Blocking the search and other illusory conjunction

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Talk available on:
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Two leading ideas...

- Most previous experiments and their related analyses were based on the hidden assumption that search starts with the presentation of the stimuli

- however...
  - Search may not start when expected
  - Targets may not be located when expected

Two leading ideas...

- **If search is serial, then we must expect a FIFO (First-In-First-Out, or FI-1O) effect.**
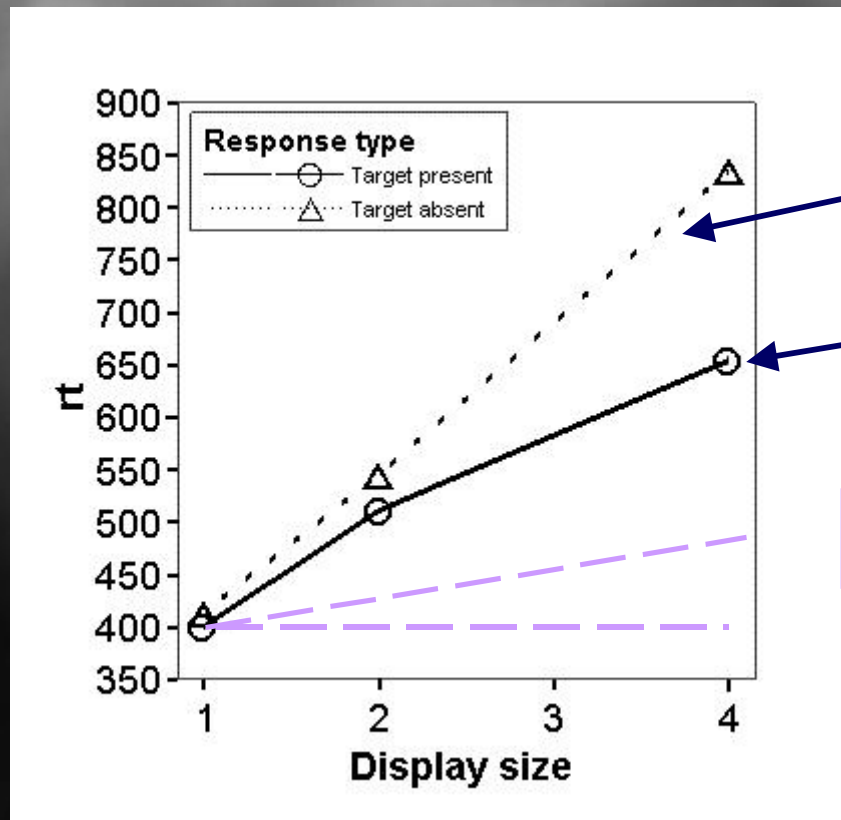
Negative trials will not be discussed here…

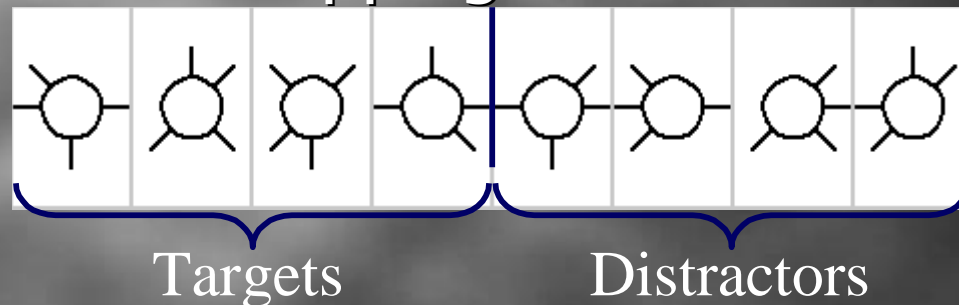Target-present indicating a slow, serial search…

Probabilistic FIFO: FI ~1O

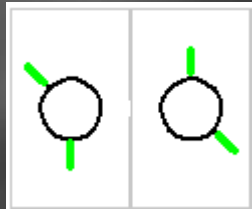True Target-Present FI-1O

Can we observe it in a non-trivial way?

