Learning Approach:

Elephant Learning

Fagen et al.

Activity

Elephants!!!!!

Psychology being investigated

What was the purpose of training elephants?

- Vulnerable to Tuberculosis (TB)
- Affects 20% of the elephants in Nepal
- Reduce TB transmission
- Train elephants to willingly participate in TB testing

Psychology being investigated

- Elephants had to learn to perform a series of behaviors in the correct order.
- If the behaviors were not performed accurately, the TB test result may not be accurate and an elephant could be infected without anyone knowing.

Psychology being investigated

Operant conditioning and positive reinforement

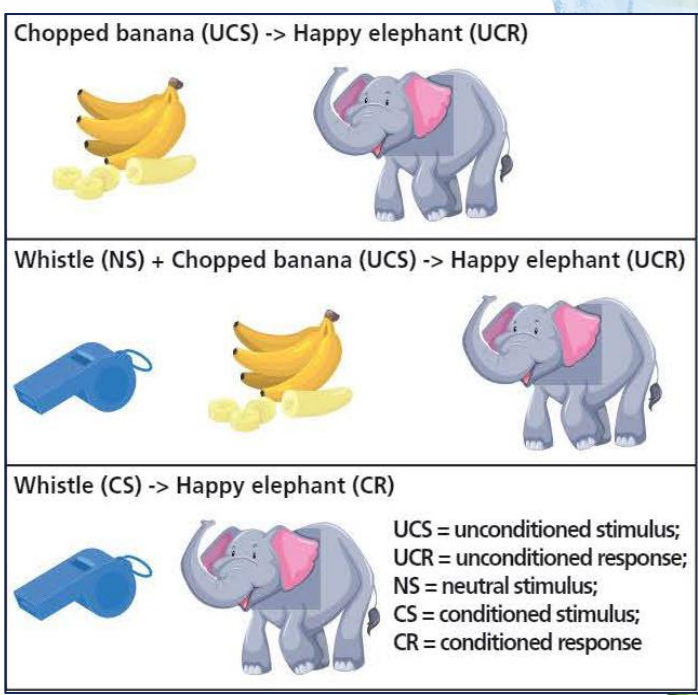
Elephants were trained using **operant conditioning** → consequence of behavior determines the probability of that behavior being performed again.

Elephants were rewarded for performing specific trunk movements in the correct order → **positive reinforcement**.

Psychology being investigated

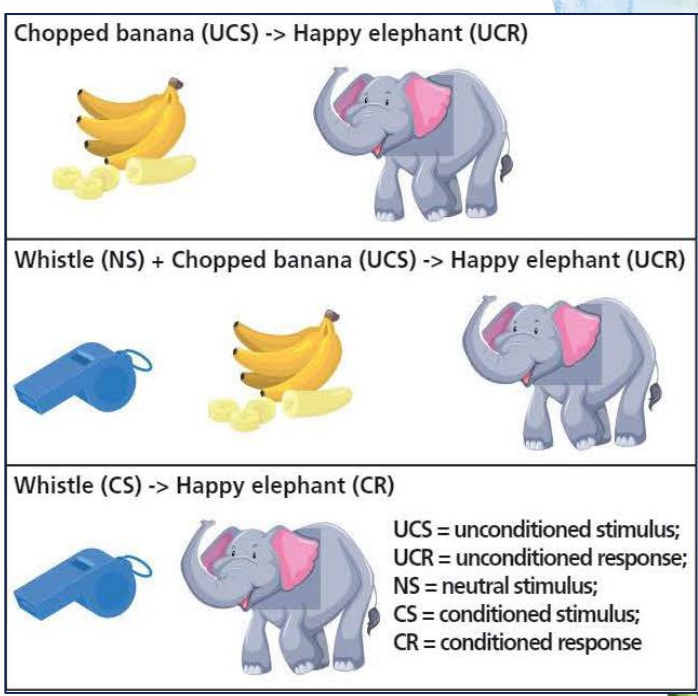
Primary and secondary reinforcement

- Each time elephant moved its trunk into the correct position → rewarded with chopped bananas.
- **Chopped banana is a primary reinforcer** because it meets a basic need (hunger).
- Operant conditioning is most successful when the **time between the behavior and the consequence is as brief as possible.**

