Paying Attention to Attention

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Intelligent Room HCI Group

Demos!!!

demo 1

demo 2

Attention – What is it?

"Every one knows what attention is. It is the taking possession by the mind, in clear and vivid form, of one out of what seem several simultaneously possible objects or trains of thought."

-- William James, 1890

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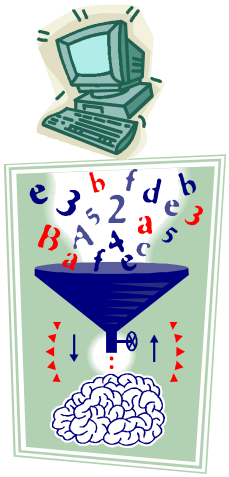
- **A central aspect of our mental life**
- **Visual and speech perception, discourse, …**
- **Competition between salience (stimulus-driven) and intention (goal-driven)**

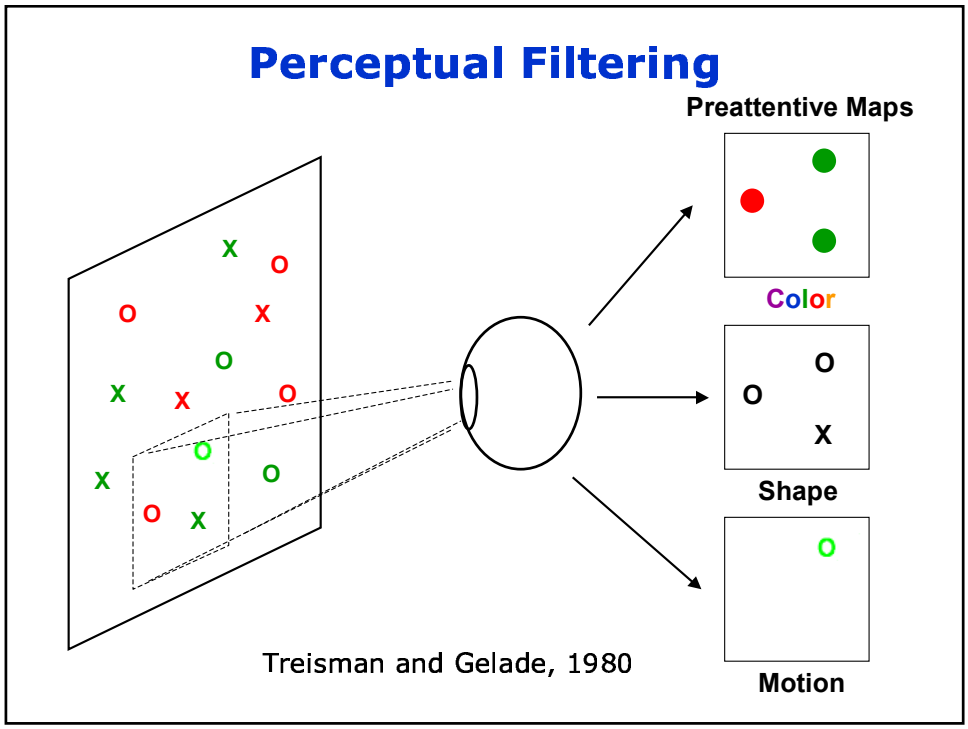
Attention Is Crucial for HCI

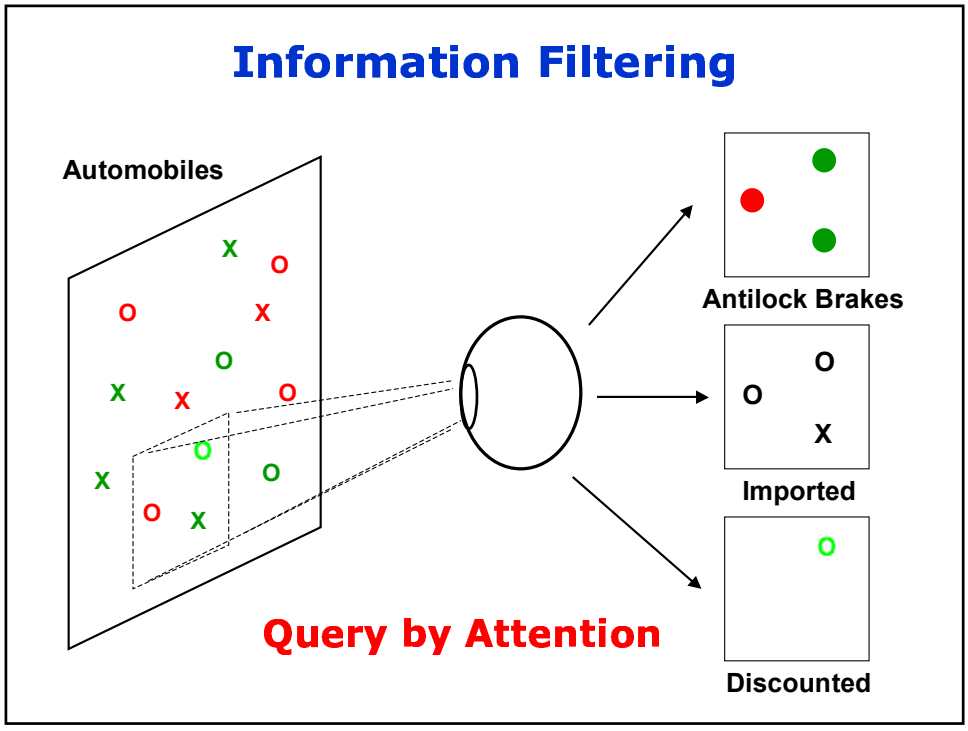


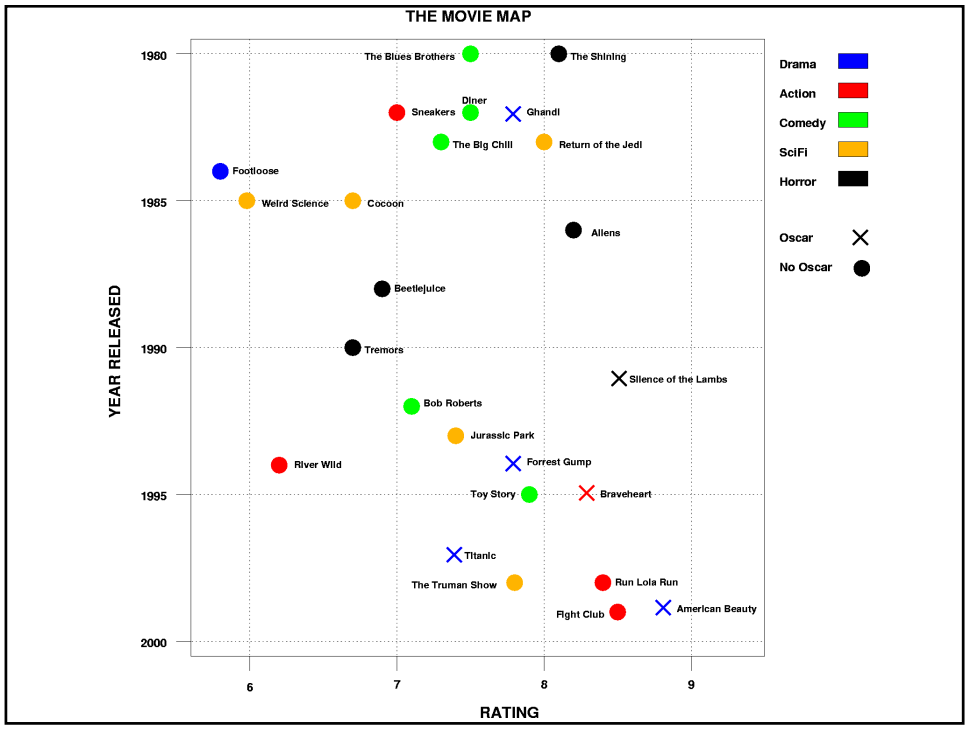
- Bandwidth mismatch
- No Moore's Law for humans
- Pervasive = more info sources, more competition for attention
