

[FINAL] The Associative-Cognitive Distinction Today: A Survey of Practitioners – Copy

Survey Flow

Block: Information Sheet and Consent (2 Questions)

Standard: Demographics (5 Questions)

BlockRandomizer: 3 -

Standard: Questions on exclusivity and exhaustivity (1 Question)

Standard: Questions on parsimony (6 Questions)

Standard: Questions on the role of the distinction in scientific reasoning (3 Questions)

BlockRandomizer: 2 -

Standard: Questions on the meaning of 'associative' (7 Questions)

Standard: Questions on the meaning of 'cognitive' (6 Questions)

Standard: Final Questions (2 Questions)

Page Break

Start of Block: Information Sheet and Consent

Q1 Welcome!

Thank you for taking the time to participate in this University of Cambridge (Department of Psychology) survey. We are reaching out to you because you recently published a paper as first, last, or corresponding author on the topic of animal behaviour, psychology and cognition. We are investigating the attitudes of scientists working in these areas towards distinctions between 'associative' and 'cognitive' explanations and processes.

Please read the following information carefully and decide whether you would like to participate.

Study Purpose

The purpose of this study is to investigate the attitudes towards the associative-cognitive distinction of scientists who experimentally investigate non-human animal behaviour and cognition.

What does the study involve?

This survey involves a mixture of multi-choice questions, Likert-scales, and free answer textboxes and should take no more than 20 minutes. It can also be completed on a phone or tablet, as well as a desktop computer. We will ask you some demographic questions about your experience in the fields of comparative psychology and animal behaviour and cognition. We will then ask you about how the terms 'associative' and 'cognitive' relate to each other and to ideas about parsimony such as Morgan's Canon, how they figure in your day-to-day research, and what the terms mean to you.

The supervising investigator for this study is Dr Lucy Cheke (University of Cambridge). The primary investigator is Mr Konstantinos Voudouris (University of Cambridge).

Confidentiality – who will have access to the data?

We will be using any personal information you give us in free answer questions to undertake this study and the University of Cambridge will act as the data controller for this purpose. The legal basis for using your personal information is to carry out a task (i.e. academic research) in the public interest. Personal information, including names and contact details, that you voluntarily provide in free answer questions will be stored securely and separately from the main dataset at the Department of Psychology until January 2024. This information will be used in order to forward any articles or conference proceedings to you or contact you for further surveys until January 2024, if you consent. Even if you consent to one or both of these, you may contact kv301@cam.ac.uk at any point to request removal of information from these databases. All personal information will be destroyed after January 2024. Your rights to access, change or

move your information are limited, as we need to manage your information in specific ways in order for the research to be reliable and accurate. If you withdraw from the study, we will keep the information about you that we have already obtained. To safeguard your rights, we will use the minimum personally-identifiable information possible. For further general information about the University of Cambridge's use of your personal data as a participant in a research study, please see [here](#).

What will happen to the study results?

We are collecting responses using a platform called Qualtrics, which is compliant with EU data protection standards. At the end of the project, we will download the data and delete them from Qualtrics. Anonymous questionnaire responses and any data derived from these will be kept securely for a minimum of 10 years in the Department of Psychology in accordance with good research practice. The final data may be presented at conferences and written up in journals. If published, the results of the study will be presented in terms of groups of individuals (e.g., “comparative psychologists”), or if any individual data are presented, the data will be totally anonymous, meaning all personal information will be removed. There will be no means of identifying the individuals involved. The anonymised dataset will be made fully open access upon publication. No IP address or location data will be collected by the Qualtrics software.

Withdrawal

You are under no obligation to participate. We would like to emphasise that you are able to withdraw from the survey at any time by closing your browser, without explaining why.

Risks

There are no foreseeable risks to participation in this survey.

Ethics Committee Review

This project has been reviewed and approved by the Cambridge Department of Psychology Ethics Committee [PECXXXXX].

Consent

Please select one of the following options

Feel free to email Konstantinos Voudouris at kv301@cam.ac.uk if there is anything that is not clear or if you would like more information.

☐ I have read and understood the information above and I agree to participate in the survey (4)

☐ I do not agree to participate in the survey (5)

Skip To: End of Survey If Welcome! Thank you for taking the time to participate in this University of Cambridge (Departme... = I do not agree to participate in the survey

Q33 Are you a robot?