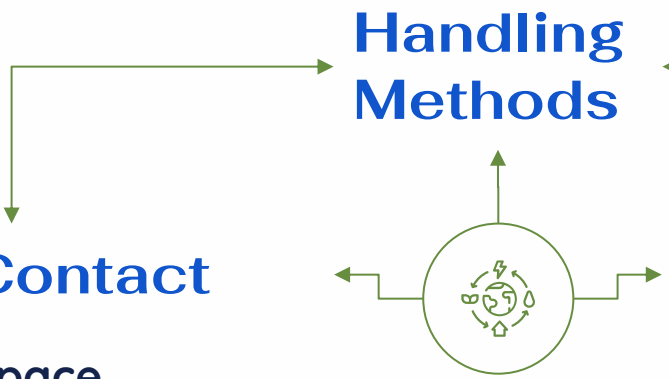


Psychology being investigated

- Animal trainers often use **secondary reinforcer**, such as sounds, which the **animal is taught to associate with the primary reinforcer.**
- ***Eg:*** short blast on a **whistle** was used as a **secondary reinforcer**. Use of whistle allowed the researchers to reward the elephants exactly as the desired behavior was performed, creating strong association between the behavior and consequence.



Background of the study



Free Contact

- Shared space, unlimited contact
- Negative reinforcement
- Aversion techniques

Protected Contact

- Barrier between animal and handler
- Positive reinforcement
- Encourage voluntary behaviour

Background of the study

Currently

Trained by Mahouts

Training

Aversion based techniques

Safety

Safer for the handler

Veterinary Practice

Tb Testing

Aim of the Study

Observational study to investigate whether secondary positive reinforcement (SPR) could be used to train the elephants to voluntarily complete a trunk wash, a behaviour that allows the elephants to be tested for a disease called Tuberculosis.

Methodology

- **Controlled observation** of the elephant training sessions.
- Observation took place while elephants were chained in their stall at the stable where they lived and not in the wild.
- Used a **behavioral checklist** to measure how successful the elephants were in completing various behaviors.

Behavioral checklist

Behaviour	Description
Trunk here	The distal end of the trunk is placed gently on top of the outstretched palm of the trainer, with the ventral aspect of the trunk in contact with the trainer's palm.
Trunk up	The distal end of the trunk is held upward either in a loose curl with the dorsal aspect of the tip of the trunk in close contact with the elephant's own forehead or is held diagonally up and outward with a completely straight trunk. The exact height or angle of the trunk is not measured.
Bucket	The distal end of the trunk is gently placed inside a bucket.
Blow	The elephant gives a strong, sharp exhale through the trunk.
Steady	The elephant holds the trunk still with the trunk held in the position previously requested (trunk here, trunk down or trunk out). The elephant can move his or her feet, ears, head, tail and body slightly as long as the trunk remains still in the previous position requested.
Syringe	The elephant holds the trunk still in the trunk-here position to have the distal end of a catheter tip syringe placed inside the nostril of the trunk and up to 60 ml of saline or water instilled into the trunk.
Blow into bucket	The elephant places the distal end of the trunk in the bucket and gives a strong, sharp exhale through the trunk.
Trunk down	The trunk is held in a relaxed position with the trunk hanging loose towards the ground.
Trunk out	The trunk is held stretched straight outward, approximately parallel to the ground.
Targeting	The elephant moves such that the centre of the forehead makes contact with the end of a targeting stick placed at the height of the forehead.