Two leading ideas…

- One huge experiment, 74 sessions with four subjects in consistent mapping.

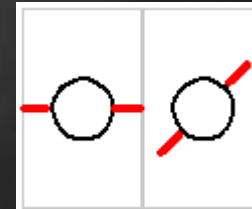Targets   Distractors

Demo

- Targets had to be learned; unbeknownst to them:

are diagnostic: are irrelevant:

It is a search for one of two possible conjunctions of features, explaining why it was so difficult

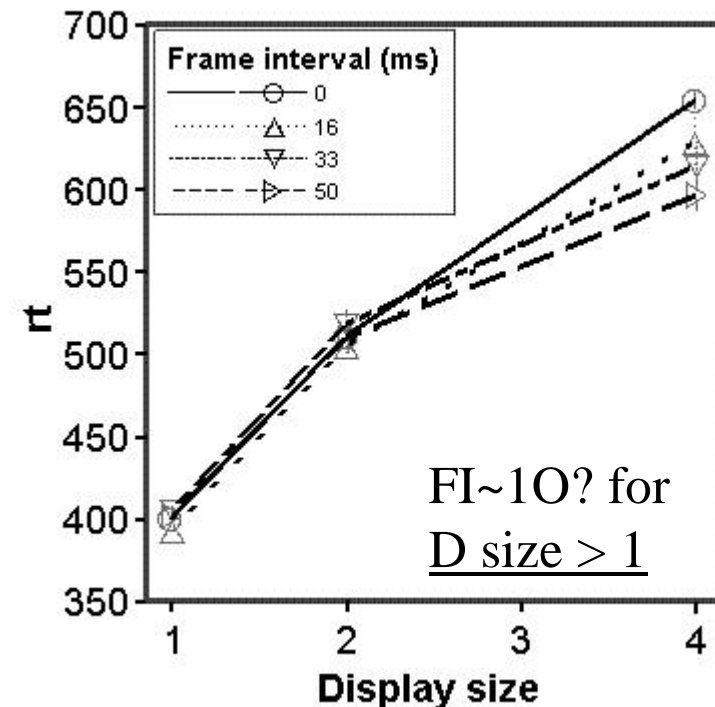targets may not be located when expected

targets may not be located when expected

RSSP (1/3 of the trials; sessions 30-34; random)

Target is either first or last of the stream;

ISI were fast (16 ms, 33 ms or 50 ms per slide).

FI~1O? for D size > 1

The effect is weak, ~1 ISI.
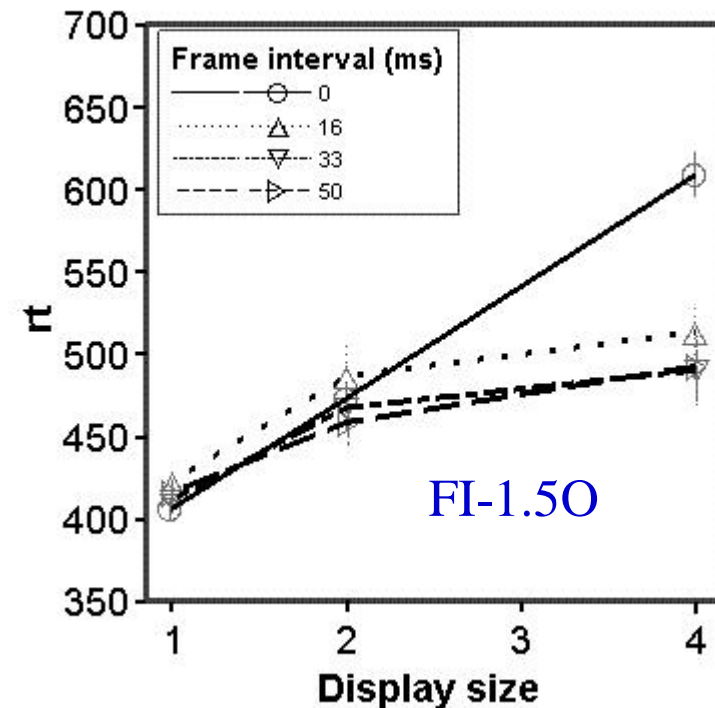This is a FI~1O for D>1.

