Transient attention when detecting pictures in RSVP search

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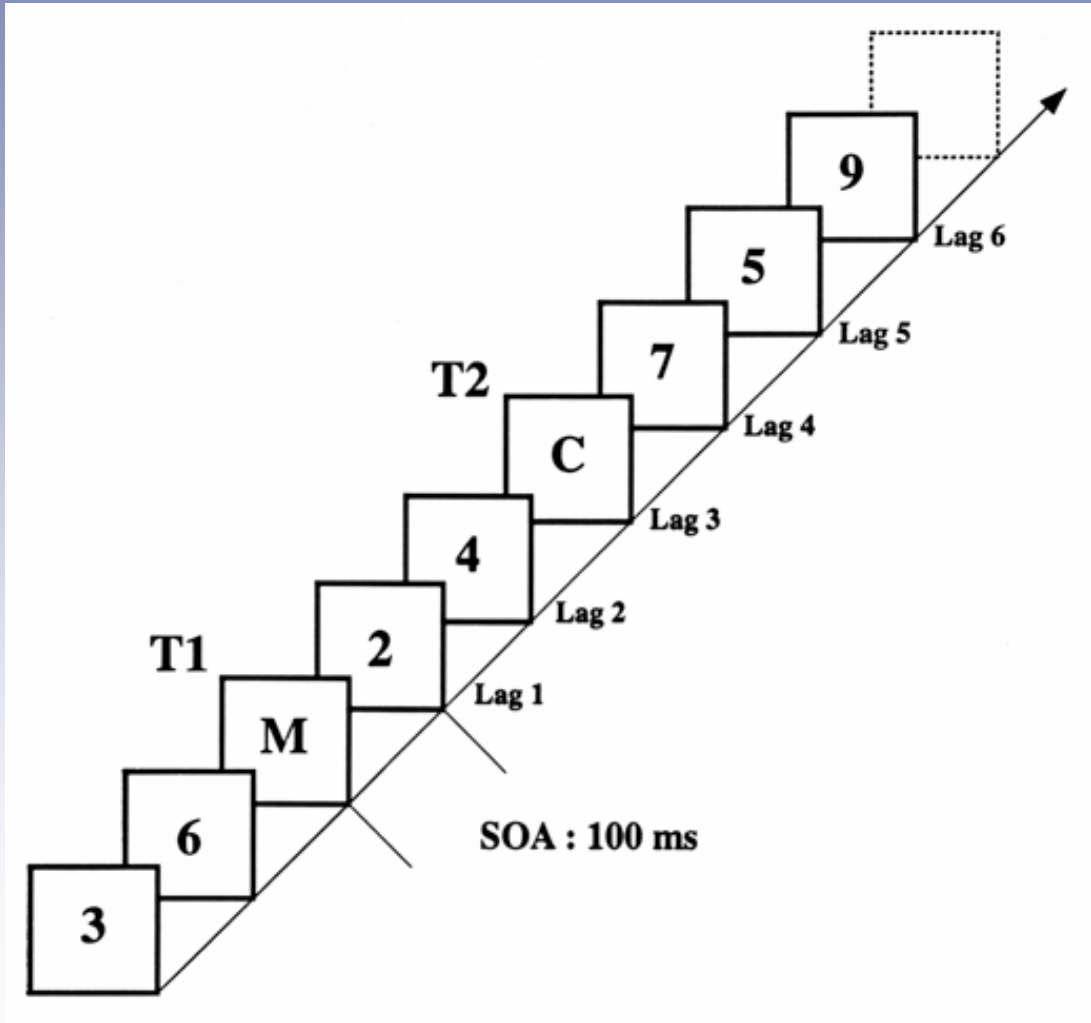
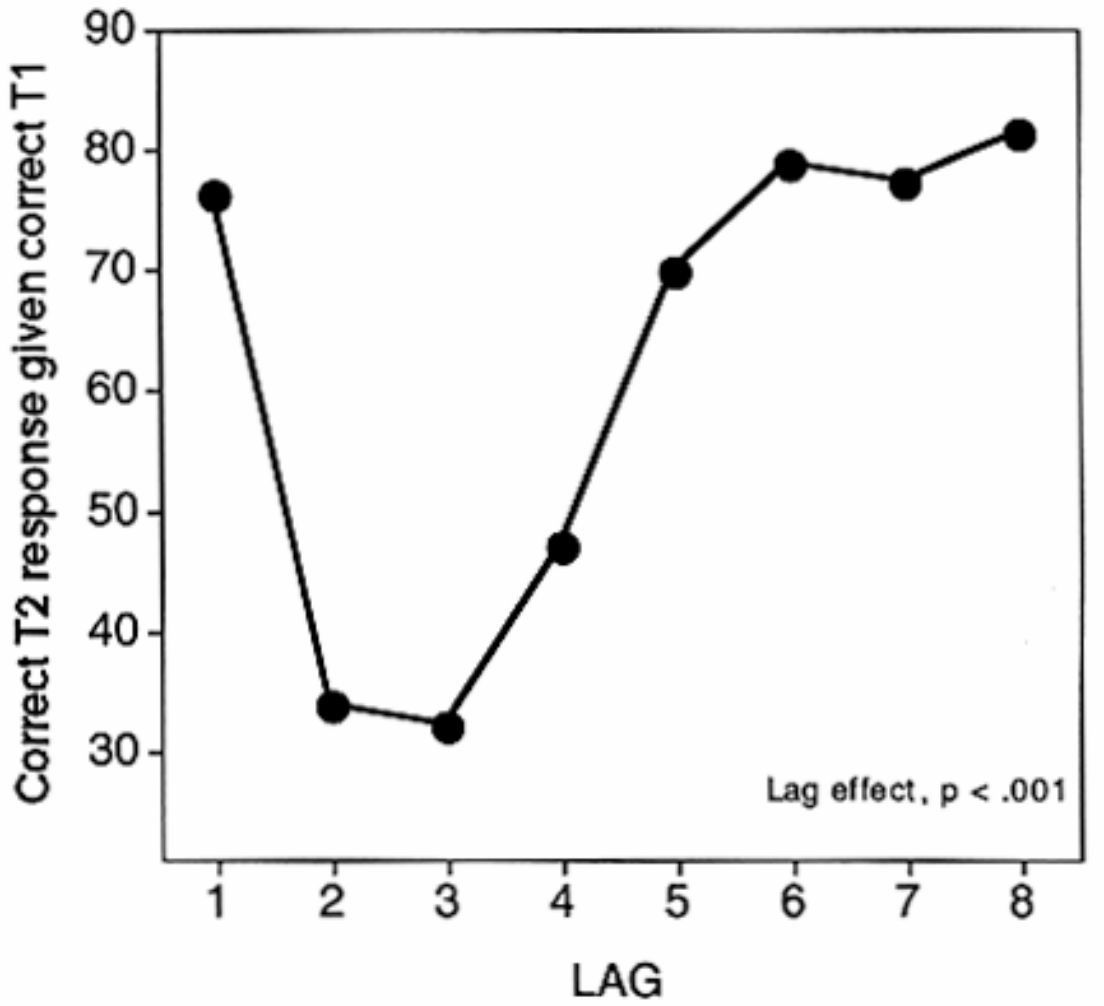
Outline

