Sternberg

**1: Introduction:** This experiment is grounded in **stage theory**: Cognitive processes unfold in discrete stages, time between stimulus and response is occupied by a series of mental operations, each starting when the preceding has ended.

And **Subtraction method:** By assuming pure insertion, two experiments only differentiating in one variable can be conducted. The difference in RT will be the result of that variable.

**2: Hypothesis**

1. Whether searching is a serial or a parallel process.

🡪 If serial: Whether it is a self-terminating or exhaustive process.

2. Whether a distorted probe is unmasked before searching starts or if it is done on a continuous basis.

3. Whether we see a speed-accuracy trade-off and if this is affected by probe condition.

**3: Expectations**

1 Serial search evident as higher RT at greater set size

2.Exhaustive search apparent if the slopes of RT-curves are unaffected by probe presence

3.Unmasking in the encoding stage appearing as a higher zero-intercept for masked probes but similar slopes within probe conditions.

**4: Method:**

- 12 blocks x 12 trials: memory set (2, 3 or 5 letters exposed 500 ms/letter) + probe + blank 1000 ms

- Measures of RT considers only correct responses

**5: Results** Figure 1: RT in each condition:

- ↑**SetSize**, **Masking** and **probe** **absence** increase RT

- **RT increases linearly** with **SetSize** 🡪Serial search *(or battery analogy).*

- **Slopes** for **mask** **present** = **absent** 🡪 exhaustive search

- **Intercept** for masked proves **are higher** 🡪 unmasking before searching

Figure 2: RT as a function of setsize:

- **Equal** **slopes** between mask and no mask 🡪 same search process

- **Different** **intercepts** 🡪 unmasking happens before searching starts

**6: Results** Figure 3 accuracy: Accuracy is **influenced** by **SetSize**, **masking** and **probe** **presence**, but **not** **speed**

o **Interactions**: Set size and masking, masking and probe presence 🡪 As set size increases, accuracy decreases

- Comparing with fig. 1: masked present might be the most difficult task 🡪 Highest RT + lowest ACC – bad investment of extra time spent

- No speed/acc trade-off

Figure 4 + 5: Individual plots

- Even when some general trends can be recognised, **individual data looks vastly different**

- Can we even say that all humans conduct serially exhaustive searches when individual data is this messy?

**7: Conclusions**

- **Serial search**: Increased set size increases RT

- **Exhaustive search**: slopes of present and absent probes are similar

- **Unmasking before searching**: different intercepts but similar slopes for masked and unmasked probes

**8: Criticism:** Parallel search 🡪 Increased RT with set size could be due to **battery** **hypothesis** (same cognitive capacity divided onto a larger set size in a parallel manner)

- Basic assumptions: Stage model, pure insertion, subtraction (is it that simple? No overlap?)

- How can we be certain that it is STM we are investigating?

o LTMs influence (chunking, semantic network, priming)

 Priming: An earlier seen letter is read faster the second time it is seen. If a probe is in the following memory set 🡪 read faster 🡪 more time for the rest of the set to be encoded

**9: Grand perspective**

- **STM+WM - Capacity Limit of Visual Short Term Memory in Human Posterior Parietal Cortex (art 3)**

o Investigates only the visual part of STM (according to Baddeleys model), while Sternberg investigates the entire throughput.

- **STM/WM models**: Cowan (LTM, WM, focus of attn), Baddley (Phono, Visual, Episodic), Atkinson & Shiffrin (Input, attn, stm, rehears, ltm)

- Adelman et al: **Letters** **in words are processed in** **parallel**. This effect is more prominent for the first couple of letters in a word, since we often don’t articulate the last parts of our words (due to overlap with the following word in a sentence)