

Cambridge AS & A Level · Psychology 9990 · Notes

Fagen et al. (elephant learning) AS

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What you need to know

Fagen et al. (2014) trained a small group of working elephants in Nepal to give a **trunk wash**, using rewards instead of traditional training. As with every AS core study, you should be able to:

1. **Explain the psychology being investigated: operant conditioning; reinforcement** of four kinds (positive, negative, primary, secondary); **shaping; behavioural chaining**.
2. **Give the background:** why a trunk wash is useful for captive elephants, and why reward-based training was being tried as an alternative to traditional methods.
3. **State the aim.**
4. **Describe the procedure and its methodology:** the research method (watching the elephants and ticking off what they did against a **behavioural checklist**: an observation), the sample and how it was chosen, the reinforcers, the training techniques (luring, shaping, capturing, chaining), the trained behaviours, and how success, session time and difficulty were measured.
5. **Discuss the ethical issues**, using the guidelines for **animals**, not the human ones.
6. **Give the results:** who passed the full trunk wash, how many sessions it took, how success changed over time and which tasks were hardest.
7. **State the conclusions** that were or could be drawn.
8. **Evaluate every part of the study:** method, sample, data, observation, validity, reliability, generalisability and ethics.
9. **Relate it to the AS issues and debates:** application to everyday life, individual and situational explanations, nature versus nurture and the use of animals in research. No children were used.
10. **Explain why it belongs to the learning approach**, using the approach's two assumptions, and compare it with the other learning core studies, Bandura et al. and Saavedra and Silverman.

Understand it

The psychology: operant conditioning

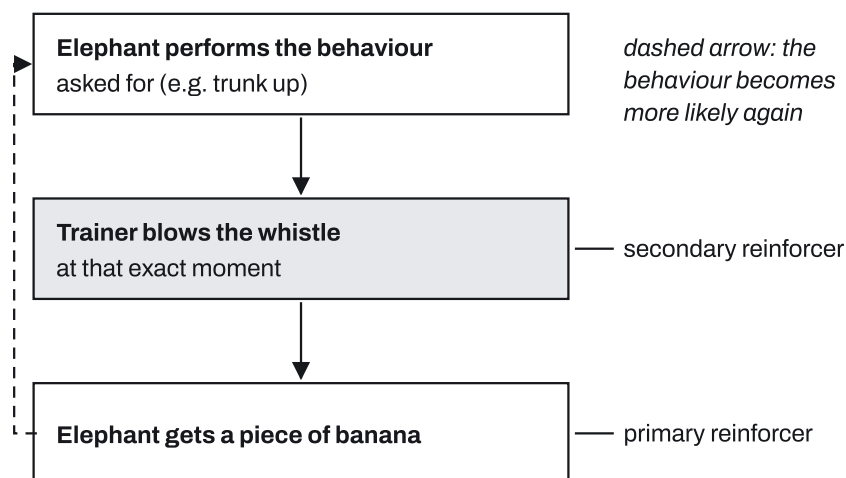
Operant conditioning is learning from what happens **after** a behaviour. If an action is followed by something good, the animal or person becomes more likely to do it again; if it is followed by something bad, they become less likely to.

Reinforcement is anything that makes a behaviour **more** likely to happen again. It comes in four kinds:

Kind	What it means	Example
Positive reinforcement	Something pleasant is added after the behaviour, so the behaviour becomes more likely	An elephant lifts her trunk when asked and is handed a piece of banana
Negative reinforcement	Something unpleasant is taken away after the behaviour, so the behaviour becomes more likely	A driver fastens a seatbelt and the beeping alarm stops
Primary reinforcer	A reward that satisfies a biological need by itself, with no learning needed	Food, such as the banana in this study
Secondary reinforcer	Something with no value of its own that becomes rewarding because it is reliably followed by a primary reinforcer	The trainer's whistle in this study; money or tokens for people

Punishment is different: it makes a behaviour **less** likely. Fagen et al. used no punishment.

How the whistle became a reward



A banana takes a moment to hand over, and by then the elephant may have moved. The whistle can be blown at the **exact instant** the right behaviour happens. Because a banana piece always follows the whistle, the elephant learns that the sound means "that was right, food is coming". The whistle becomes rewarding in its own right: a **secondary reinforcer**. Training like this is called **secondary positive reinforcement**.

Building a behaviour step by step

The full trunk wash is too complicated to wait for. The trainers built it from parts using four techniques:

- **Luring**: placing a reward so that the only way to reach it is to make the wanted movement. For **trunk up**, banana pieces were held a few inches from the elephant's forehead, so she had to raise her trunk to get them. The adult's head was too high for that, so her trainer stretched out an arm and held the banana up at

full reach.