- Attentional Blink and Lag1 Sparing
- Transient Attention
  - Nakayama & Mackeben (1989)
  - Categorical targets : Wyble et al. (2007)
  - Sparing in the Attentional Blink?
- Transient attention in picture search
- How transient attention may work

The RSVP target search paradigm

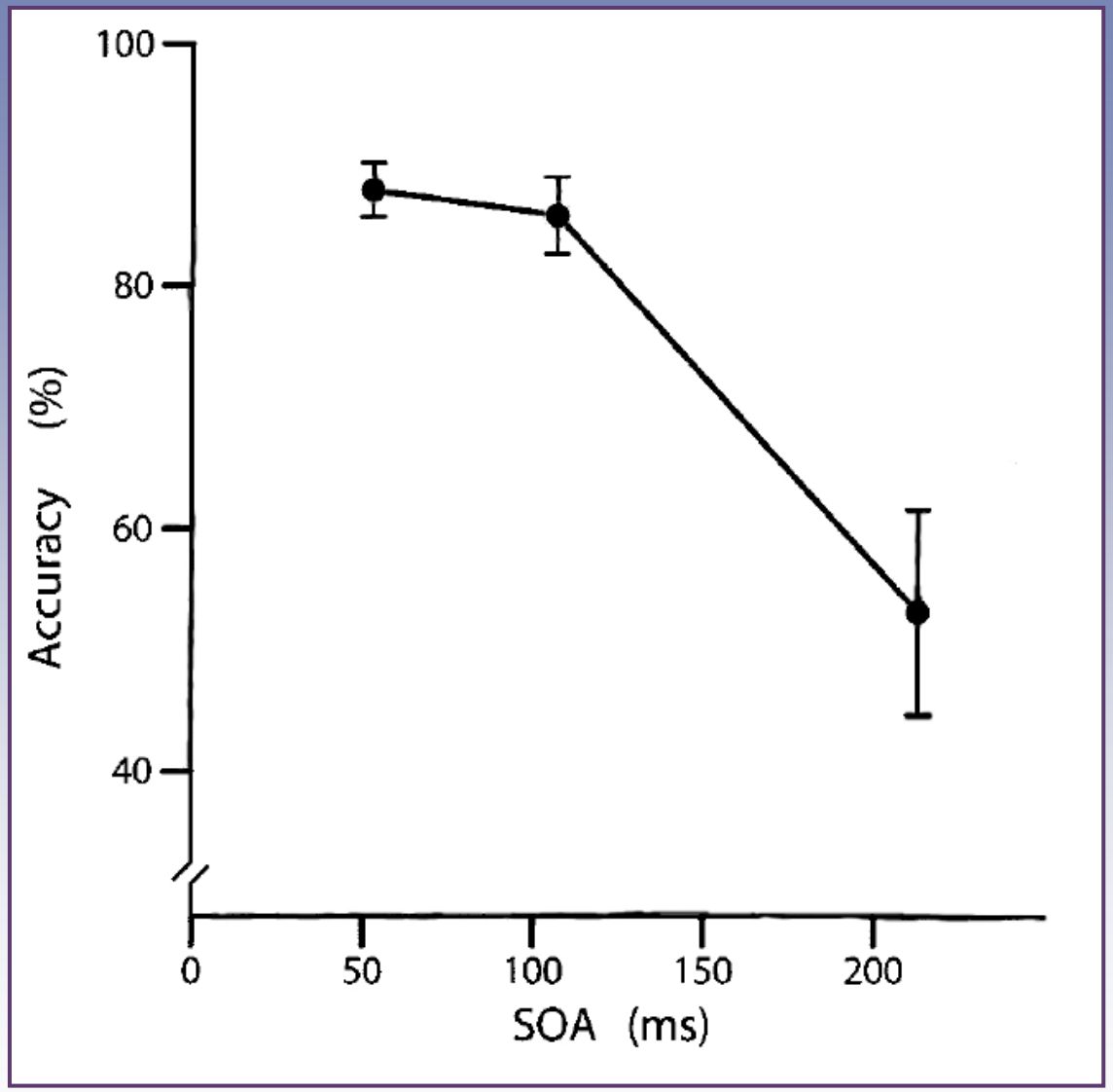


Attentional Blink
with Lag 1 sparing



- Task: Report two letters among a string of digits. Rate: 10/s
- Report of T2 (given correct report of T1) is impaired at Lags 2-5, but not at Lag 1.

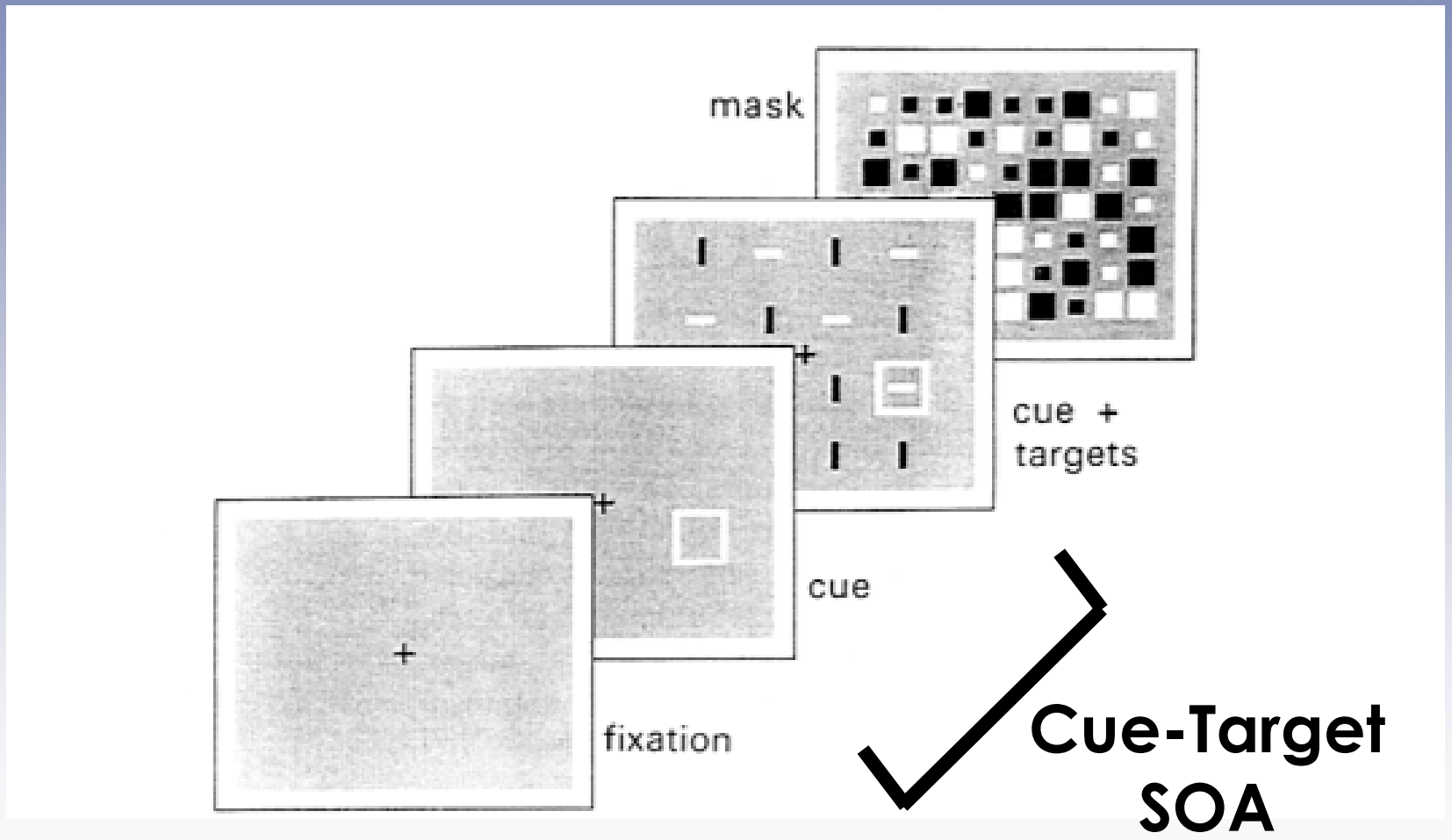
(Chun & Potter, 1995)



