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A2 Biology OCR

Unit F215: Control, genomes and environment

Module 4.3 Animal behaviour

Notes & Questions

Explain the advantages to organisms of innate behaviour.

- Behaviour
 - An animal response to a stimulus
- Innate behaviour
 - Occurs without the need for learning
 - Rapid response
 - involuntary
 - Inherited response
 - Similar in all members of the same species = Stereotyped
 - Always performed in the same way in response to the same stimuli
- Innate behaviours enable organisms to escape danger, locate and remain in suitable habitats, and locate food
- Innate behaviours are important for invertebrates because they;
 - Have short life spans
 - Live solitary lives
 - Do not take care of their offspring
- Innate behaviours are also important for all animals including humans

Describe escape reflexes, taxes and kineses as examples of genetically-determined innate behaviours.

- Reflexes – Escaping predation
 - Example; earthworms withdrawing down their burrow in response to vibrations
 - Example: spinal reflexes in humans
- Kinesis – Non-directional movement
 - Behaviour which increases in organisms movement when in unfavourable conditions
 - Response changes rate of movement
 - Example: woodlice in bright/dry = move faster
 - Example: woodlice in damp/dark = move slower/stop
- Taxes – Directional orientation response
 - Positive _____taxis = movement towards stimuli
 - Negative _____taxis = movement away from stimuli
 - Chemo = chemical
 - Photo = Light

- Example: Nematode worms have chemoreceptors in their lips. They move their heads from side to side to monitor chemicals strength in the air.
- Complex Innate Behaviours
 - Waggle dance of the bee

Explain the meaning of the term *learned behaviour*.

- Learned behaviour
 - Can be adapted with learning and experience
 - Can be adapted to new situations
 - Voluntary
 - Not inherited
 - Shows variation between individuals
- Learned behaviours are important for humans because they;
 - Have longer life spans
 - Care for their offspring
 - Live in social groups
- The advantage of learned behaviour over innate is its adaptability to respond to changing environments and circumstances.

Describe habituation, imprinting, classical and operant conditioning, latent and insight learning as examples of learned behaviours.

- Habituation
 - Animals can ignore certain stimuli, from repeated exposure to the stimuli providing neither punishment nor reward
 - E.g. Sleeping near railway tracks
- Imprinting
 - Young animals becoming associated with other organisms within a sensitive or receptive period.
 - E.g. Seen in baby goslings
- Classical Conditioning
 - Animals learn to relate a pair of events
 - Respond to the first in anticipation of a second = two stimuli
 - A conditioned response stimulated by a stimulus that does not naturally bring about that response.
 - Passive and involuntary
 - E.g dogs salivating at the sound of a bell being rung

- Operant Conditioning
 - 'Trial & Error'
 - Stick and carrot to reinforce learning of an operation = one stimulus
 - Associative learning
 - Repetition
 - Active and voluntary

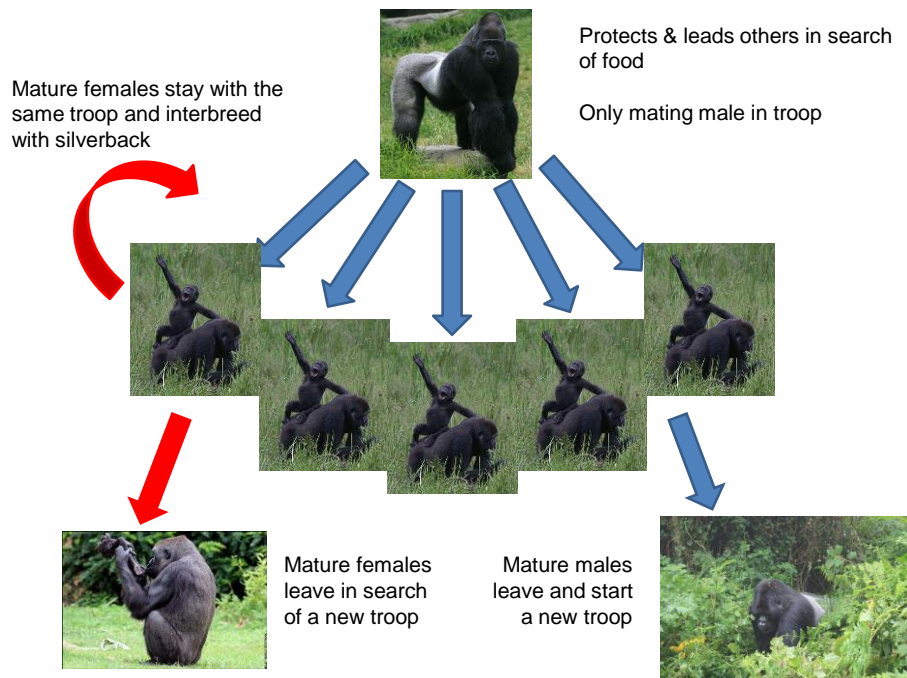
- Latent Learning
 - Animals explore their environment and retain information that is not immediately useful but will help inform future scenarios
 - E.g young rabbits investigate areas around their burrows which when under threat will help them escape predation

- Insight Learning
 - Highest form of learning
 - Ability to think and reason to solve problems

Describe, using one example, the advantages of social behaviour in primates.