- **Shaping** (reinforcing **successive approximations**): at first any movement roughly like the target earns a reward; then the trainer only rewards attempts that come nearer to it. For trunk up, the trunk had to be lifted a little higher each time before the reward came.
- **Capturing**: letting a behaviour that the animal produces **naturally, of its own accord** earn a reward every time it turns up, until it comes on cue. **Blow** was captured: elephants breathe out through the trunk anyway, and the trainers rewarded that natural exhale.
- **Behavioural chaining**: linking several learned behaviours into a sequence, so that finishing one becomes the signal for the next. The trunk wash is a chain made from the separate behaviours below.

Background

Captive elephants have to be checked for **tuberculosis (TB)**, a serious disease, as part of their care. A **trunk wash** collects a sample from inside the trunk, and the elephant has to cooperate for it to work: offer the trunk, raise it, hold it still and then blow into a bucket. The study set out to show that reward-based training could teach this, as an alternative to traditional methods of training elephants, and in doing so help the management and welfare of captive elephants.

The aim

- To find out whether **positive reinforcement**, using a whistle and banana rewards, could train working elephants that had never had this kind of training to perform a **full trunk wash**, so that captive elephants could be managed and tested for TB more humanely.

The sample

Feature	Detail
Size	5 elephants
Sex	All female
Age	4 juveniles aged 5 to 7 years; 1 adult in her 50s
Where from	All from the same stable in Nepal (working elephants in captivity)
The adult	Had impaired vision, a foot abscess and weakness in her trunk

Each elephant was chosen because she:

- was **docile** (calm and easy to handle);
- was **not pregnant** and had no calf;
- had a **mahout** (her own handler) who was willing to take part;
- had been trained before only by **traditional methods**;
- had **no previous experience of secondary positive reinforcement**.

The trained behaviours

Each behaviour was **operationalised**: it had a precise definition, so the observers knew exactly what counted.

Behaviour	What the elephant had to do
Trunk here	The trainer holds out a hand; the elephant lays the very end of her trunk (the distal end) softly in it, and the trunk's lower surface (the ventral side) must make contact with that hand too
Trunk up	Raise the trunk into the air
Steady	Keep the trunk still in whatever position had just been asked for; she was free to move her head, ears or feet
Trunk down	The trunk is relaxed and dangles freely, not held in any position
Bucket	A behaviour involving the bucket, one link in the trunk-wash chain
Blow	Captured from the elephant's own natural exhale
Blow in bucket	The blow, aimed into the bucket
Trunk wash	The whole sequence, chained together

The research method and what was measured

The researchers did not set up conditions to compare; they watched and recorded, so the method was an **observation**. Because each elephant's responses were ticked off against a **behavioural checklist** of defined behaviours, it counts as a **structured observation**. The data were mostly **quantitative**:

- **Performance tests**: to pass a behaviour, the elephant had to respond correctly to at least **80%** of the cues given.
- **Number of offers (cues)**: how many times a cue had to be given before the elephant passed a test.
- **Relative difficulty** of each task: for each elephant, every offer it took her to pass that task's test was counted into a **total**; the **mean** of these totals across the elephants gave the task's difficulty. The higher the mean, the harder the task.
- **Session times**: measured in whole minutes (to the **nearest minute**) by an assistant, with the clock running from the first cue until the elephant answered the final cue.
- **Sessions to pass**: how many training sessions each elephant needed before passing the full trunk wash.
- **Percentage success** on trunk washes over the sessions.

There was some **qualitative** data too, for example the early observation that one elephant preferred drinking **saline** to water.

There was **no fixed length** for the training: each elephant moved on when she was ready, because elephants learn at different speeds. Each trainer was familiar with the animal in their care and could set the pace to suit her, and training had to go back a step for the elephant whose taste for saline over water came to light.

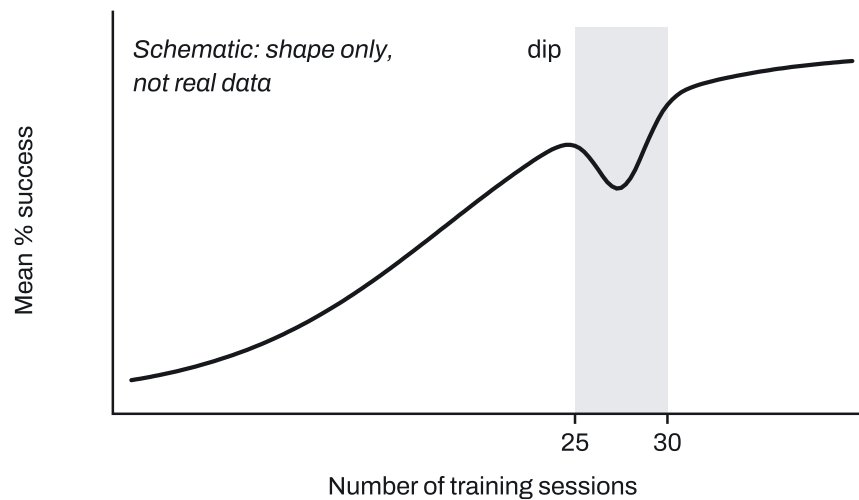
Ethical issues (guidelines for animals)