Can we do better? yes

targets may not be located when expected

RSSP no circles (1/4 of the trials; sessions 55-59)

*

Again, target is either first or last of the stream;

ISI were fast (16 ms, 33 ms or 50 ms per slide).

FI-1.5O

The effect is stronger, a FI~1.5O.

targets may not be located when expected

- Tentative explanation:
  - Attention might be already fixed at one location (since task is difficult). Thus, there would be one useless scan (unless by chance, it is the location of the target).
  - With no circles, the appearance of the target is more salient. Thus, the second scan is more likely to be drawn to that location.

- One last question:
  - why the 16 ISI condition is slower?
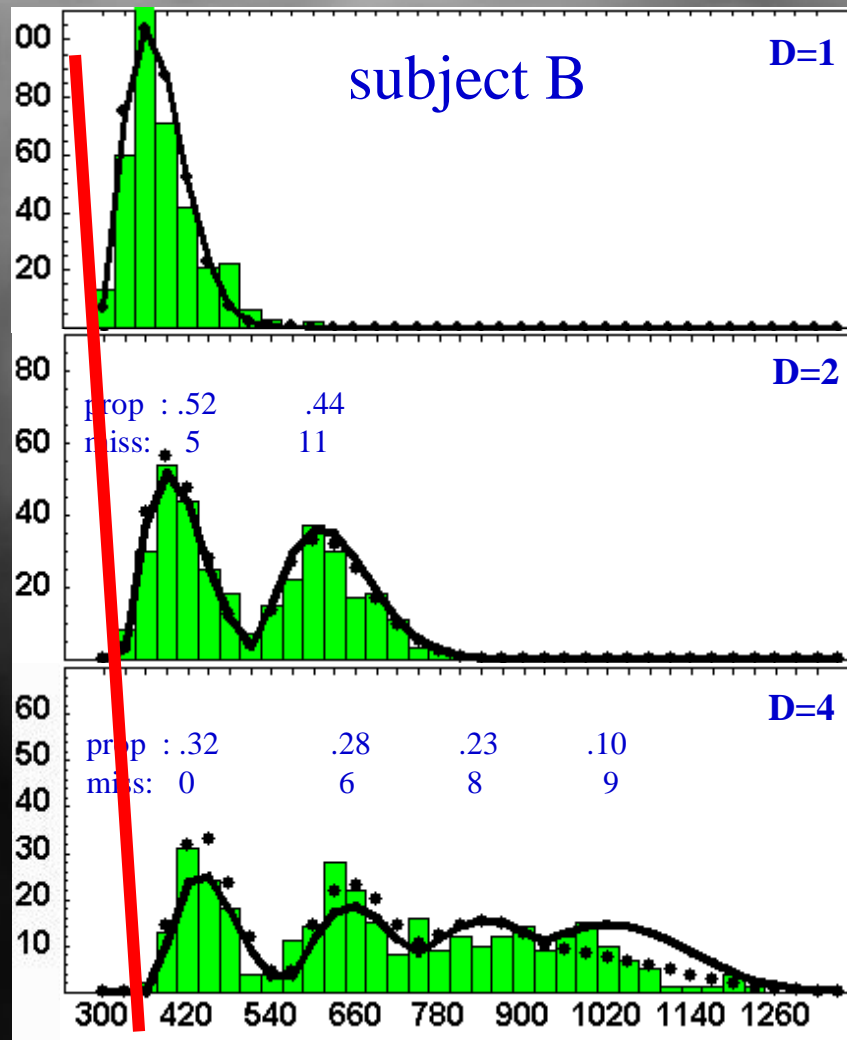
search may not start when expected

search may not start when expected

Standard condition
(1/3 of the trials;
sessions 30-34;
random)