End of Block: Information Sheet and Consent

Start of Block: Demographics



Q9 This section asks some demographic questions.

Please rank how well the following terms describe your research (1: best description, 7: worst description). Drag and drop the statements into your preferred order.

- _____ Animal behaviour (1)
 - _____ Animal cognition (2)
 - _____ Animal learning (3)
 - _____ Behavioural ecology (4)
 - _____ Behavioural neuroscience (5)
 - _____ Comparative psychology (6)
 - _____ Other (8)
-

Q10 On approximately how many papers in these research areas have you been an author or co-author?

- ☐ 0-5 (7)
 - ☐ 6-10 (8)
 - ☐ 11-25 (9)
 - ☐ 26-50 (10)
 - ☐ 51-75 (11)
 - ☐ 76+ (12)
-

Q11 Approximately how many years have you been working in these research areas?

- ☐ 0-2 (7)
 - ☐ 3-5 (8)
 - ☐ 6-10 (9)
 - ☐ 11-20 (10)
 - ☐ 21-30 (11)
 - ☐ 30+ (12)
-

Q12 In which country(s) do you conduct most of your research? (optional)



Q40 What methods do you use in your research? (Please tick all that apply)

- ☐ Computational Modelling (1)
 - ☐ Behavioural testing (e.g., string-pulling) (2)
 - ☐ Ethological/Observational methods (3)
 - ☐ Other (please specify) (4)
-

End of Block: Demographics

Start of Block: Questions on exclusivity and exhaustivity



Q13

There are often several potential explanations for the way an animal behaves in a particular scenario.

To what extent do you agree with the following statements?

Note: by 'behaviour', we mean specific behavioural sequences such as 'food caching', 'pecking', or 'string pulling'.

	Strongly disagree (1)	Somewhat disagree (2)	Neither agree nor disagree (3)	Somewhat agree (4)	Strongly agree (5)
A candidate explanation for a particular behaviour cannot be both a cognitive explanation and an associative explanation at the same time. (1)	☐	☐	☐	☐	☐
An explanation for a behaviour must be cognitive or associative, it cannot be neither . (2)	☐	☐	☐	☐	☐
Whether an explanation for a behaviour is cognitive, associative, both, or neither depends on the behaviour in question. (3)	☐	☐	☐	☐	☐

End of Block: Questions on exclusivity and exhaustivity

Start of Block: Questions on parsimony



Q14 How often are these statements the case?

	Never (6)	Rarely (7)	Sometimes (8)	Often (10)	Always (11)	Not sure (12)
Associative learning is simple (1)	☐	☐	☐	☐	☐	☐
Cognition is complex (2)	☐	☐	☐	☐	☐	☐
Explanations of animal behaviour in terms of association are simpler than those in terms of cognition (3)	☐	☐	☐	☐	☐	☐
Associative learning should be the default explanation for how an animal behaves (4)	☐	☐	☐	☐	☐	☐

Page Break

Q34 What does Morgan's Canon mean to you? (Please be as detailed as you like)

Page Break

Q36 Morgan's original (1903) Canon stated that: "In no case is an animal activity to be interpreted in terms of higher psychological processes if it can be fairly interpreted in terms of processes which stand lower in the scale of psychological evolution and development."

Does Morgan's Canon have a modern interpretation?

- ☐ Yes (1)
- ☐ No (2)
- ☐ Not sure (5)

Display This Question:

If Morgan's original (1903) Canon stated that: "In no case is an animal activity to be interpreted i... =
Yes

Or Morgan's original (1903) Canon stated that: "In no case is an animal activity to be interpreted i... =
No

Q38 Please explain why you think Morgan's Canon does/does not have a modern interpretation

Q35

To what extent do you agree with the following statements about Morgan's Canon?

	Strongly disagree (1)	Disagree (2)	Neither agree not disagree (3)	Agree (4)	Strongly agree (5)	Not sure (6)
'Lower processes' are more common across the animal kingdom (1)	☐	☐	☐	☐	☐	☐
'Higher processes' evolved more recently (2)	☐	☐	☐	☐	☐	☐
'Lower processes' are more evolutionarily conserved (3)	☐	☐	☐	☐	☐	☐
There is no hierarchy of processes (6)	☐	☐	☐	☐	☐	☐



Q15

To what extent do you agree with the following statements?