- A research opportunity

Agenda

- "Query by Attention," Foltz and Davis 2001
- "Notification, Disruption, and Memory," Cutrell, Czerwinski, Horvitz 2001
- Discussion/Brainstorming: Implications for E21


Perceptual Filtering
Preattentive Maps
Color
Shape
Motion
Treisman and Gelade, 1980


Information Filtering
Automobiles
Antilock Brakes
Imported
Discounted
Query by Attention

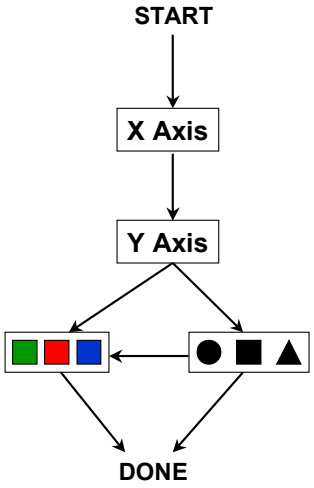


Why Query by Attention?

- **User controls attention, instead of manipulating an interface**
- **Rapid adjustment of query parameters**
- **Immediate feedback**
- **Can lead to more complete exploration of info space**

Mapping Information to Perception

Step 2: Match info attributes to visual properties



Review

Year

Oscar

Genre

Title

Mapping Information to Perception

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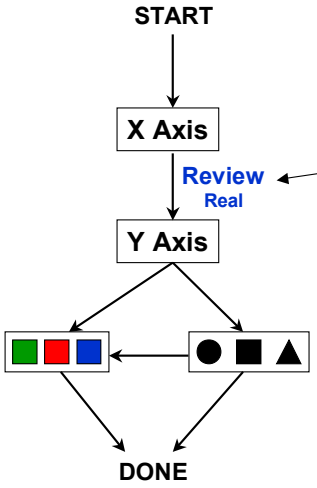