- **Primates are Apes, Monkeys and Lemurs**
 - Live in family groups
 - Show Hierarchy within the group
 - Have large brains in relation to their body size – Highly developed cerebral cortex

- **Group organisation in Gorillas**



- **Primate behaviours**

- **Grooming**

- Picking parasites out of another's fur
- Reinforces relationships



- **Large groups**

- Greater ability to see danger
- Deters predators
- Passing on of knowledge
- Protection of food sources



- **Care of Offspring**

- 1 – 5 months
 - Constant contact with mother
- > 12 months
 - Can wander up to 5 metres
 - Learns social skills
- > 2 years
 - Play together
 - Imitate adults foraging
- 3 – 6 years
 - Silverback teaches skills



- **Communication systems**

- **Signal danger and issue threats by**
 - **Calls**
 - **Displays**
 - **Grunts**
- **Facial expressions - recognition**



Discuss how the links between a range of human behaviours and the dopamine receptor DRD4 may contribute to the understanding of human behaviour.

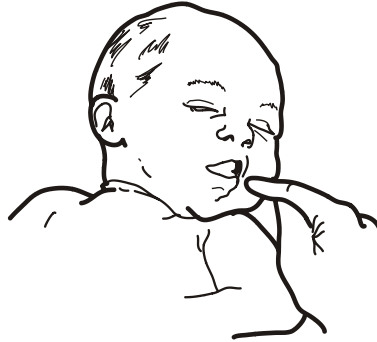
- **Dopamine**
 - Hormone & Neurotransmitter
 - Precursor for adrenaline & Noradrenaline
 - Increases
 - Arousal
 - Creativity
 - Decreases
 - Inhibition
 - High levels lead to schizophrenia
 - Low levels leads to Parkinson's disease
 - Can be treated with L-dopa
 - L-dopa is linked to gambling and other addictions
 - There are 5 different dopamine receptors
 - DRD1 – DRD5 each coded by a different gene
- **DRD4 Dopamine receptor gene**
 - There are 50 variants of this gene caused by a variable number of tandem repeats
 - These variants affects
 - Dopamine levels in the brain
 - Dopamine action in the brain
- **Conditions linked to DRD4 Dopamine receptor**
 - **1: Attention Deficit Hyperactivity Disorder (ADHD) – Low Dopamine levels**
 - A certain variant of the DRD4 is linked to ADHD
 - Ritalin increases dopamine levels in the brain
 - **2: Addictive & Risk taking behaviours**
 - Certain variants of DRD4 receptor is linked to addictive behaviours such as smoking and gambling
 - A study proved this with two test groups
 - Test group 1 took **L-Dopa** (increases dopamine levels in the brain)
 - Test group 2 took **Haloperidol** (decreases dopamine levels in the brain)
 - The two groups showed large differences in
 - Level of arousal
 - Level of risk taking

- **Serotonin & Obsessive Compulsive Disorder (OCD)**
 - Low serotonin levels are linked to OCD

Questions

1

If the cheek of a newborn baby is brushed with a finger, as shown in the figure below, the baby will turn its head towards the finger.



Describe the type of behaviour shown by the baby and suggest an advantage of this response.

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.....

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[Total 4 marks]

2

Classical conditioning concerns learning by association and was discovered by the Russian scientist Ivan Pavlov, using dogs.

A study was carried out on a group of people to test classical conditioning.

- Each person was given a slight electric shock on the hand, which caused the arm to be jerked back.
 - The procedure was carried out again but this time a red light was shone just before the electric shock was applied.
 - This was repeated many times.
 - Eventually, when presented with a red light, most people withdrew their

arms even though a shock was not applied.

For **this** study state precisely:

- (i) the conditioned stimulus
- (ii) the conditioned response

[Total: 2 marks]

3

Operant conditioning was initially investigated by the scientist B.F. Skinner, using rats.

Explain briefly how a rat can learn to press a lever in its cage.

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.....
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.....
.....

[Total: 3 marks]

4

Reflex actions are unlearned responses to a stimulus.

Describe **one** advantage of reflex actions compared to learned responses in a mammal.

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.....

[Total 1 mark]

5

Reflexes are automatic, stereotyped responses to stimuli that can also be conditioned.

(a) Explain the meaning of the terms

- (i) *automatic*;

.....
.....

[1]

(ii) *stereotyped;*

.....
.....