- Two word targets among keyboard symbols
- 53 ms/item

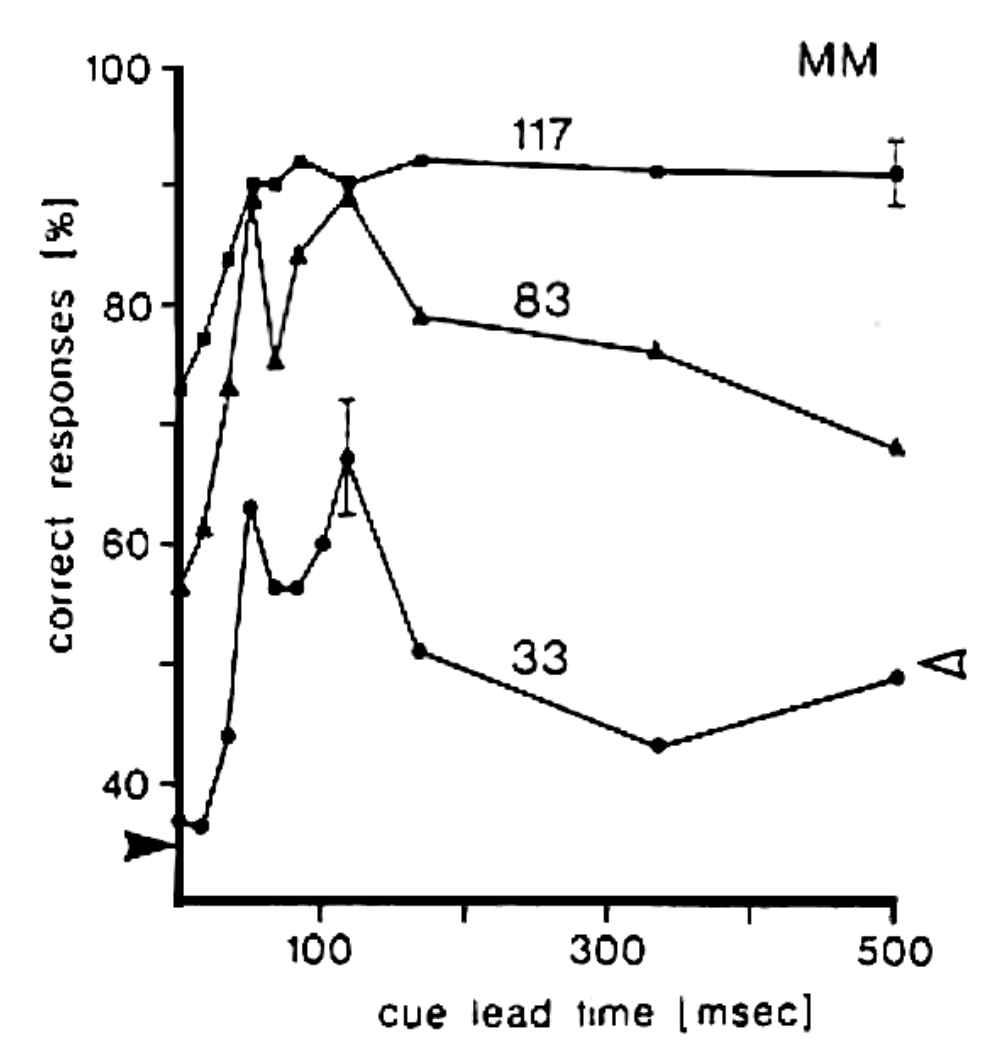
Potter, Staub & O'Connor (2002)