Ratio 1.8 : 1
Slope ~ 120 ms/item
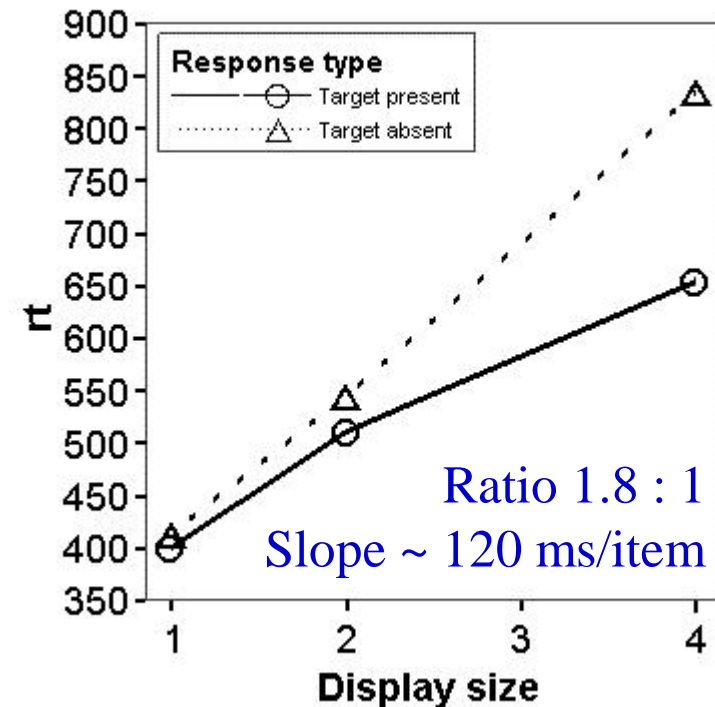
Can we extract more
information from this
condition? yes.

search may not start when expected

subject B

- There is a "blank zone" of about 30 ms / d where no response occurred.

- If the search was random, all modes would be equally present. Yet, the blank zone is compensated by a decrease in the modes (that is, less slow responses).

search may not start when expected
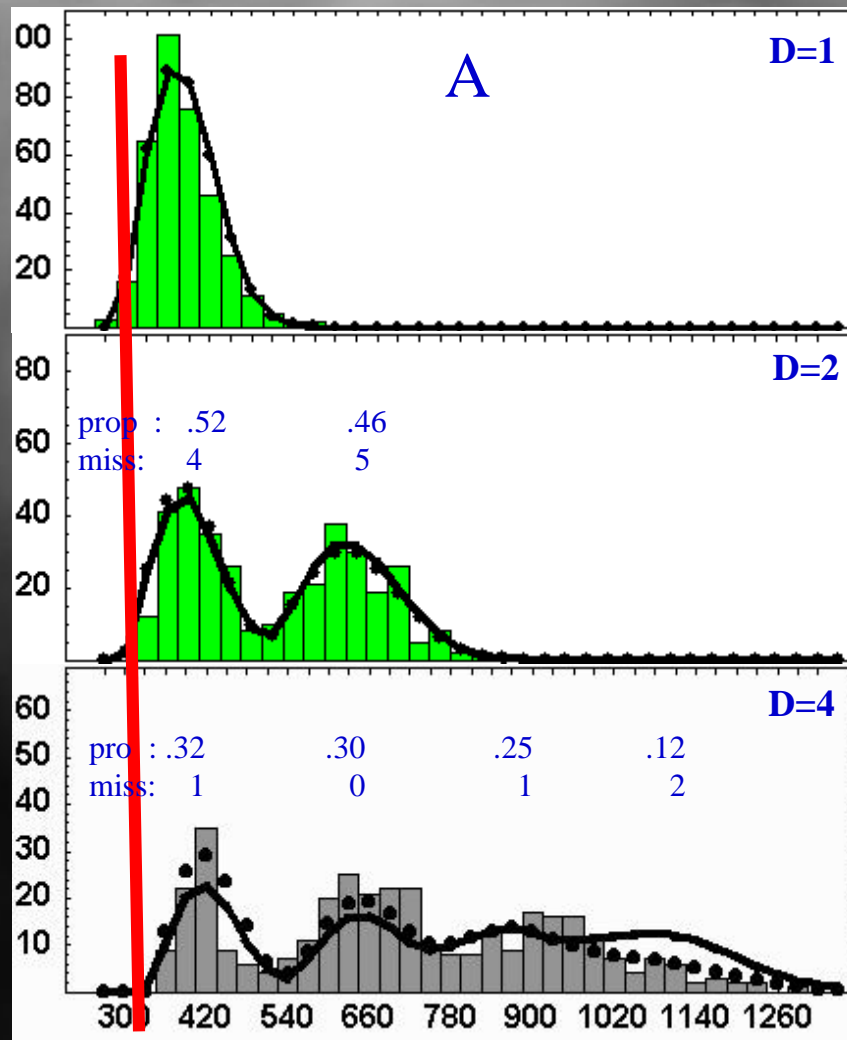
- The blank zone is much smaller, about 10 ms / d;
- The decrease in the modes is also smaller.