Animal research is judged against its own guidelines from the syllabus: **minimising harm** (and maximising benefit), **replacement**, **species**, **numbers**, and **procedures** (pain, suffering and distress; **housing**; **reward**, **deprivation and aversive stimuli**). Human guidelines such as informed consent and the right to withdraw **do not apply**.

Guideline	In this study
Minimising harm	Only rewards were used, never punishment; no elephant was forced to stay in a session, since she was free to leave it; and banana was an extra, because between sessions food and water were never withheld (kept). But the only route to a banana was doing what was asked, and that pressure could have upset some elephants (arguable)
Maximising benefit	A trunk wash helps with TB management in captive elephants (kept)
Species	Elephants were the species that needed the trunk wash, so no other animal would do (kept)
Numbers	Only 5 elephants took part, keeping the number of animals used low (kept)
Replacement	The aim was to train elephants, so no non-animal method could replace them (kept)
Housing	For some hours each day a chain held each elephant to a post by one leg, which restricts where she can go and whom she can be with (arguably broken)
Reward, deprivation	Banana was a reward, and the elephants were not starved to make them want it (kept)

The results

- **Four** elephants passed the full trunk wash: all four juveniles, within **25 to 35** sessions.
- **Elephant 2** was the fastest, passing after **25** sessions; **Elephant 1** needed **30**.
- **Elephant 5**, the adult, **never passed** the full trunk wash. Her poor eyesight, foot abscess, trunk weakness and age may all have played a part, and a calf from the neighbouring stable kept coming over and interrupting her training.
- Averaged over the elephants, the share of trunk washes done correctly **kept climbing as training continued**, though it **fell back for a while somewhere in sessions 25 to 30**. (The mark scheme accepts approximate figures of about 36% rising to about 86%.)
- Some tasks needed many more offers than others before they were passed, so the tasks differed in **relative difficulty**.
- Distractions such as **tourists** slowed training down.



The conclusions

- **Secondary positive reinforcement works with elephants:** a whistle paired with banana, plus luring, shaping, capturing and chaining, taught working elephants with no experience of this training a full trunk wash.
- **There is a humane alternative to traditional elephant training,** which can make captive elephants easier to manage and test for TB.
- **Older animals with health problems may find this training harder,** so the method may need adapting for them.

A **result** is something that was measured ("Elephant 2 passed after 25 sessions"). A **conclusion** is a general claim the results support ("rewards can be used to train elephants").

Why it is from the learning approach

The learning approach rests on two assumptions (syllabus), here in plain words:

- **The blank slate:** no one starts life already knowing how to behave; experience and the environment mould behaviour, and the changes can be seen and recorded.
- **Three ways of learning:** behaviour is acquired through **operant conditioning**, **classical conditioning** and **social learning**, each of which can be described as a **stimulus** leading to a **response**.

Fagen et al. fits the second: the elephants learned new behaviours because of their **consequences** (whistle and banana), which is **operant conditioning**. It fits the first too: none of the elephants could do a trunk wash before, and the change came from the training they experienced, measured on a checklist. The whistle also shows **classical conditioning** at work: by being paired again and again with banana, a neutral sound came to mean food.

Issues and debates

- **Application to everyday life:** training zoo and working animals for health checks without force; teachers and parents rewarding each small step of a new skill; token systems in classrooms.
- **Individual and situational explanations:** the **individual** side puts the cause of behaviour down to something about the animal or person **themselves**, such as age, health or personality. Example: the four juveniles passed but the older elephant, with poor eyesight and a sore foot, did not; and the juveniles passed after different numbers of sessions. The **situational** side puts the cause down to the **setting** and what happens around them. Example: the elephants learned because they were rewarded with banana each time; the calf from the next stable and the tourists disrupted training.
- **Nature versus nurture:** mainly **nurture**, because the trunk wash was learned through experience. The **nature** side can point to natural behaviours, such as breathing out through the trunk, which training simply captured.
- **The use of animals:** elephants could be trained for a task humans could not be, and the findings help the animals themselves; but what works with elephants may not work with people, and captive animals cannot agree to take part.

