Language: **CATEGORICAL PERCEPTION**

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**WHAT IS CATEGORICAL PERCEPTION?**

- Broadly, it is the ability to qualitatively, or categorically separate sensory phenomena
- This means that a change in some variable along a continuum is perceived not as gradual but as instances of discrete categories.

**COLOR PERCEPTION**

- Color is continuous spectrum but we can perceive it as separate categories.
  - Red, Green, Blue, Yellow

**WHAT ABOUT LANGUAGE?**

- Same sounds can differ by one aspect
  - VOT (voice onset time)
    - Eg. /pa/ vs /ba/
  - POA (place of articulation)

**VOICE ONSET TIME (VOT)**

- This figure below shows only three of many possible times for voicing to begin
**PLACE OF ARTICULATION (POA)**

/\ba/ \(\rightarrow\) /\da/ \(\rightarrow\) /\ga/

Exist along a continuum
- All sound the same
- Diffs in POA

**HUMAN LANGUAGE: OLD EXPERIMENT**

- **Broad Question**
  Do humans show categorical perception of speech sounds?
- **Two specific questions**
  1) Will humans show agreement in identifying whether a sound is /\ba/, /\da/, or /\ga/?
  2) Will humans only be able to discriminate sounds that lie between the category boundaries shown in identification tasks?

**TWO EXPERIMENTS**

1) **Identification**
   - Simply, do we categorize sounds into the appropriate discrete categories

2) **Discrimination**
   - When are two sounds perceived as different

**HUMAN LANGUAGE EXPERIMENT**

**Identification Task**

% different

**Why is this useful?**

The way people pronounce the /\ba/ sound may vary slightly on the continuum between people. There may also be variation in the way a single person makes the /\ba/ sound! BUT we still perceive it as /\ba/! And the same with /\da/ and /\ga/.
DOES EVERYONE HAVE THE SAME BOUNDARIES?

- Yes and No
  - Yes- as English speakers, we all tend to have about the same categorical boundaries
  - No- Someone who speaks Hindi would have another boundary- one in between our /da/ and our /ga/ on this continuum
  - /r/ & /l/ distinction

BIRDSONG EXPERIMENT

SEXY AND NON-SEXY SYLLABLES

VARIATION IN SYLLABLE STRUCTURE

TWO EXPERIMENTAL DESIGNS

- Present song syllables:
  - Sexy versus non-sexy

- Pair two song variants together
  - Same different – all variations of possible pairs presented together.

VARIATION IN SYLLABLE STRUCTURE

Sound

Color
**QUESTIONS**

- Song in birds is functionally significant. It is critical for reproductive success.
- Broad Question:
  - Are categorical distinctions in sound shared across species? (Eg. Chinchillas & English...)
- Specific Questions 1: Can humans identify Sexy and non sexy syllables in canary songs?
- Specific Questions 2: Are humans able to correctly discriminate between two closely paired syllables.

**ALTERNATIVES**

What are possible outcomes of the experiments?

1) We might not notice the difference between the song syllables.
2) We might be capable of perceiving both song types.
3) We might correctly identify song syllables, but are incapable of discriminating when paired in quick succession.

What are the implications for each alternative?

**LOGIC**

Identification and Discrimination Tasks

1) If subjects could identify sexy and non sexy songs...
   ... Then song structure may exist along a continuum.
2) If subjects could discriminate pairs of song syllables...
   ... Then there is a specific period along the continuum when the perception changes.

What does this mean for cross species comparisons of vocalizations?

**RESULTS: IDENTIFICATION**

![Identification Task](song_morph)

**RESULTS: DISCRIMINATION**

![Discrimination Task](pairs_of_songs)

**QALMRI**

- Write-up: Results and Inferences
  - (1) Data presentation (graph)
  - (2) Data descriptions
- Graphs:
  1) Song Identification
  2) Song Discrimination
INFERENCES

Conclusions
- Answer Question #1 & what data support your answer
- Answer Question #2 & what data support your answer

Discussions
- Some observations on the class data
- What is the language data like compared to the Song data?
- Proposal of follow-up questions & experiments
- Relevant problems you think of that can be explained/understood better or informed by this experiment