[1]

(iii) *conditioned.*

.....
.....

[1]

(b) Describe **one** example of a reflex response to a **named** stimulus.

stimulus

.....

response

.....
.....

[1]

Fig. 1 shows a piece of apparatus called a puzzle box, used by Edward Thorndike to investigate operant conditioning in animals.

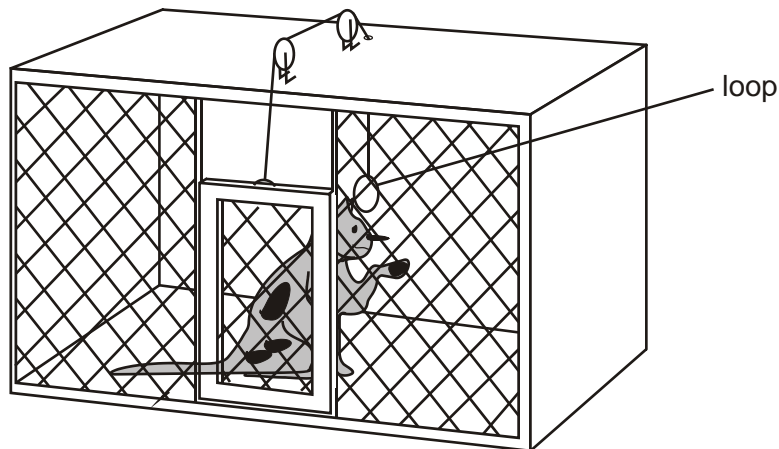


Fig. 1

During an experimental trial, a cat was placed inside the puzzle box. If the cat pulled the loop with its mouth or a paw, the door opened and it could escape. The time taken for the cat to escape was recorded. The experiment was then repeated several times with the same cat.

Fig. 2 shows a graph of the time taken for the cat to escape from the puzzle box during repeated trials.

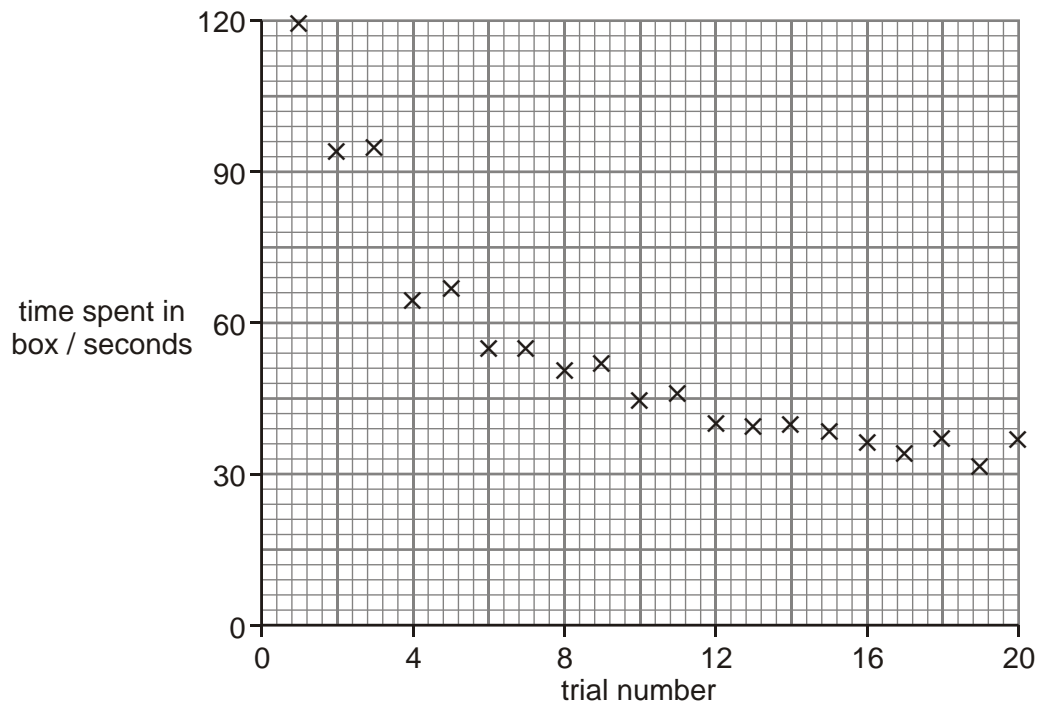


Fig. 2

- (c) In this question, one mark is available for the quality of spelling, punctuation and grammar.

Describe **and** explain the data shown in Fig. 2.

Include in your answer a reason why the type of learning shown by the cat is operant conditioning.

(Allow one line page)

[7]

Quality of Written Communication [1]

(d) State **two** differences between operant conditioning and classical conditioning.

1

.....

.....

2

.....

.....

[2]

[Total 14 marks]