Comparing with the other learning studies

Point	Fagen et al.	Bandura et al. (aggression)	Saavedra and Silverman (button phobia)
Method	Observation (structured, with a behavioural checklist)	Laboratory experiment, data collected by observation	Case study
Data	Quantitative (offers, sessions, % success)	Quantitative (counts of each behaviour)	Mainly qualitative (interviews), plus scales
Learning process	Operant conditioning (secondary positive reinforcement, shaping, chaining)	Social learning (observation and imitation)	Classical conditioning and evaluative learning (disgust)
Participants	5 elephants	72 children	One boy

Key facts and formulas

There is no formula list in the 9990 exam. "Learn it" means you must remember it.

Fact	Status
Fagen et al. sample: 5 female elephants from one stable in Nepal; 4 juveniles aged 5–7 years and 1 adult in her 50s	Learn it
Fagen et al. selection: docile; not pregnant, no calf; mahout willing to take part; trained only by traditional methods; no experience of secondary positive reinforcement	Learn it

Fact	Status
Fagen et al. reinforcers: primary = banana; secondary = whistle	Learn it
Fagen et al. techniques: luring (trunk up), shaping (trunk up, raised higher each time), capturing (blow, from a natural exhale), behavioural chaining (the trunk wash)	Learn it
Fagen et al. results: 4 juveniles passed the full trunk wash within 25–35 sessions (Elephant 2 in 25, Elephant 1 in 30); the adult never passed; average success climbed over the sessions but fell back for a while in sessions 25–30	Learn it
Fagen et al. performance test pass mark: at least 80% of cues answered correctly	Learn it
Relative difficulty = mean, across the elephants, of the total number of offers each needed to pass a task's test	Learn it
Percentage correct = $\frac{\text{correct responses}}{\text{cues given}} \times 100$	Learn it

How to do it

We have tagged 17 questions on this study, from 2024 to 2026 (Papers 1 and 2). 8 of them have parts of more than one type, so the counts add up to 26.

Question type	Questions
Define a learning term with a Fagen example	6
Describe a trained behaviour, technique or measure	4
Outline a result	3
Apply a research-methods idea to Fagen	3
Ethics and the use of animals	2
Individual and situational explanations	2
Describe the sample	2
Compare Fagen with another learning study	2
Evaluate in 10 marks: two strengths and two weaknesses	1
Advice in a scenario	1

1. Define a learning term with a Fagen example (6 questions)

Terms asked so far: positive reinforcement, shaping, the capture technique, the primary and secondary reinforcer, and "the psychology being investigated".

1. **Define the term in general words**, one point per mark, without repeating the term itself.
2. **Add one example from Fagen et al.**, naming the reward **and** a specific behaviour. Examples from anywhere else earn nothing when the question says "from the study".

Variations you will meet:

- **Positive reinforcement** (2–3 marks): the learner gains something pleasant as a consequence of an action (1), so the chance of that action happening again goes up (1); example: an elephant got a piece of banana when she did trunk here correctly (1). "Rewarded with banana" on its own is not enough for the example: say what for.
- **Shaping** (3 marks): rewarding **successive approximations** (1); each attempt that comes closer to the target is rewarded, and the standard rises step by step (1); example: banana given for lifting the trunk a bit higher each time until it was fully up (1). Explaining only how rewards work, with no "closer and closer" idea, scores nothing (March 2025 report).
- **Capture technique** (2 marks): the behaviour must arise **spontaneously**, with no prompt or lure (1), and it is **rewarded** whenever it occurs (1). The study's example: blow, rewarded from a natural exhale.
- **Identify the reinforcers** (1 mark each): primary = **banana**; secondary = **whistle**. "Food" or "a sound" on its own is not accepted.
- **The psychology investigated** (4 marks): in operant conditioning, what follows an action decides whether it is learned; a reward makes the action likelier and a punishment makes it rarer; a primary reinforcer satisfies a basic biological need; a secondary reinforcer only becomes rewarding through repeatedly coming before a primary one; shaping and chaining. Only one mark can come from a Fagen example. Classical conditioning is ignored here.

2. Describe a trained behaviour, technique or measure (4 questions)

These lists are definitive: learn the table under "The trained behaviours" word for word in meaning.