- The blank zone seems beneficial. What is it? Could it be an "accommodation" phase reducing "noise", i. e. the uncertainty of the display?

search may not start when expected

Standard no circles (1/4 of the trials; sessions 55-59; random)

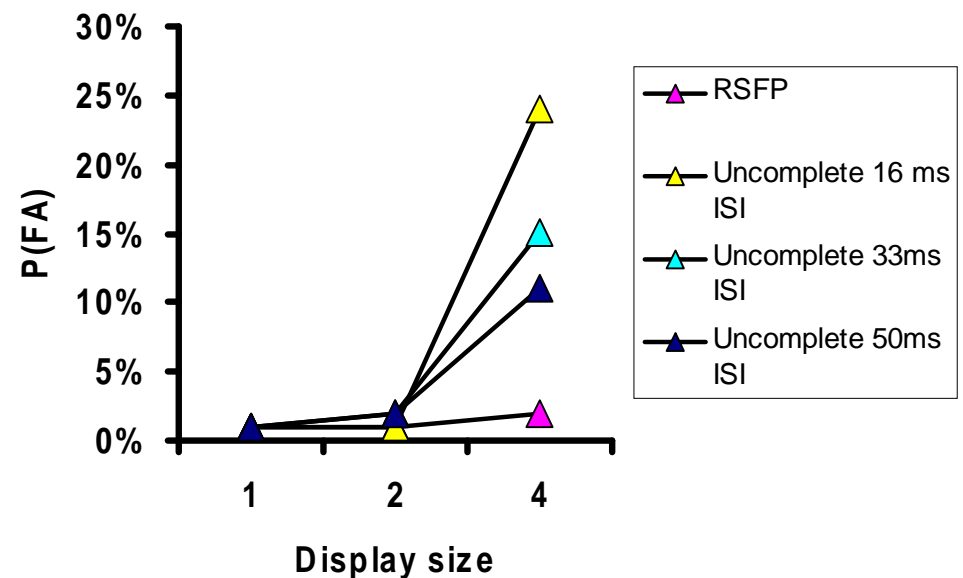Standard too many circles (1/10 of the trials; sessions 60-64; random)

- In both situations, the results were the same: RT were slower by ~30 ms.

- By contrast, we saw earlier that in RSSP, no circles helps obtaining the FI~1.5O effect, except at 16 ms ISI.

- What else could occur during the blank zone? something with a very brief time window.

search may not start when expected

RSFP with partial objects only (1/4 of the trials; random, sessions 70-74)

Etc.

*

False alarms!

P(FA)

30%
25%
20%
15%
10%
5%
0%

Display size
1   2   4

- RSFP
- Uncomplete 16 ms ISI
- Uncomplete 33ms ISI
- Uncomplete 50ms ISI

Whereas anywhere throughout training, P(FA) never exceeded 3% for any subject, it reaches now 25% in the fastest ISI.

Conclusions

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- FI~1.5O: Search with difficult (conjunctively defined) stimuli tend to favor concentrated attention.

- Blank zone as an accommodation phase:
  - whole objects are not perceived (no response given), but features are (illusory conjunction).
  - dissociation between attention and preattentive search, both occurring in parallel (last mode less likely) in a conjunctive search (modes were ~180 ms apart, but search slope was ~120 ms/item).

- thanks