	Strongly disagree (38)	Disagree (44)	Neither agree nor disagree (45)	Agree (46)	Strongly Agree (47)	Not sure (39)
Morgan's Canon, as you understand it, is useful for interpreting results in animal research (1)	☐	☐	☐	☐	☐	☐
Associative learning is a lower process (2)	☐	☐	☐	☐	☐	☐
Cognition is a higher process (3)	☐	☐	☐	☐	☐	☐
Morgan's Canon, as you understand it, is useful for coming up with control conditions for experiments (6)	☐	☐	☐	☐	☐	☐

End of Block: Questions on parsimony

Start of Block: Questions on the role of the distinction in scientific reasoning

Q16 Your day-to-day research

	Never (1)	Rarely (2)	Sometimes (3)	Often (4)	Always (5)	Not sure (6)
How often do you think about and apply Morgan's Canon, as you understand it? (1)	☐	☐	☐	☐	☐	☐
How often do you think about and apply an associative-cognitive distinction? (2)	☐	☐	☐	☐	☐	☐
How often do you use associative explanations as a 'null hypothesis'? (3)	☐	☐	☐	☐	☐	☐



Q17 To what extent do you agree with the following statements?

	Strongly disagree (18)	Disagree (19)	Neither agree nor disagree (20)	Agree (21)	Strongly agree (22)	Not sure (23)
An associative-cognitive distinction is useful for coming up with control conditions for experiments (1)	☐	☐	☐	☐	☐	☐
Falsifying an associative explanation for a particular behaviour is evidence for a cognitive explanation (2)	☐	☐	☐	☐	☐	☐
Falsifying a cognitive explanation for a particular behaviour is evidence for an associative explanation (3)	☐	☐	☐	☐	☐	☐
As more sophisticated associative models become available to explain behaviour, the less need there is	☐	☐	☐	☐	☐	☐

for cognitive
explanations
(even if they
are just as
explanatory)
(5)

Q18 Do you have any comments about the role an associative-cognitive distinction might play in your day-to-day research?

End of Block: Questions on the role of the distinction in scientific reasoning

Start of Block: Questions on the meaning of 'associative'

Q19 How is your understanding of the literature on associative learning?

- ☐ No understanding (1)
- ☐ Basic understanding (21)
- ☐ Good understanding (22)
- ☐ Excellent understanding (23)
- ☐ I have published papers on this topic (24)
- ☐ Other (please state) (26) _____

Display This Question:

If How is your understanding of the literature on associative learning? != No understanding

Q20 To contextualise the following questions, please read these sentences:

An animal solves a task via **associative learning**. This animal is **associative** or learns by association. **Associative** explanations account for the animal's behaviour in the task.

In your opinion, given the above context, what are the defining characteristics of an **'associative' explanation** of animal behaviour? (Please be as detailed as you like)

Display This Question:

If If To contextualise the following questions, please read these sentences: An animal solves a task vi... Text Response Is Displayed



Q21 'Associative learning' is:

	Never (6)	Rarely (7)	Sometimes (8)	Often (9)	Always (10)	Not sure (11)
Flexible (1)	☐	☐	☐	☐	☐	☐
Automatic (2)	☐	☐	☐	☐	☐	☐
Explicit (3)	☐	☐	☐	☐	☐	☐
Representational (4)	☐	☐	☐	☐	☐	☐
Symbolic (5)	☐	☐	☐	☐	☐	☐
Deterministic (6)	☐	☐	☐	☐	☐	☐
Intentional (7)	☐	☐	☐	☐	☐	☐
Intelligent (8)	☐	☐	☐	☐	☐	☐
Propositional (9)	☐	☐	☐	☐	☐	☐
Information-theoretic (10)	☐	☐	☐	☐	☐	☐
Computational (11)	☐	☐	☐	☐	☐	☐
Like a neural network (12)	☐	☐	☐	☐	☐	☐
Conditioning (13)	☐	☐	☐	☐	☐	☐

Display This Question:

If If To contextualise the following questions, please read these sentences: An animal solves a task vi... Text Response Is Displayed

Q22 Are there any other terms that you would use to describe 'associative' behaviour?