- **Trunk here** (2 marks): the end of the trunk rests lightly in the trainer's open hand (1), with its lower (ventral) surface in contact with the hand too (1).
- **Steady** (2 marks): the trunk stays motionless (1), kept wherever the last command put it (1); the rest of the body, such as head, ears or feet, is allowed to move (1). "Had to hold still" earns nothing: say it is the **trunk**.
- **How trunk up was trained** (5 marks): lure and shaping used (1); a reward placed so the behaviour is the only way to reach it (1); banana pieces a few inches from the forehead (1); for the tall adult, held up at the trainer's full arm's reach (1); shaped by asking for more height each time until the trunk was fully up (1); banana or whistle named (1).
- **Why training had no fixed length** (2 marks): individual differences (1), linked to the study: elephants learn at different rates; when one elephant turned out to like saline better than water, her training had to go back a step; each trainer was familiar with their own elephant and set the pace for her (1).
- **How relative difficulty was measured** (2 marks): add up how many offers (cues) each elephant was given before she passed that task's test, a **total** (1), then find the **mean** of those totals over all the elephants (1). Saying just "the average number of offers" earns only 1.

- **How session times were measured** (specimen paper): an assistant did the timing, in whole minutes; the clock started at the first cue; it stopped once the elephant had answered the final cue.

3. Outline a result (3 questions)

- **A number** (1 mark): how many passed the full trunk wash: **4**. How many in the sample: **5** (or "4 juveniles and 1 adult").
- **Sessions to pass, with data** (3 marks): a meaningful comparison (2) plus correct data (1), for example "Elephant 2 passed in 25 sessions, fewer than Elephant 1, who needed 30", or "the juveniles passed within 25–35 sessions, while the adult never passed". No tolerance on the numbers.
- **Mean success over time** (2 marks): a trend with a comparison: "mean trunk-wash success climbed as training went on, so later sessions had a much higher success rate than early ones", or "success briefly fell back somewhere between session 25 and session 30". "They got better over time" alone is 1. Who passed, or how many sessions it took, does not answer this question.

4. Apply a research-methods idea to Fagen (3 questions)

Paper 2 takes a general idea and ties it to this study. Always link at least once to a Fagen detail.

- **A strength of structured observation** (2 marks): it improves **reliability** (1): two observers using the same checklist, with behaviours such as trunk up defined in advance, can check that they recorded the same thing (1). Or: the checklist tells observers exactly which behaviours matter, so nothing irrelevant an elephant does, such as flapping her ears, is recorded by mistake (1), which makes the data more valid (1).
- **Why the performance test might lack validity** (2 marks): question the **test**, not the elephants. An elephant could pass while getting one cue in five wrong (1), and the test recorded nothing about how badly those were missed, so a near miss and a total failure counted the same (1). Or: judging a response is partly subjective, so different observers might score the same response differently (1). Answers about the elephants' health or personality score nothing (March 2025 report).
- **Improving that validity** (1 mark): demand a higher pass mark, such as 90% or 100%; define each behaviour more precisely (for example, how high the trunk must be or which way it faces); have one observer, not involved in the training, judge all five elephants.
- **Qualitative data** (1 mark): detailed, descriptive data ("in words" alone scores 0). **Quantitative data** (2 marks): numerical data, such as counts or totals (1), plus a Fagen example: session time, number of cue offers, or percentage success on a task (1).

5. Ethics and the use of animals (2 questions)

- **Ethical or not** (two friends, 4 marks): pick one side. Name an **animal** guideline (1), then explain how the study kept or broke it with evidence (up to 3). **Ethical**: numbers (only 5 elephants); species (elephants were the animals that needed a trunk wash for TB); minimising harm (free to leave a session, no punishment, food and water never withheld between sessions). **Not ethical**: housing (a leg chain tied each

elephant to a post for some hours a day, which restricts her movement and social contact); minimising harm (the only route to a banana was doing what was asked, and that pressure could have upset some elephants).

- **Human guidelines score nothing:** informed consent, and right to withdraw, are human guidelines. An elephant walking away counts as minimising harm, not right to withdraw (March 2025 report).
- **How the elephants' size affected the study** (2 marks, one per way): the study needed a huge area to work in; an elephant could injure a trainer by accident, so safety mattered at every step; there was no way to confine one in a cage while testing; moving and controlling an animal that heavy is much harder than with lab animals such as rats. Do not say their size stopped them doing the tasks: it didn't (March 2026 report). How much elephants eat is not about the study.

6. Individual and situational explanations (2 questions)

1. **Define each side without repeating its name:** individual = the cause lies in the animal or person themselves, such as their age, health or temperament (1); situational = the cause lies in the setting, in what is going on around them (1). "Individual differences" or "it depends on the situation" earns nothing.
2. **Give Fagen examples on the right side** (1 each):
 - **Individual:** the juveniles needed different numbers of sessions (Elephant 2 in 25, Elephant 1 in 30); the adult never passed, perhaps because of her age, poor eyesight, foot abscess or trunk weakness.
 - **Situational:** the elephants learned because training rewarded them with banana every time; behaviours were shaped by the trainers; the calf from the next stable interrupted the adult's training; tourists distracted the elephants.
3. If you pick one side ("two friends"), stay on it; mixing up who said what caps the answer at 2. Number the elephants: an un-numbered "one elephant was faster" is credited only once.