Spatial Cueing



Nakayama & Mackeben (1989)

Transient Attention



- A simultaneous array of stimuli was presented briefly followed by a mask
- Task: subjects searched for a single target
- On some trials location of target was cued by a box appearing at different SOAs

Nakayama & Mackeben (1989)

Two Types of Spatial Attention

- Sustained attention
  - Top-down, endogenous,voluntary
  - Slow (~300ms to engage fully), sustained indefinitely
- Transient attention
  - Bottom-up, endogenous, involuntary: requires a visually salient stimulus
  - Fast (~50 ms to engage fully), declines by 150-200 ms

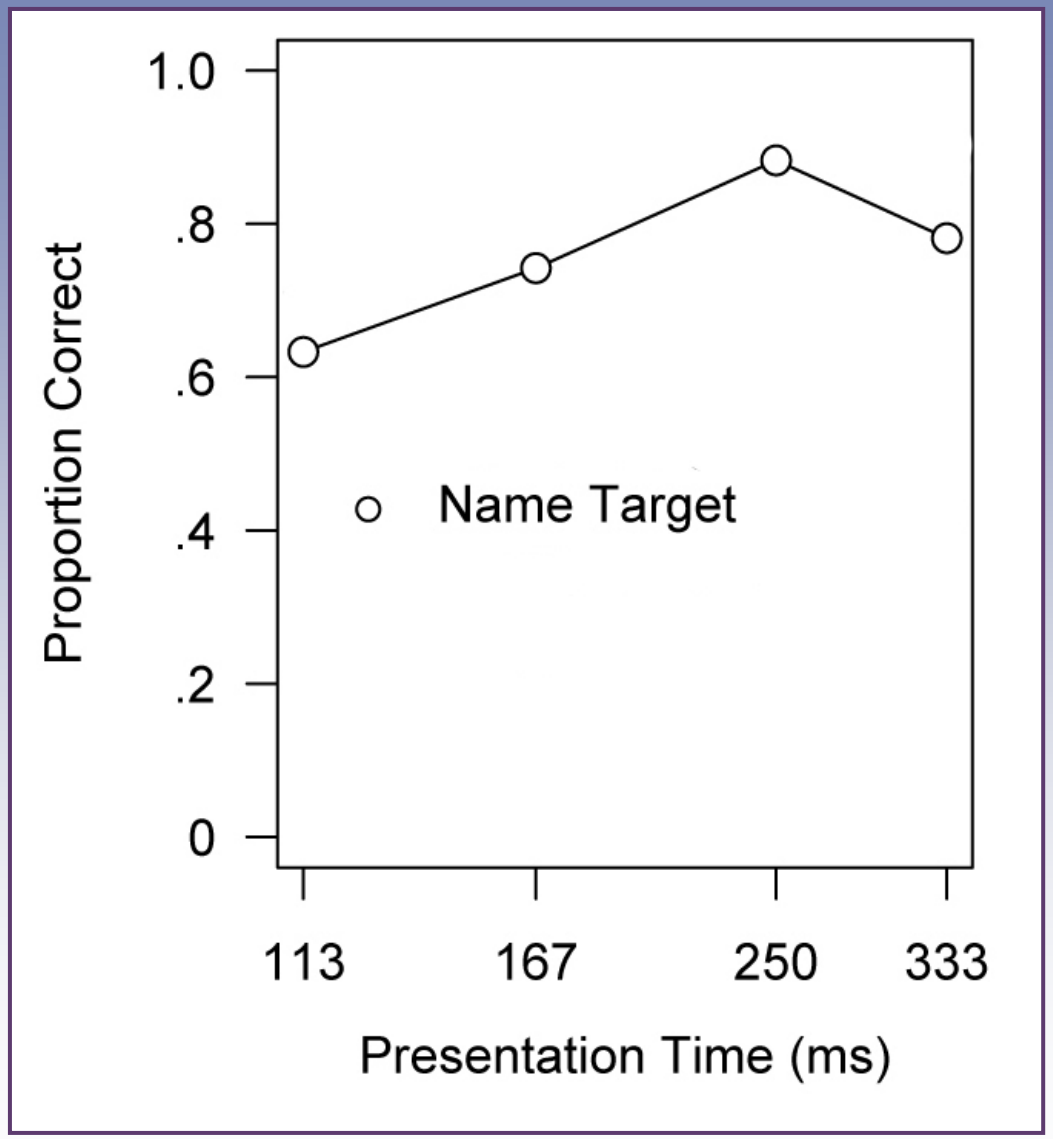
Triggering Transient Spatial Attention by Category

- Eight RSVP streams of keyboard characters
  - A digit target in one
- Brief preceding target (T1)
  - in same stream, enhanced detection of T2
  - in different stream, decreased detection of T2
  - The enhancement effect lasted for about 150ms only

Wyble, Bowman & Potter (2006)

Transient Attention in a Single RSVP Sequence?