Display This Question:

If If To contextualise the following questions, please read these sentences: An animal solves a task vi... Text Response Is Displayed

Q23 To what extent do you agree with the following statement:

'Associative learning' is a well-defined theoretical concept

- ☐ Strongly agree (6)
 - ☐ Agree (7)
 - ☐ Neither agree nor disagree (8)
 - ☐ Disagree (9)
 - ☐ Strongly disagree (10)
 - ☐ Not sure (11)
-

Display This Question:

If If To contextualise the following questions, please read these sentences: An animal solves a task vi... Text Response Is Displayed

Q39 To what extent do you agree with the following statement:

'Associative' explanations of animal behaviour are becoming increasingly powerful

- ☐ Strongly agree (1)
 - ☐ Agree (2)
 - ☐ Neither agree nor disagree (3)
 - ☐ Disagree (4)
 - ☐ Strongly disagree (5)
 - ☐ Not sure (6)
-

Q24 Do you have any further comments on the topic of associative learning and its definition?

End of Block: Questions on the meaning of 'associative'

Start of Block: Questions on the meaning of 'cognitive'

Q41 How is your understanding of the comparative cognition literature?

- ☐ No understanding (1)
 - ☐ Basic understanding (21)
 - ☐ Good understanding (22)
 - ☐ Excellent understanding (23)
 - ☐ I have published papers on this topic (24)
 - ☐ Other (please state) (26) _____
-

Display This Question:

If How is your understanding of the comparative cognition literature? != No understanding

Q26 To contextualise the following questions, please read these sentences:

An animal solves a task cognitively. This animal is cognitive. **Cognitive** explanations account for the animal's behaviour in the task.

In your opinion, given the above context, what are the defining characteristics of a 'cognitive' explanation of animal behaviour? (Please be as detailed as you like)

Display This Question:

If If To contextualise the following questions, please read these sentences: An animal solves a task co... Text Response Is Displayed



Q27 'Cognition' is:

	Strongly disagree (30)	Disagree (31)	Neither agree nor disagree (32)	Agree (33)	Strongly agree (34)	Not sure (35)
Flexible (1)	☐	☐	☐	☐	☐	☐
Automatic (2)	☐	☐	☐	☐	☐	☐
Explicit (3)	☐	☐	☐	☐	☐	☐
Representational (4)	☐	☐	☐	☐	☐	☐
Symbolic (5)	☐	☐	☐	☐	☐	☐
Deterministic (6)	☐	☐	☐	☐	☐	☐
Intentional (7)	☐	☐	☐	☐	☐	☐
Intelligent (8)	☐	☐	☐	☐	☐	☐
Propositional (9)	☐	☐	☐	☐	☐	☐
Information-theoretic (10)	☐	☐	☐	☐	☐	☐
Computational (11)	☐	☐	☐	☐	☐	☐
Like a neural network (12)	☐	☐	☐	☐	☐	☐
Conditioning (13)	☐	☐	☐	☐	☐	☐

Display This Question:

If If To contextualise the following questions, please read these sentences: An animal solves a task co... Text Response Is Displayed

Q28 What other terms would you use to describe cognition or cognitive behaviour?

Display This Question:

If If To contextualise the following questions, please read these sentences: An animal solves a task co... Text Response Is Displayed

Q29 To what extent do you agree with the following statement:
Cognition is a well-defined theoretical concept

- ☐ Strongly agree (6)
- ☐ Agree (7)
- ☐ Neither agree nor disagree (8)
- ☐ Disagree (9)
- ☐ Strongly disagree (10)
- ☐ Not sure (11)

Q30 Do you have any further comments on the topic of cognition and its definition?

End of Block: Questions on the meaning of 'cognitive'

Start of Block: Final Questions

Q31 Thanks for completing this survey! Your participation is greatly appreciated!

☐

Would you like to receive any publications or conference proceedings that result from the data collected in this survey? (1)

☐

Would you be happy to be contacted in the future for further surveys on your attitudes towards topics in animal behaviour and cognition? (2)

Display This Question:

If Thanks for completing this survey! Your participation is greatly appreciated! = Would you like to receive any publications or conference proceedings that result from the data collected in this survey?

Or Thanks for completing this survey! Your participation is greatly appreciated! = Would you be happy to be contacted in the future for further surveys on your attitudes towards topics in animal behaviour and cognition?

Q32 Please provide the email address you would like to be contacted at:

End of Block: Final Questions