7. Describe the sample (2 questions)

One mark per point, from a definitive list: 5 elephants; all female; from the same stable in Nepal; 4 juveniles aged 5–7; 1 adult in her 50s; the adult had a foot abscess and poor eyesight; selected for docility; not pregnant, no calf; the mahout was willing to take part; trained only by traditional methods; no previous secondary positive reinforcement training. "In captivity" is accepted.

- **Selection criteria** (2 marks, one each): docility; not pregnant or with a calf; a willing mahout; trained traditionally; no experience of secondary positive reinforcement. "Healthy", "Nepalese" or "untrained" are **not** accepted.

8. Compare Fagen with another learning study (2 questions)

8 marks: a similarity (Level 1–4) and a difference (Level 1–4). Level 4 needs the point **explained** with an example from **both** studies.

- **Similarity with Bandura et al.:** both collected data by observation of operationalised behaviours. In Fagen et al., each trunk position on the checklist, such as trunk down, had its own exact definition; in Bandura et al., categories such as mallet aggression (hitting something other than Bobo with the mallet)

were defined before anyone was watched. Precise definitions mean observers record the same thing, which improves reliability. Both also collected quantitative data and both studied learning from consequences or models.

- **Difference with Bandura et al.:** method (Fagen was an observation, not an experiment: there was no comparison of conditions); or learning process (operant conditioning with direct rewards versus social learning by watching a model).
- **Difference with Saavedra and Silverman:** quantitative versus mainly qualitative data; observation versus case study; operant versus classical conditioning.
- Often banned or low: "different species" or anything about the sample, "different aims" (Level 1), "both from the learning approach" (Level 2). Do not call Fagen a field experiment: it scores 0.

9. Evaluate in 10 marks: two strengths and two weaknesses (1 question)

The named issue so far has been quantitative data.

1. **Plan four points of equal depth**, one on the named issue; leaving it out caps the answer at Level 3.
2. For each: name it, say strength or weakness, give **at least two** Fagen details and explain **why** it matters.
3. Don't describe the procedure for its own sake. Low demand characteristics "because they were elephants" is not credited.

Point	Strength or weakness	Evidence from the study
Quantitative data	Strength	Offers to pass, sessions to pass and % success can be compared across the five elephants and across tasks, objectively
Standardisation (reliability)	Strength	Every behaviour had a set definition and every test had the same 80% pass mark, so the study could be repeated
Structured observation	Strength	A behavioural checklist kept observers on the listed behaviours and allowed agreement to be checked
Ethics	Strength	Only rewards, no punishment; free to leave a session; food and water never withheld; only 5 animals
Practicality of animals	Strength	Teaching an elephant a trunk wash could only be studied with elephants, and it benefits them directly
Sample (generalisability)	Weakness	Only 5 elephants, all female, from one stable, and just one adult, so results may not apply to other elephants, especially adults
Validity of the test	Weakness	An 80% pass mark leaves 20% of responses unknown; judging a response is partly subjective
Uncontrolled variables	Weakness	Tourists and a visiting calf disrupted training, and training length varied, so not every difference came from the training method
Ethics	Weakness	A leg chain held each elephant to a post for some hours a day; performing for food could be stressful

Point	Strength or weakness	Evidence from the study
Quantitative data	Weakness	Numbers show how fast an elephant learned but not why one struggled, which needed qualitative notes (such as the saline preference)

10. Advice in a scenario (1 question)

Someone (a teacher, coach or parent) needs to teach a skill made of steps. Give advice based on the study (one mark per piece), then, if asked, a reason.

- Advice** (4 marks): reward each correct step with something the learner wants (a **primary** reinforcer such as a snack); or use a **secondary** reinforcer, such as stickers or tokens that the learner later trades in for a treat or a privilege; **shape** the skill by first rewarding a rough try at the sequence, then only rewarding tries that are more accurate than before; teach each step on its own and reward it, then link the steps (**chaining**); **capture** useful behaviours the learner already does; never punish. Naming a technique without saying **how** to do it ("use chaining") scores nothing; classical conditioning and social learning are not credited.
- A reason** (2 marks): link it to part (a), using a finding or theory in full: "four juvenile elephants, taught step by step with whistle-and-banana rewards, ended up able to do the whole trunk wash, so building a skill in small rewarded steps works"; or "according to operant conditioning, children who get something they like after a correct step will want to do that step again". "It encourages them to repeat it" is worth 2; a bare "rewards motivate them" is 1.