- If transient attention can be triggered by a categorical target, then targets in RSVP category search should trigger attention
- Is sparing of T2 at SOAs up to ~150 ms the result of transient attention triggered by T1?
- If so, any category-defined target--including picture targets--should result in sparing of T2



- Detection of picture target (e.g. two men drinking) in RSVP
- Pictures all new to viewer

Potter (1976)

An Attentional Blink for Pictures?

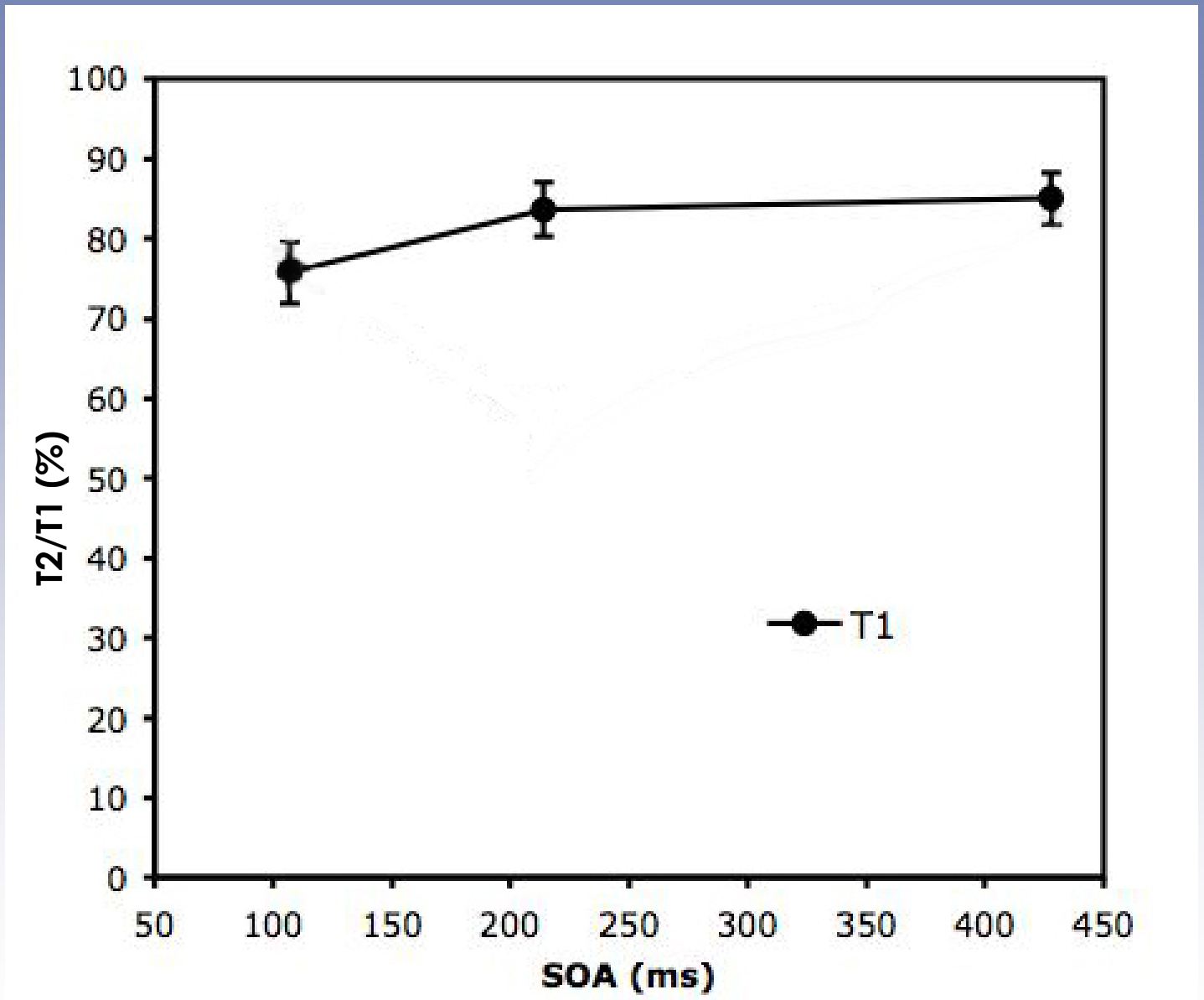
- Yes: Evans & Treisman (2005): Search for animals and vehicles