Observational study

Main features of observation	Definitions
Overt vs covert	Participants may know (**overt**) or many not know (**covert**) they are being observed
Naturalistic vs controlled	Real-life setting or a controlled laboratory environment
Structured vs unstructured	Structured observations have a **predefined behavioral checklist** to record/determine behavior while unstructured observations do not
Number of observers	Observes the experiment and record qualitative data; number of observers depend on the experiment

Sample

01

5 female:
4 Juvenile (5-7 years old)

1 Adult (atleast 50 years)

02

Gentle/tame, not pregnant, no pevious experience with SPR

Sampling technique

Procedure

Animal care

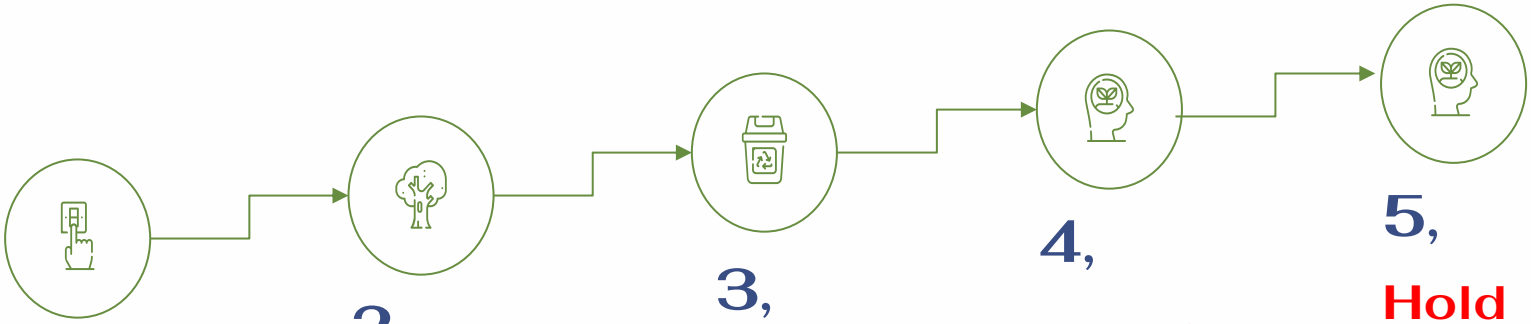
Animal Husbandry

Grazing in the jungle: Morning (7:30 to 10.00am) and afternoon (4:00 to 7:00pm)

Chained otherwise

Diet of fresh grasses and dhana (grains)

WHAT THE ELEPHANTS HAD TO DO



1,
Place trunk into trainers' hand (saline water can be inserted)

2,
Lift trunk and hold (Fluid to the base of trunk)

3,
Lower trunk into a bucket

4,
Blow into bucket (remove fluid)

5,
Hold steady (keep trunk still)

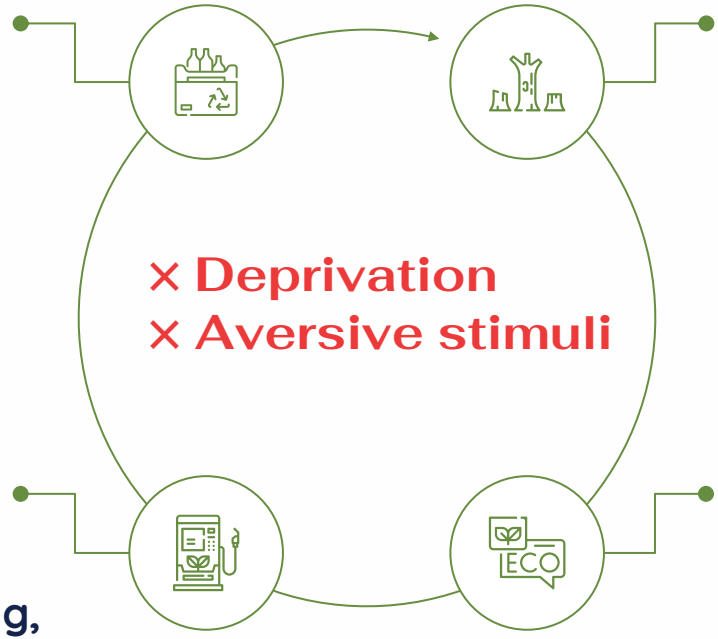
How they were trained

1, CAPTURING

Encouraged to perform natural behaviors that were already part of their unsual behavior using reward

2, LURING

More unusual behaviors encouraged by careful positioning of treats



3, SHAPING

Reward for similar behaviour in the beginning, and later only reward for the accurate behavior

