

## CORE STUDY #3: PEPPERBERG 1987 (PARROT LEARNING)

### Aim:

- To investigate whether an avian subject could use vocal labels to demonstrate symbolic comprehension of the concepts of *same* and *different*.

### Background:

- Humans are not the only species capable of making meaningful communication.
- Previous studies investigated how different species communicate with each other, but this research has mainly been done on primates such as chimpanzees and gorillas.
- Very very few studies investigated communication and symbolic understanding in avian species, and even fewer explored the concepts of 'same' and 'different'.
- A study on pigeons found that pigeons can understand the concept of 'same', but not different.

### Method:

#### *Participants:*

- One African Grey parrot (*Psittacus erithacus*) called Alex
- He had been the focus of Pepperberg's research since 1977 (10 years) and had been part of multiple studies investigating learning and communication within avian species.
- Alex had free access to all parts of the laboratory for 8 hours a day while researchers were present (he also requested to go to places by saying "Wanna go X")
- The trials and tests were conducted in different parts of the lab, depending on where Alex was at the time or wherever he requested to be taken
- During his 'sleeping hours' Alex was put in his cage with water and standard food (seeds and oatmeal). Other foods such as nuts, fruits, and vegetables (and also toys) were provided when Alex asked for them (he was not deprived of anything)

Before training, Alex already had a wide range of vocabulary due to his participation in previous experiments. He could name some colors (including rose (red), green, yellow, blue, and grey), some shapes (such as triangle and square), and different materials such as wood, cork, paper, and rawhide.

- ↳ He could also respond to verbal prompts, e.g. when asked "What color?" he could often reply with the correct color of the object. He could also combine words to describe the items, e.g. "green wood"

The training method used was a model/rival technique.

- One human acted as another human's trainer, asking questions and presenting different objects
- When the person gave a desirable response, they would be rewarded with praise. This human acted as a model for Alex, who watched this interaction, while Alex would be considered a rival for the trainer's attention
- At the start of training, continuous reinforcement was used to create the closest association between the object or category and the label to be learned.
- During the same/different training, the trainer would ask the model "What's same?" or "What's different?", the model would respond with either a desirable answer or an incorrect answer.
  - ↳ When they gave a correct answer, they were rewarded by being allowed to keep the object
  - ↳ When they gave an incorrect answer, they were scolded and the object was taken away

- ★ **Continuous Reinforcement** - when a learner receives a reward each time they perform a desirable behavior. It is one of several possible schedules of reinforcement.

#### *Procedure*

- Alex was tested by secondary trainers who had not worked with him on learning same/different to prevent any extraneous variables such as trainer familiarity when Alex was answering questions.
- The materials were paired from a selection given to a student who had no association with the study
- They also randomly ordered the set of questions in each trial
- Though the researchers were only interested in the response to the questions of same/different, other questions were asked to prevent boredom:
  - ↳ What color?
  - ↳ What shape?
  - ↳ How many?
- In each trial, Alex was presented with two objects that were different in ONE of THREE categories: shape, color, and material, e.g. the objects could be a blue wooden triangle and a blue wooden square
- Alex would then be asked "What's same?" and "What's different?"
- The task could involve objects Alex had been tested with before (familiar trial), or completely new objects (novel trials)
- The principal trainer was present in each trial but faced away from where Alex was being tested
- After each of Alex's responses was repeated aloud. If he was correct, he was praised and given the object to keep. If he was wrong, the trainer would say "No!" and remove the object
  - ↳ Before testing Alex with novel objects, they would be placed on a shelf in the background within Alex's view, so that he wasn't daunted when presented with a completely new object he had never seen before.

## Results

### *Familiar Objects*

- Alex correctly responded in 99/129 trials (76.6%)
- First trials only: he answered correctly 69/99 times (69.7%)
  - ↳ These findings only give conservative recounts of the findings, possibly because a response was only counted correct if it was the first vocalization, and rather than giving an outright 'wrong' answer, he may have just not responded at all.

### *Novel Objects*

- Alex correctly responded in 96/113 trials (85%)
- First trials only: he answered correctly 79/96 times (82.3%)
  - ↳ While it would be expected that Alex would be worse at describing novel objects, he was better at it. One reason for this could be that he would be allowed to keep the object if he answered correctly, and his curiosity for a new object motivated him to give more correct answers.

## Conclusions

- 1) Parrots have the potential to demonstrate comprehension of the symbolic concepts 'same' and 'different'
- 2) They may also learn to respond to verbal questions to vocalize categorical labels

## Evaluation

**A strength of this study is that it has high replicability.** This is because it was done in a controlled lab environment with standardized procedures with "One African Grey parrot named Alex", so another researcher can simply get another parrot and replicate the procedure to compare the results for accuracy. This increases the reliability of this experiment because the results can be tested.

**Another strength of this study is that it could be argued that there were very few demand characteristics.** This is because it was conducted in the form of a model/rival technique, using a different trainer each time. This means that the results were not impacted by Alex being familiar with the trainer and their facial expressions, which may have influenced the results. This, therefore, increases the validity of the study.

**A weakness of this study, however, is that it lacks generalisability.** This is because it was only conducted on one "African Grey parrot named Alex", and so the results cannot be generalized to the rest of the population of African Greys, or other species of bird. It could also be argued that Alex may have been inherently smarter than other parrots, so the results cannot be generalized. This reduces the validity of the study.

**Another weakness of this study is that it lacks ecological validity and mundane realism.** This is because the study was done in a controlled lab environment with standardized procedures, which is not a natural environment for a tropical parrot. The study also focused on tasks such as vocalizing the concept of "some" and "different", which is not a natural task for a parrot to do. This reduces the validity of the findings of the study.

## Issues and Debates

This study supports the learning approach and the nurture side of the nature/nurture debate.

### *Use of animals:*

- The study only used one parrot, so only the minimum number of animals was used
- Positive reinforcement was given, and the parrot was not deprived of anything or abused in any way
- Alex was housed in his usual cage during "sleeping hours", and other than that he was allowed to be anywhere in the lab