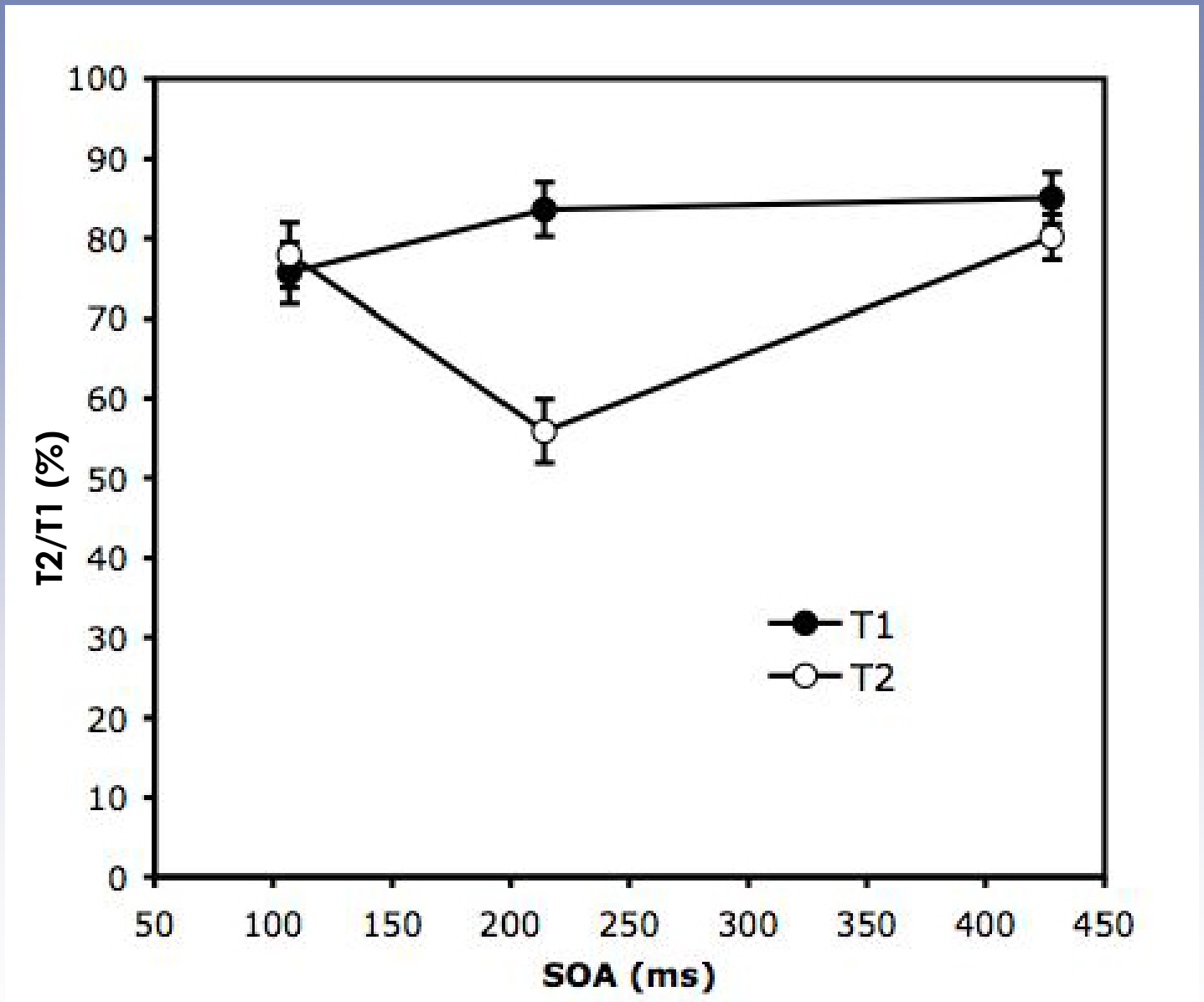
- Lag 1 sparing? Lag 1 was not tested

Experiment:

- Sequence of 8 pictures presented at the rate of 107ms/picture
- Subjects looked for two targets in a given category.
- Category: furniture
- Targets : bed, chair

M2


100
90
80
70
60
50
40
30
20
10
0
T2/T1 (%)
50
100
150
200
250
300
350
400
450
SOA (ms)
T1


100
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80
70
60
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20
10
0
T2/T1 (%)
50
100
150
200
250
300
350
400
450
SOA (ms)
T1
T2

