experimental psychology, made it likely that these *S*s would express positive attitudes toward biological research of this kind. However, the data showed that they had no inhibitions about expressing negative views. Once again it was found that beliefs about animal experimentation are not particularly complex and multi-dimensional (Furnham & Pinder, 1990). Factor analysis confirmed only one strong main factor with minor subfactors which correlated predictably with various demographic variables.

Studies such as this one provide interesting data for teachers of comparative and physiological psychology. They suggest that opposition to animal experimentation may be reduced not only by informing students of research rationales, but also by specifying the nature of procedures more clearly, and by providing information about regulations governing the use of animals for experimental purposes. Furthermore, the scale used here could also be used to measure students' attitudes after a degree or a specific course is animal behaviour to see if and what changes. Most importantly, perhaps studies such as this can inform the public debate on animal experimentation. Both sides claim not only a monopoly of the truth but of population backing, but only empirical studies such as this one can determine which is right about the latter.

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