The Role of Discriminative Stimuli and Motivation Level in a Three Response Sequence

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Earlier Research
- Previous study by Reid, Kelly, and Weaver (1999)
- Role of Discriminative Stimuli in a Three Response Sequence
- How does a discriminative stimulus influence which response is produced next in a sequence?

Trial Types:
- No Tone: R₁ → R₂ → R₃ ⇒ Food
- Tone: R₁ → R₂ → R₃ ⇒ Food
- Probe: R₁ → T → R₂ → R₃ ⇒ Food

Compare Accuracy:
- R₂?
- R₃?

Sequence Types
- AAB, ABA, and ABB
- AAB is the harder sequence
- First response tells the subject to “persist” while pressing the same response a second time now means “switch” to another lever
- Conflict of meaning that does not occur with the other types of sequences

Results

Conclusions:
- The tone did influence the next response in the sequence:
  - IRTs were shorter in sequences with tones
  - Justification for our experiment: Tone increased accuracy on R2 and unexpectedly increased accuracy on R3 as well
**Interpreting the Earlier Study**

- Is the tone acting as one stimulus or as two separate stimuli?
- Therefore, shorten the duration of the tone so it ends before R2

**Our Experiment**

- 8 naïve rats
- Rats randomly assigned to sequences from previous study (AAB, ABB, ABA)

**Procedure**

- Condition 80%: Alternated between Tone and No Tone trials until 76 reinforcements were obtained or 45 min. expired

**Trial Types:**

- **No Tone:** $R_1 \rightarrow R_2 \rightarrow R_3 \Rightarrow \text{Food}$
- **Tone:** $R_1 \rightarrow R_2 \rightarrow R_3 \Rightarrow \text{Food}$

**The Tone had no effect on R2!**

- Subjects did not differentiate between tone and no tone trials, in relation to accuracy of R2, after approximately 60 sessions
- Did not show same results as previous study
- Possibly tone duration was too short to be salient
- Interestingly: subjects were run more than twice as long as in previous study and still no effect
- Tone did not have an effect on R1 or R2 IRT’s
- Also, trial accuracy stabilized for most subjects at 60%, not at 100%

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**ABA Inter-Response Times**

- The tone did not affect IRT
- IRTs (sec)

![](https://example.com/aba_irt.png)
**ABB Inter-Response Times**

- IRTs (sec)
  
<table>
<thead>
<tr>
<th>R2-R3</th>
<th>R1-R2 Tone</th>
<th>R1-R2 No-Tone</th>
</tr>
</thead>
<tbody>
<tr>
<td>0</td>
<td>1</td>
<td>2</td>
</tr>
<tr>
<td>0.5</td>
<td>1.5</td>
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- The tone did not affect IRT

**AAB Inter-Response Times**

- IRTs (sec)
  
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- The tone did not affect IRT

**AAB: Accuracy of R2**

- Percentage Trials w/ Correct R2
  
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<th>0</th>
<th>10</th>
<th>20</th>
<th>30</th>
<th>40</th>
<th>50</th>
<th>60</th>
<th>70</th>
<th>80</th>
</tr>
</thead>
<tbody>
<tr>
<td>Tone</td>
<td>0</td>
<td>10</td>
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- The tone did not affect accuracy

**Why Would Accuracy Become Stable at 60%?**

- What are the sources of the errors? R1, R2, or R3
- Look at correlations between R2 and R3 with trial accuracy
- Compare accuracies of R2 and R3
- Also compare accuracy of R1 across sequences, in addition to doublets
• R2 was significantly less accurate than R3

**Correlation between R2 and Trial Accuracy**

- r = .895
- $r^2 = .801$

**Correlation between R3 and Trial Accuracy**

- r = .589
- $r^2 = .347$

• R2 was significantly less accurate than R3

**Condition 80%: AAB: Comparing Accuracies of R2 & R3**

**Condition 90%: AAB: Comparing Accuracies of R2 & R3**

**Condition 100%: AAB: Comparing Accuracies of R2 & R3**

**R1 Errors**

- ABA
- ABB
- AAB
Errors May Be Doublets

Discussion

- Tone had no effect on whether or not the rat completed the sequence accurately.
- R2 seems to be the major source of error for all the sequences (AAB, ABA, and ABB).
- R1 is a significant source of error for ABB also.
- Doublets are another potential source of error in the three response sequences.
- Manipulation of Motivation level decreased accuracy, but did not change the source of error (R2).

The Question Remains...

- Why would the tone not have an effect here when it had such a strong effect in the earlier study?

The End

- WE ARE SO GRADUATING!!!
ABA: Accuracy of R3

![Graph showing accuracy of R3 over sessions](image)

Tone
No-Tone
Overall trial accuracy

80% 90% 100%

Sessions
Percentage Trials w/ Correct R3

ABA: Accuracy of R3

![Graph showing accuracy of R3 over sessions](image)

Tone
No-Tone
Overall trial accuracy

80% 90% 100%

Sessions
Percentage Trials w/ Correct R3

ABB: Accuracy of R3

![Graph showing accuracy of R3 over sessions](image)

Tone
No-Tone
Overall trial accuracy

80% 90% 100%

Sessions
Percentage Trials w/ Correct R3

ABA
Correlation between R2 and Trial Accuracy

![Graph showing correlation between R2 and trial accuracy](image)

Percentage R2 Accuracy
Percentage Trial Accuracy

$\text{r} = 0.537$

$\text{r}^2 = 0.288$

R2- Tone
R2- No Tone

ABB
Correlation between R2 and Trial Accuracy

![Graph showing correlation between R2 and trial accuracy](image)

Percentage R2 Accuracy
Percentage Trial Accuracy

$\text{r} = 0.517$

$\text{r}^2 = 0.267$

R2- Tone
R2- No Tone

ABA
Correlation between R3 and Trial Accuracy

![Graph showing correlation between R3 and trial accuracy](image)

Percentage R3 Accuracy
Percentage Trial Accuracy

$\text{r} = 0.528$

$\text{r}^2 = 0.279$

R3- Tone
R3- No Tone

ABB
Correlation between R3 and Trial Accuracy

![Graph showing correlation between R3 and trial accuracy](image)

Percentage R3 Accuracy
Percentage Trial Accuracy

$\text{r} = 0.349$

$\text{r}^2 = 0.122$

R3- Tone
R3- No Tone