9.63 Laboratory in Visual Cognition

Fall 2009

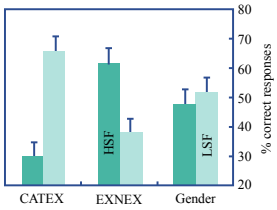
Paradigms of Attention : Selective - Divided Attention

Selective attention in scale space

Figures by MIT OpenCourseWare.

Man vs. woman?
Expressive vs. non-expressive?
Neutral, angry or happy?
Mary or John ?

Selective attention in scale space



Figures by MIT OpenCourseWare.

Different face categorizations elicited a different usage of spatial scales

- Schyns & Oliva, 1999.

Selective attention in scale space

Hybrid Stimuli

- Combine the LSF and HSF of two different images (LSF < 2 c/d and HSF > 6 c/d).
- Multiplex information in scale space.
- Enable the analysis of task-dependent scale biases.
- Enable the study of selective attention in "scale space"

Figure removed due to copyright restrictions.

Oliva & Schyns, 1997

Selective attention in scale space

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Oliva & Schyns, 1997

Selective attention in scale space

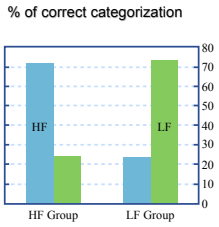

Figure by MIT OpenCourseWare.

Subjects were *not* aware of the presence of two scenes.

- Mutually exclusive categorization of identical stimuli
- Selective attention to a spatial scale (with overlapping stimuli at different frequencies) is possible

Oliva & Schyns, 1997

Selective and Divided Attention

- Selective attention: we choose to attend to stimuli and ignore others
  The concentrated focus of attention on particular stimuli or some information of those stimuli enhances our ability to manipulate them for other cognitive processes
- Divided attention: we allocate our available attentional resources to coordinate performances on more than one task at a time

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Divided Attention

- We often manage to engage in more than one task at a time and we shift our attentional resources to allocate then as needed
- Example: experienced drivers easily can talk while driving under most circumstances, but they can quickly shift all their attention from talking and toward driving…
- Question: how difficult is it to do 2 or more tasks at once ?
- => Dual-task performance

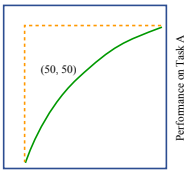

Figure by MIT OpenCourseWare.

An Attention Operating characteristics curve (AOC). The broken line shows an atypical case where equal emphasis on both tasks (50,50) produce no sacrifice in performances. More commonly performance on both tasks is impaired

Divided attention while driving: a dangerous dual task

- A dual task performance in the real world.
- Legislation: prohibit drivers from talking on cell phones while behind the wheel.
- Using cell phones while driving is believed to be a major cause in 50% of highway accidents.
- The argument is: talking on a cell phone distracts the driver's attention from navigating the vehicle on the road

Divided and selective attention at the same time: Unexpected objects fail to capture the attention

Figure removed due to copyright restrictions.

Talking on a Cellular Telephone Dramatically Increases Sustained Inattentional Blindness

Brian Scholl, Nicholaus Noles, Rachel Sussman, & Vanya Pasheva

Yale
Perception & Cognition
Laboratory

http://www.yale.edu/perception/

Multiple-Object Tracking

1. Requires *sustained* attention (vs. shifts)
2. Inherently *active* tracking (vs. monitoring)
3. No required strict timing constraints!
4. Yields relatively large & salient effects
5. *Can easily vary the attentional load . . .*

- Scholl et al (2003)

Method Notes

- Natural cell phone conversation
- MOT: Track 3 in 7 black circles
- Extra items: 4 white Ls
- Tracking for 15 seconds, UE (red cross) visible for 5 s
- 20 subjects / condition
- 4 Track-only trials preceding critical trial
  - Scholl et al (2003)

Results (UE = +)

	Tracking Task	% Noticing
Baseline	77.2%	70%
Cellphone	78.4%	**10%**

Figure removed due to copyright restrictions.

- Scholl et al (2003)

Results (UE = +)

	Tracking Task	% Noticing
Baseline	77.2%	70%
Cellphone	78.4%	**10%**
Talking	75.1%	25%
Listening	78.9%	5%
Shadowing	76.4%	25%

Figure removed due to copyright restrictions.

- Scholl et al (2003)

Implications

. . . for Human Factors (+Policy)

- Inattentional blindness may be a critical cause of collisions

. . . for Psychology

- Perception research can be ecologically valid!
- The multi-modal nature of attention
- Interference between modalities.

- Scholl et al (2003)

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