4, SECONDARY REINFORCERS

Whistle for quick association

More conditioning

Verbal Cues

- One syllable cues when successful in all five behaviors
- Not words in English or Nepali

Behavioral chaining

- Connect the behaviors
- Rewarded when behaviors are completed in order

The syringe and sample fluid

- Syringe was introduced after trunk-wash behaviors were learnt.
- It is an aversive stimuli as it may be unpleasant for elephants.
- Desensitization was applied where trainers gradually brought the syringe closer to elephants' trunk, rewarding with chopped bananas, until they were happy to have the syringe touch their trunk.
- Counterconditioning was used to teach elephants to associate syringe with the arrival of chopped banana.

The syringe and sample fluid

- Gradually the syringe went from being an aversive stimulus to a conditioned stimulus.

- Total 60ml of fluid was injected gradually from 1ml to 15ml to full 50ml

Methodology (Performance tests)

Measured Variables

Minutes of training from the point at which elephant was offered her first cue to her response to the last cue

Number of offers/cues made by the trainer to the elephant

Success rate for each behaviour/sequence.
80% = pass
Tb test

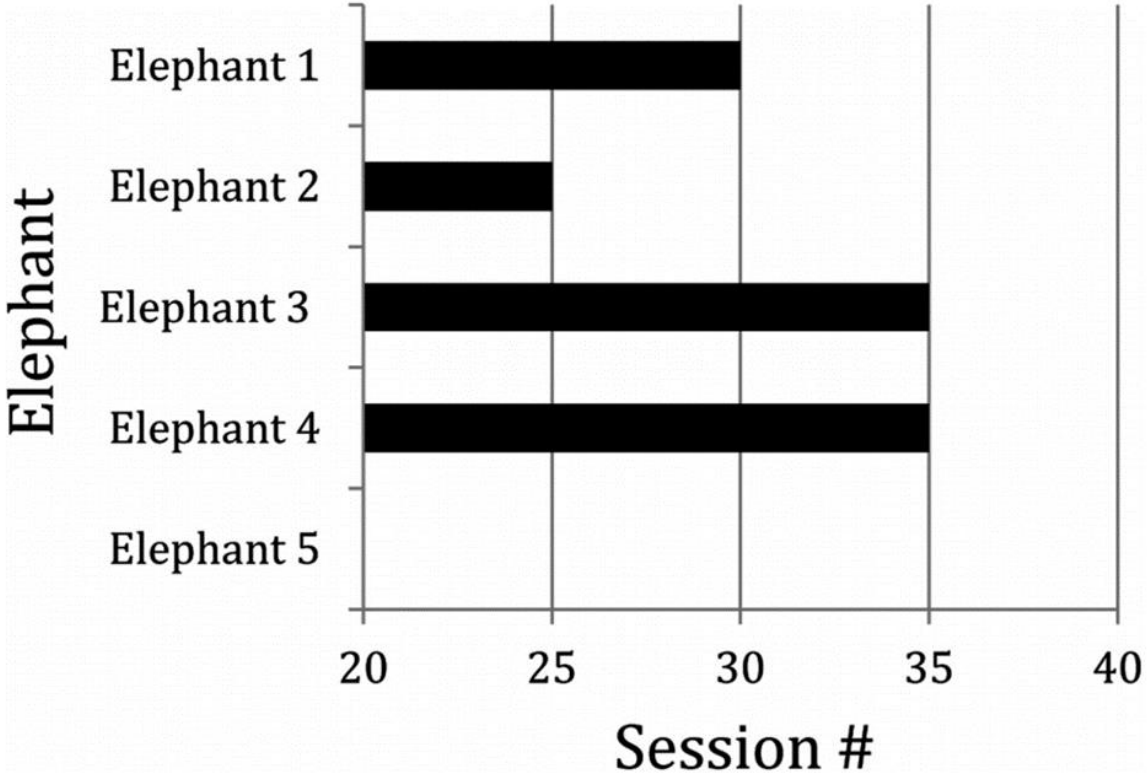
Results

- All 4 learnt in 25-35 sessions, mean average=12 minutes.
- Older elephant (“5”) was never tested on the full trunk wash as she failed to learn full sequence in time.
- Elephants “2”,”4” never mastered “trunk steady”.
- Elephant “5” never fully desensitized to syringe
- Success rates: 39% after 10 sessions/ 89.3% after 35 sessions

