Divided Attention

• What happens to unattended information?
• What factors affect our ability to divide our attention?

Dual Task Performance

• Task Similarity
• Task Difficulty
• Practice

Task Similarity

Allport & Colleagues
– Shadowing while recognizing:
  • Words presented in auditory modality
  • Pictures (presented visually)
– Memory for:
  • Words – terrible
  • Pictures – excellent

Task Similarity

• MacCleod (1977)
• Continuous Tracking
  – (Manual Response)
• Tone Identification
  – Manual Response
  – Spoken Response
• Spoken Response Easier

Multiple Resources

• Treisman & Davies
• Monitor
  – Visual
  – Auditory
• Detect
  – Visual
  – Auditory
• Aud/Vis, Vis/Aud Easy
• Aud/Aud, Vis/Vis Hard

Task Difficulty

• Sullivan (1976)
• Method:
  – Dichotic Listening
  – Tone Detection on Unattended Channel
  – Shadowing Simple Message
  – Shadowing Complex Message
• Result:
  – Tone Detection Worse when Shadowed Message Complex

Practice, Practice, Practice

• Spelke et al.
  – Read stories
  – Write down dictated words
• Hirst et al.
  – Read stories
  – Write down dictated sentences

Table 1. Chronology of the Study

<table>
<thead>
<tr>
<th>Sessions</th>
<th>Activity</th>
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</thead>
<tbody>
<tr>
<td>1–29</td>
<td>Practice: 14 trials per week of reading while writing at dictation</td>
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<tr>
<td>30–35</td>
<td>Controlled testing: 1 full experimental, 5 recognition, and 1 control trial per day.</td>
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<tr>
<td>36–43</td>
<td>Dictation with embedded lists of related words. Sentences, words from semantic categories, words from syntactic classes, no rhymes. Subjects were not forewarned that the dictated words would be remembered in any way.</td>
</tr>
<tr>
<td>44–46</td>
<td>Dictation with embedded lists of related words (subjects were asked to look for and repeat the occurrence of any structured subsets in one-week vacation followed session 46).</td>
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<tr>
<td>47–49</td>
<td>Retaining (comprehension trials only).</td>
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<tr>
<td>50–55</td>
<td>Controlled testing of reading comprehension by means of free and cued recall of the stories.</td>
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<tr>
<td>56–61</td>
<td>Dictation of categorizable lists, in which subjects either wrote the dictated word or the name of its category.</td>
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<tr>
<td>62–68</td>
<td>Completion of sessions 44–46.</td>
</tr>
<tr>
<td>69–74</td>
<td>Controlled practice of reading while categorizing dictated words, as in sessions 56–61. (Phono only).</td>
</tr>
<tr>
<td>75–80</td>
<td>Controlled testing of reading while categorizing dictated words.</td>
</tr>
<tr>
<td>81</td>
<td>Writing of dictation while reading aloud.</td>
</tr>
<tr>
<td>82–85</td>
<td>Writing at dictation while shadowing.</td>
</tr>
</tbody>
</table>

Automatic Processes

• Fast
• Require no attentional resources
• Outside of consciousness
• Obligatory

Stroop Effect

![Stroop Effect Image]
Stroop Effect

- Experiment I: Say the word.
  - Incongruent: GREEN
    - 43.3 secs
  - Congruent: BLUE
    - 41.0 secs

- Experiment II: Say what color the word is printed in.
  - Incongruent: GREEN
    - 110.3 secs
  - Congruent: BLUE
    - 63.3 secs

Kahneman & Henik

- Fixate in the middle, name ink color in circle
- Fixate in the middle, name ink color in rectangle
- Attention Matters
  - Reading is not completely obligatory

Automatic

- Without intention
- Not subject to introspection
- Few, if any, attentional resources
- Rapid (1 second or less)
- Inflexible

Controlled

- With intention
- Subject to introspection
- Uses most, if not all attentional resources
- Relatively slow (several seconds)
- Flexible

Memory Search Task (S&S)

- Memory Set: Consonant
- Distractors: Numbers

Consistent Mapping

- Memory Set: Consonant
- Distractors: Numbers

Varied Mapping

- Memory Set: Consonant or Number
- Distractors: Consonant OR Number
Schneider & Shiffrin

- Consistent Mapping (diff cat. distr.)
  - Memory Set Size (no effect)
  - Distractor Set Size (no effect)
  - 80 ms/trial for 95% accuracy
- Varied Mapping (same cat. distr.)
  - Memory Set Size (more is harder)
  - Distractor Set Size (more is harder)
  - 400 ms/trial for 95% accuracy
- Letter/Number distinction automatic: fast and done in parallel

Problems w/S & S

- Redescription of data w/o explanation

Cheng

- Quantitative Effects
- Qualitative Effects
  - Restructuring
    \[2 + 2 + 2 + 2 + 2 + 2 + 2 + 2 + 2 = ? \]
    \[2 \times 10 = 20\]

Instance Theory of Automaticity (Logan)

- Each time stimulus encountered, traces stored in memory
- Practice
  - More info about stim and what to do w/it
  - Rapid retrieval of info in response to stim

Instance Theory

- Race between memory & procedure
- 12 + 5 = ?
  - If solved before, remember “17”
  - If not, calculate
- Needle Analogy
  - When needles easy to find, search works
  - When needles hard to find, make a new needle

Explains Characteristics

- Fast
  - Retrieve old solutions
  - (Don’t compute anew)
- No Effect on Processing Capacity
  - Retrieval of overlearned material
- Unconscious
  - No processes intervene
**Attention & Resource Allocation**

- Partial Selection Occurs Early
- Not Simple Physical Filter
- Sensitive to:
  - Past Experience
  - Context
  - Arousal
- Performance of multiple tasks is a complex task of:
  - allocating limited resources
  - using automatized routines