Worked examples

Example 1

From the study by Fagen et al. (elephant learning):

- (a) Explain why the trainers blew a whistle the moment a behaviour was performed, before giving the banana. [2]
- (b) A sanctuary repeats the study. In a performance test for trunk up, an elephant responds correctly to 17 out of 20 cues. Using the pass mark from Fagen et al., state whether she passes, showing your working. [2]
- (a) Handing over banana takes time, so the reward could arrive after the elephant had moved on to something else; the whistle marks exactly which movement earned it (**1**). Because the whistle was always followed by banana, it became a **secondary reinforcer**, rewarding in itself, so the right behaviour was reinforced at the precise instant it happened (**1**).
- (b) $\frac{17}{20} \times 100 = 85\%$ (**M1**). The pass mark was at least 80%, and $85\% \geq 80\%$, so she **passes (A1)**.

Example 2

A wildlife park repeats Fagen et al. with three elephants. The total number of offers each one needed to pass two of the tests is shown below.

Elephant	Steady	Bucket
A	38	54
B	46	61
C	30	47

(a) Calculate the relative difficulty of each task, using the method from Fagen et al., and state which task was harder. [3]

(b) Explain one reason why relative difficulty was based on totals from all the elephants rather than one elephant. [2]

(a) Steady: $\frac{38 + 46 + 30}{3} = \frac{114}{3} = 38$ offers (**M1**). Bucket: $\frac{54 + 61 + 47}{3} = \frac{162}{3} = 54$ offers (**A1**). Bucket needed more offers on average, so **bucket was the harder task (1)**.

(b) Each elephant learns at her own pace, so one elephant's total could make a task look easy or hard just because of her (**1**). Averaging the totals evens out these individual differences, giving a fairer measure of the task itself, just as the juveniles in the study passed the trunk wash after different numbers of sessions (**1**).

Example 3

Dev volunteers at an animal shelter. Before each vet visit, a nervous dog has to sit, lift a front paw onto the vet's hand and keep it there while the claws are checked, but the dog keeps pulling away.

(a) Using your knowledge of the study by Fagen et al. (elephant learning), outline the advice you would give Dev. [4]

(b) Choose one piece of your advice and explain why it should work. [2]

(a) Dev could give the dog a small treat each time it does one part correctly, such as sitting when asked (**1**). He could click a clicker the moment the dog gets it right and always follow the click with a treat, so the click itself becomes rewarding (**1**). He could shape the paw lift by first rewarding a slight raise of the paw, then only rewarding higher lifts, until the paw rests on the hand (**1**). Once the dog can do each step alone, he could join them up, giving the treat only after the dog sits, lifts and holds the paw still in one go (**1**). He should never scold or punish the dog for pulling away.

(b) In Fagen et al., elephants that had never had reward training learned a full trunk wash when its parts were shaped and chained with a whistle followed by banana, so the same method should let Dev build the paw check one step at a time (**2**).

Example 4

Evaluate the study by Fagen et al. (elephant learning) in terms of two strengths and two weaknesses. At least one of your evaluation points must be about ethics. [10]

Plan: strengths are ethics (the named issue) and standardisation; weaknesses are the sample and uncontrolled variables. Each paragraph has the point, two or more details, and why it matters.

Strength 1: ethics (the named issue). The study kept several of the guidelines for animal research. The training used rewards only, so no elephant was hit or frightened into obeying, which minimises harm. No elephant was made to stay in a session, and food and water were never held back between sessions, so banana was a bonus rather than food she had been denied. Only five elephants were used, keeping numbers low. This matters because the study's whole purpose was to show a kinder way to train elephants, and it did so without causing them distress.

Strength 2: standardisation. Every behaviour had a fixed definition before training began; for example, trunk here meant the tip and underside of the trunk resting on the trainer's palm. Every performance test used the same 80% pass mark, and session times were measured the same way for all. Because the procedure is written down so exactly, another team could repeat it with other elephants to check whether the findings hold.

Weakness 1: the sample. Only five elephants took part, all female and all from one stable in Nepal, and only one was an adult. That adult also had poor eyesight, a foot abscess and a weak trunk. So it is impossible to say whether healthy adult elephants, males, or elephants kept elsewhere would learn the trunk wash as the juveniles did, which limits how far the results can be generalised.