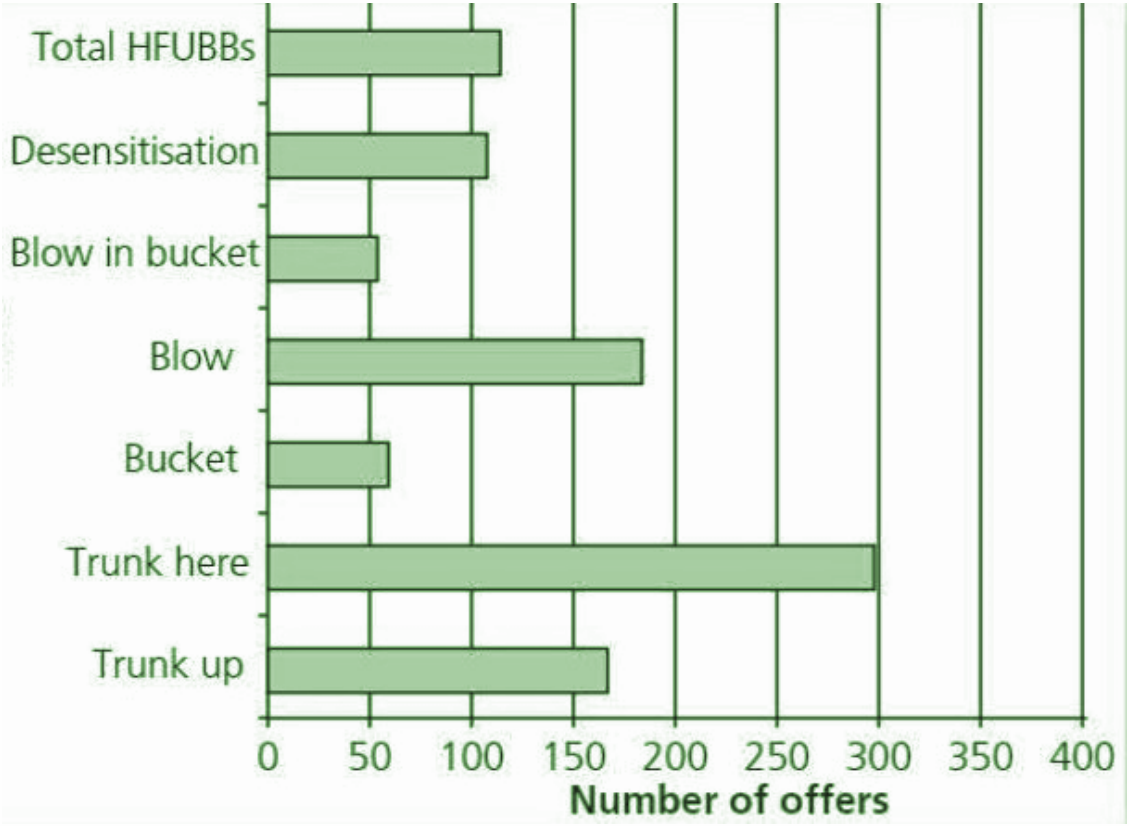
Results

	Number of sessions to pass trunk wash	Mean average session time (minutes)	Individual behaviours faile
Elephant 2	25	10.29	Steady
Elephant 1	30	12.42	None
Elephant 3	35	13.27	None
Elephant 4	35	11.11	Steady

Success rate per subject



Difficult behaviour



Conclusion

SPR is effective for training Juvenile, traditionally trained elephants to voluntarily and reliably participate in trunk wash

SPR could be a great tool for captive management programs around the world to improve

- behavioral management,
- animal health through voluntary veterinary participation,
- trainer–elephant relations,
- animal welfare.

