

EVOLUTION, BEHAVIOURAL ADAPTATION AND LEARNING

Elizabeth Gaffan

6 September 2006

Part 1

1. What does the lecturer outline in her introduction?
2. Why do species change?
3. List some of the examples of individual differences within a species.
4. What is the process of natural selection?

Part 2

5. How did environmental change during the Industrial Revolution increase the proportion of black moths in relation to white moths?
6. Why has the peacock's tail evolved and become larger?
7. Besides structure, what else is necessary to increase fitness? Give an example mentioned by the lecturer.
8. What is a main behavioural difference between the chicks of the kittiwake and other gull chicks, and why?

Part 3

9. What is 'the inherited behaviour'? What does the lecturer say about inherited adaptation and the environment?
10. The lecturer says that learning is not necessarily adaptive. Why is it so?
11. What is a 'precocial species'? List some examples.
12. What are 'ultricial species'? Do the parents of this species need to recognise their children?

Part 4

13. How do the parents of precocial species recognise their offspring?
14. How are kittiwakes different from other gulls?
15. What example of structural adaptation does the lecturer mention?

Part 5

16. What is 'imprinting'? What is the example mentioned by the lecturer?

17. What is the characteristics of imprinting?
18. What will happen if the young birds are separated from their parents during the sensitive period?
19. When Conrad Lorentz hatched young goslings out in an incubator, how did the young chicks treat him?
20. Why did the lecturer scream?

Part 6

20. What did the lecturer predict would happen if she repeated the screaming over and over again?
21. Explain what happened to the marine worm *nyearus* when they were presented to a moving shadow.
22. Then what happened to nyreaus when they were given 'mechanical shock'?

Part 7

23. What is food neophobia?
24. Why do young birds hide when they see hawks flying over when they see adults birds of their own species? Explain it from the habituation point of view.
25. What did Schleight, a German biologist, find in his experiment?

Part 8

26. Why is habituation adaptive? What explanation does the lecturer suggest?
27. What is associative learning? Give one example of associative learning which the lecturer mentioned.

Key

1. The lecturer will talk about the concepts of evolution and fitness. She will talk about adaptation; how animals are adapted to their environment. She will also talk about differences in species and two aspects of learning - habituation and associative learning.
2. Because they need to adapt to the environment in which they live.
3. Different hair colours, height, weight, etc.

4. The process by which individuals who compete more successfully in an environment will have more offspring. They will have more surviving other relatives, because those other relatives will share the same characteristics.
5. During the Industrial Revolution in the 19th century in England a number of factories produced a lot of smoke and soot. Trees which used to be white became black and walls which used to be light-coloured became black. Therefore those moths which were less visible on the black trees survived better because they are less likely to be eaten by birds. So the proportion of black moths got larger.
6. To be more attractive to female peacocks so that it will mate successfully and have more offspring.
7. Behaviour. The evolution of the structure will only be successful if there is an evolution of the behaviour as well. For example, black moths can survive better only if they stay still. Similarly, the peacock needs to show his larger tail to the female peacocks.
8. While other gull chicks walk around, kittiwake chicks stay in the nest. This is because kittiwakes make a nest on the cliff, unlike other gulls, and if the kittiwake chick walked, it would fall and would not live to reproduce.
9. It means that young members of a species inherit the behaviour from their parents. They don't have to learn it. Inherited adaptation only works when the environment is stable.
10. In order to learn to adapt it may take a long time. The young members of a species are vulnerable during that time and may not survive very long if the learning takes a long time.
11. The young animals can move soon after they are born or hatched. Gulls, sheep and horses are examples of such species.
12. The young animals of this species can't move around when they are born. The parents keep the young in the safe place where they can find them. They need to learn where their nest is but they do not need to recognize their children.
13. They learn to recognise their offspring by their appearance, sound or smell.
14. Unlike other gulls, kittiwakes do not need to recognise their offspring because their offspring live in a nest. If they didn't stay in the nest they would not survive. If you put a strange bird in the nest, the kittiwake would not realise it was not its own.
15. All the gull chicks (except kittiwake chicks) look different from each other. Some have brown and white spots, for example. This makes it easier for the parents to learn which ones are their own chicks.

16. It is a learning process seen in precocial young. The example is that young geese very quickly learn to recognise and follow their own parents, even on a river with other geese.
17. It takes place very rapidly and at a very specific early stage in life, as offspring and parents need to recognise each other very quickly.
18. They will not learn to recognise their parents easily.
19. The young chicks treated him as their parent.
20. Because she wanted to demonstrate what habituation/dishabituation was. The students reacted in various ways because the scream was a highly unexpected stimulus.
20. The students would stop reacting to it, because it would become familiar and unsurprising.
21. They first became defensive because it was a novel stimulus and hid in the sand. As they were presented with the same shadow repeatedly they were less and less likely to hide.
22. The yearlings now started hiding because it was a different stimulus. It took a much longer time for them to get habituated compared to the case of 'a moving shadow'.
23. It's an example of habituation/dishabituation. When animals are given a novel food, they are first cautious and don't eat very much of it. This is food neophobia. When the food becomes familiar to them, the animals no longer avoid eating it and are happy to eat it.
24. The young birds are used to seeing adults birds of their species flying over (ie. they are habituated), and so they don't hide in the nest. In contrast, these young birds are not used to seeing a hawk flying overhead (ie. they are not habituated) so they hide themselves.
25. He found that, as he had expected, the young which had a lot of exposure to hawks habituated to hawks and became less likely to hide, whereas they hid occasionally from their own species. However, Schleich also found that the young birds habituated much more easily to their own species than they did to hawks.
26. She says that habituation must be adaptive because we have seen that it happens in every species. Animals react to novel stimuli in various ways to help them deal with them. But once the event is familiar and it loses its interest, the species can get on doing other behaviours which are more important.
27. It is learning about the consequences of events. It is learning when one event predicts another or has a significant consequence. For example, a certain food you eat makes you ill. You will respond in a particular way to this food because you know if you eat it again it may have bad consequences.