1. Distinguish between innate and learned behaviour:

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| --- | --- | --- |
|  | **Innate** | **Learned** |
| Basis/ foundation? | *Genetic (predetermined)* | *Based on experience.* (1) |
| Modification by the individual? |  |  |
| Variation within population? |  |  |
| Effect of environment |  |  |
| Effect of **natural selection** |  |  |
| Human examples |  |  |
| Non-human examples |  |  |

1. **TOK and Biology:** To what extent are human behaviours innate or the product of learning?

Watch the video clip on [Facial Expressions from the California Academy of Sciences](http://www.youtube.com/watch?v=5G6ZR5lJgTI): (<http://www.youtube.com/watch?v=5G6ZR5lJgTI>)

1. What was the research question of the investigation?
2. What is the effect of the observer on lab-based studies of behaviour?
3. Why did the blind Olympians provide a good model for research?
4. What conclusions could be drawn in the study? Why?

Explain how innate behaviours are the product of *natural selection*.

1. Define *learning*.
2. Discuss how the process of learning can improve chances of survival, with reference to non-human examples.
3. Distinguish between these methods of associative learning:

*Classical conditioning*

*Operant conditioning*

*Imprinting*

1. Outline Pavlov’s experiments into classical conditioning, with reference to the terms *unconditioned stimulus, conditioned stimulus, unconditioned response* and *conditioned response*.
2. **Birdsong** is in part innate and in part learned behaviour.
3. Outline the function of birdsong with regard to *sexual selection*.
4. Distinguish between the innate and learned components of birdsong development.

Innate (*template song*)

Learned

1. Explain how *imprinting* is vital in the learned part of birdsong development.
2. Birds raised in captivity are not exposed to adult songs or regional dialects of their own songs. Explain why they will not be reproductively successful if released into the wild.
3. Suggest methods by which captive-reared birds might acquire fully-formed, regional adult birdsongs with help from their human keepers.

*Questions 12 and 13 taken from the QuestionBank CD Rom*.

1. Banded wrens (*Thryothorus pleurostictus*) are known to sing actively in defence of their territories during the breeding season. Males possess over twenty different song-types. When two males approach each other near a boundary they engage in counter-singing and some song-types will be shared. The following diagram shows the pattern of song-types used during an interaction between two males at their territorial boundary in the Guanacaste Conservation Area, Costa Rica. The arrows indicate when both males sang identical song-types in succession. The interaction ended without a fight when the males retreated from the boundary.



1. Identify which song-types are shared between both males.

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**(2)**

b. Describe the changes in the song-type pattern during the entire interaction.

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**(2)**

c. Deduce how a male banded wren can communicate aggressive behaviour.

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**(2)**

**(Total 6 marks)**

1. Two groups of 15 rats were trained to escape from an electric shock that was applied to one compartment of their cages. For one group (labelled EscD) the shock coincided with switching off the light, resulting in darkness in that compartment. The training was repeated for five sessions. The graphs below show the mean results for the two groups.



[Source: K. Zielinski and Savonenko, (2000), *Acta Neurobiol. Exp*, **60**, pages 457-465]

(a) (i) Calculate the difference in escape times in session 1 between the two groups.

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**(1)**

(ii) Suggest a reason for the difference.

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**(1)**

(b) (i) Compare the changes in escape times over the five sessions between the two groups.

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**(2)**

(ii) Deduce, giving a reason, which group shows more evidence of learned behaviour.

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**(1)**

(c) If the researchers were to continue their experiments with the group Esc and apply the same experimental conditions as for the group EscD, predict what would happen to the escape times for the group Esc.

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**(1)**

**(Total 6 marks)**