How Transient Attention May Work

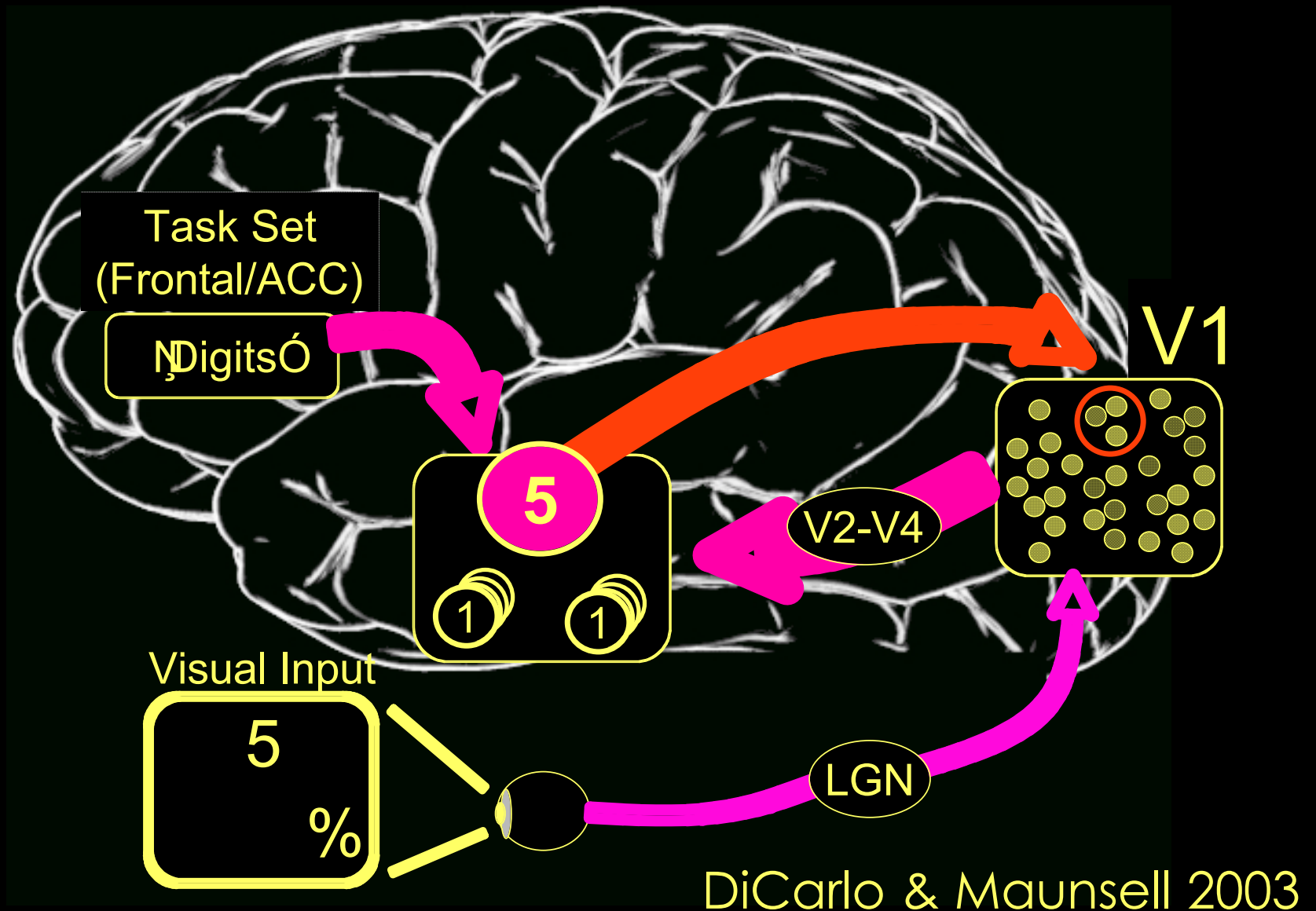
- By default, the transient mechanism is configured to respond to abrupt onsets and arresting stimuli.

- When subjects have a strong attentional set (search for a vehicle), the relevant category is pre-activated in IT.

How Transient Attention May Work

continued..

- Stimuli pass forward to IT, where a coarse representation of retinotopic location feeds back to V1, selectively enhancing the activity of feature detectors at that location and then feeding forward to IT .
- No interaction with frontal areas is required.
- The whole cycle can occur within a typical eye fixation of 250 ms.


Task Set
(Frontal/ACC)
ÑDigitsÓ
V1
5
V2-V4
1
1
Visual Input
5
%
LGN
DiCarlo & Maunsell 2003

- Transient Attention benefits only the location of the cue

- **Implication:** Lag 1 sparing should be absent when T1 and T2 appear in different locations, and that is the finding in almost all AB studies (Visser, Bischof, & DiLollo, 1999).

- Would that be true also for picture search? Tune in later this spring.

Thank you!