Weakness 2: uncontrolled variables. Training took place in a working stable, not a controlled setting. Tourists distracted the elephants, and a calf from the next stable kept interrupting the adult's sessions. The amount of training also varied from elephant to elephant. So some of the differences in how quickly the elephants learned may have come from these disruptions, not from the training method or the elephants themselves.

How it would be marked: four points of equal depth, each with study details and an explanation, including the named issue: the top level (9–10 marks).

Common mistakes

- **Explaining positive reinforcement when shaping is asked:** answers that only described rewards, with no idea of rewarding closer and closer attempts, scored nothing (March 2025 report).
- **Giving your own example when the question asks for one from Fagen et al.** (March 2025 report): name the banana and a behaviour from the study.
- **Using human ethical guidelines for the elephants:** informed consent and the right to withdraw belong to human research; an elephant walking away is minimising harm (March 2025 report). Learn the animal list in the syllabus.

- **Blaming the elephants when asked about the validity of the performance test:** their health, personality or the test being "too hard" scores nothing; question how the test measured performance, such as the 80% pass mark (March 2025 report).
- **Saying the elephants' size stopped them doing the tasks,** or writing about how much elephants eat, when asked how their size affected the study (March 2026 report).
- **Tautological definitions** of the individual and situational explanations, or putting an example on the wrong side (March 2026 report).
- **Vague reinforcers:** "food" for the primary reinforcer and "a sound" for the secondary are not accepted; say banana and whistle.
- **Answering a "mean success over time" question with who passed** (4 juveniles, not the adult): that is a different result.
- **Saying the elephant "held still" for steady:** it is the trunk that is held still, in the position just asked for.
- **Naming a technique in advice without saying how to carry it out** ("use shaping"), or suggesting punishment or copying a model.

How to get the marks

- **"Identify" and "state":** a short, exact answer (banana, whistle, 4, 5); only the first answer is marked.
- **"Outline"** a term: the definition in general words (1–2), then an example from Fagen with a named behaviour (1).
- **"Describe"** a behaviour, the sample or the training: separate specific facts, one mark each; these lists are definitive, so use the study's details.
- **"Explain":** the point (1), then the detail linked to Fagen et al. (1). Paper 2 needs the link at least once for full marks.
- **"Suggest":** a sensible idea (1), and when asked, justify it with why (1).
- **Results:** always make a **comparison** (between elephants, or between early and later sessions) and, when asked, include the data exactly.
- **Two friends disagree:** choose one and stay with them; give the definition or guideline, then linked study evidence.
- **"Evaluate ... two strengths and two weaknesses"** (10 marks): four equal points, the named issue included, at least two study details in each, no description.
- **Similarity and difference** (8 marks): state it, give an example from **each** study, explain why it matters.

Quick check

1. Explain the difference between positive and negative reinforcement, and give a new everyday example of negative reinforcement.
2. A zoo elephant answers 11 out of 15 cues correctly in a performance test. Would she pass under Fagen et al.'s rule? How many correct answers did she need?

3. An assistant notes that the first cue of a session was given at 09:04 and the elephant responded to the last cue at 09:31. Using the study's method, how long was the session?
4. Explain why behavioural chaining was needed to teach the trunk wash.
5. Some people conclude from the adult elephant's failure that older elephants cannot learn by positive reinforcement. Give one reason why the study cannot support that conclusion.

Answers

1. Both make a behaviour **more** likely. Positive reinforcement **adds** something pleasant after the behaviour (banana after trunk up). Negative reinforcement **removes** something unpleasant: for example, a student who takes a painkiller and loses a headache is more likely to take one next time.
2. $\frac{11}{15} \times 100 \approx 73.3\%$, which is below 80%, so she would **not** pass. She needed $0.8 \times 15 = 12$ correct.
3. From 09:04 to 09:31 is $31 - 4 = 27$ **minutes**, timed to the nearest minute from the first cue to the response to the last cue.
4. The trunk wash is a sequence (offer the trunk, raise it, hold it steady, blow into the bucket) that an elephant would never do all at once by chance. Each part had to be taught and rewarded separately, then linked so that completing one step led on to the next.
5. There was only **one** adult, and she had poor eyesight, a foot abscess and a weak trunk, and a calf kept interrupting her training. Her failure could be due to her health or these disruptions, and one animal is far too few to judge all older elephants.

Past questions to try

- 9990/13/M/J/24 Q6: describing how trunk up was trained, with lure and shaping.
- 9990/12/F/M/25 Q6: shaping with a Fagen example, then whether the study was ethical.
- 9990/22/F/M/25 Q5: the validity of the performance test and how to improve it.
- 9990/11/M/J/24 Q10: the 10-mark evaluation with quantitative data as the named issue.