Evaluation- strengths and weaknesses

✓	Ethics	• Ethical guidelines were followed for both elephants and trainer. • Despite elephant's leg chains, they were able to walk away from their trainers if they did not want to participate. • This helped reduce distress (psychological harm) of the animals as well as the physical risk of physical harm to the trainers/observers if elephants became uncooperative.

Evaluation- strengths and weaknesses

✓	**Reliability (Using a behavioral checklist)**	• **Detailed the exact operational descriptions of each of the taught behaviors.** *Example: TRUNK UP: "distal end of the trunk is held upward either in loose curl or is held diagonally up and outward with a completely straight trunk"* • **This helped increase the reliability of the observer's decisions regarding whether the elephant passed or failed the performance test.**

Evaluation- strengths and weaknesses

✓	Validity (no additional cues from the mahouts)	• Mahouts complied with the researcher's request not to speak to or signal to the elephants. • This means that any changes in the elephant's behavior must have resulted from the secondary positive reinforcement training and from additional communication. • This increases validity of the finding that SPR training is helpful in training elephants to voluntarily participate in trunk washing.

Evaluation- strengths and weaknesses

✓	**Generalization to everyday life and ecological validity**	• **Data was collected in a lively naturalistic setting.** *Example: large groups of tourists gathered, many distracting noises from other animals in the jungle.* • **This increases ecological validity, suggesting that it would be possible to achieve similar results with elephants in their normal settings, such as zoos or safari parks.**

Evaluation- strengths and weaknesses

X	**Validity (problem with the behavioral checklist)**	• **Total training time included training on behaviors that were not part of the trunk wash.** *Example: 4 elephants were trained to do behavior "trunk out", but trainers stopped shaping this behavior as it was unnecessary. This means total training time does not accurately reflect the time taken to train elephants to perform trunk wash.* • **This reduces validity of the study.**

Evaluation- strengths and weaknesses

X	Generalization (generalizing beyond the sample)	• Small size, specifically the lack of male and adult elephants. • Only one adult female (elephant 5) and she failed to learn the full trunk-wash sequence. • Older elephant may be able to learn using SPR a this animal suffered from physical issues (impaired vision and/or trunk weakness) that might have affected behavior. • Abscess on her foot → made her impatient and unfocused. • May not generalize her lack of learning to other older elephants.

Evaluation- strengths and weaknesses

X	Objectivity and subjectivity (Rating success and failure)	• Measurement of the elephant's performance was subjective. • Despite the detailed behavioral checklist, trainer had to decide whether they felt the elephant would be successful if they were performing a real trunk wash, and not just whether they matched the description on the checklist or not. • It is weakness because the trainers may have been biased towards viewing behavior as successful when another observer might have interpreted the same as unsuccessful.

Individual vs Situational explanations

- Elephant 5 failed to learn the trunk-wash sequence within the time available.
- Could be due to individual differences; she was much older and had some physical health problems that affected her ability to reproduce the required behaviors.

- Alternatively, her slower rate of learning could be due to situational factors; trainers may have responded differently to her and aspects of the environment were also different (distractions from young calf)

Application to everyday life

Improving animal welfare:

- **Developed relatively safe and efficient way of training captive animals to co-operate during critical veterinary procedures.**

- **Trunk wash is central to the management of TB; helps maintain the health and well-being of animals as well humans.**

- **This technique can be easily adapted to teach other behaviors through Secondary Positive Reinforcement.**

e.g: Zebras, Macaws, Tortoises and Tropical fish have been trained to undergo procedures including blood samples, x-rays and transportation to new environments using rewards.

- **These advances in veterinary practice reduce the need for manual restraint and sedative drugs, decreasing stress, and improving well-being.**

Test yourself

1. Two results relating to elephant 5 in this study [2]
2. Outline what is meant by deprivation and aversive stimuli using examples from this study [4]
3. Why is it difficult to generalize the findings of this study [4]
4. What ethical guidelines were followed in this study? [4]
5. Evaluate this study in terms of 2 strengths and 2 weaknesses. Atleast one evaluation must be about the use of animals in psychological research [10]