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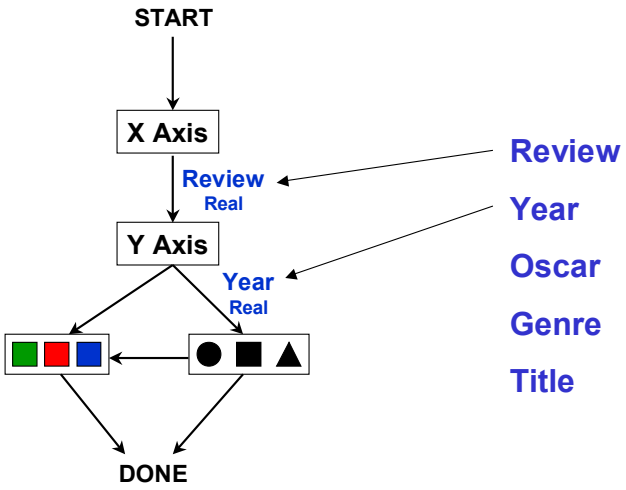

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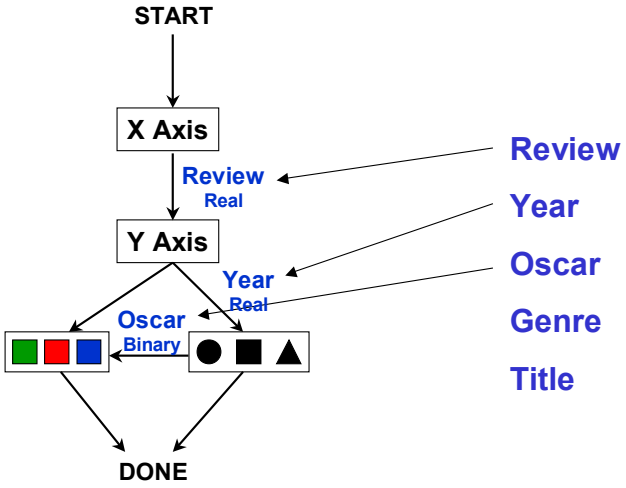

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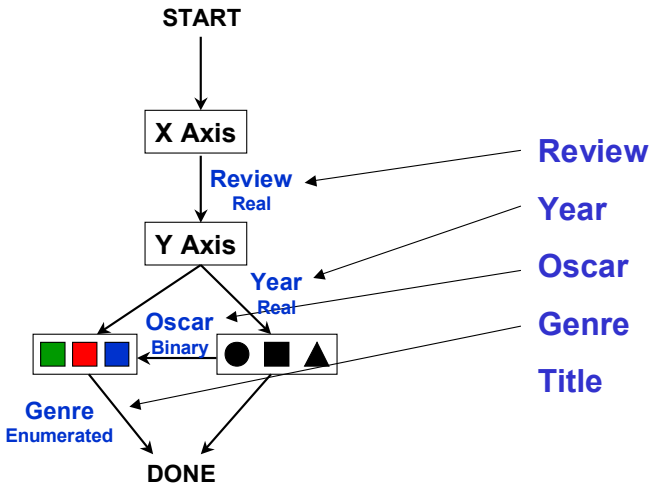

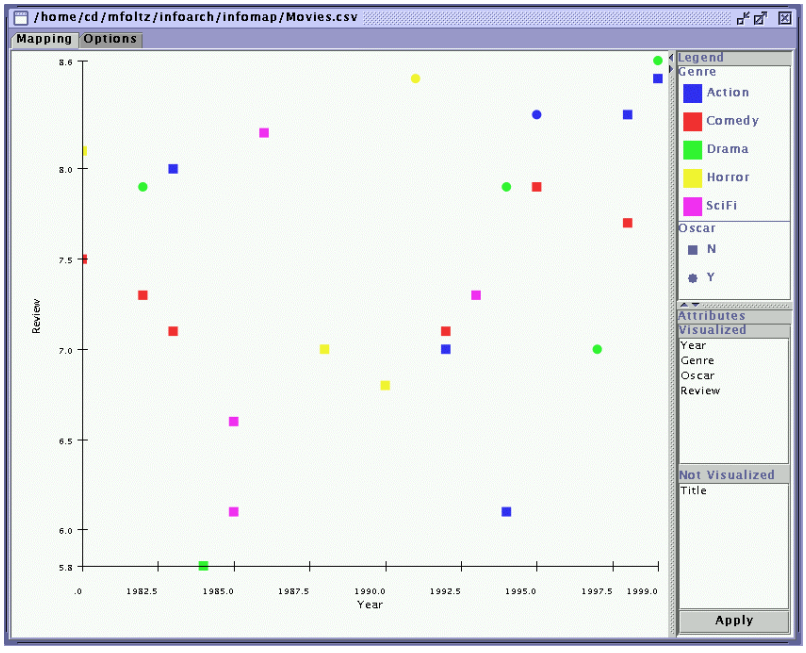

Interruptions: Issues

- **Interrupt or not?**

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- And whom (individual, group, a delegate)?

Interruptions: Issues

- Interrupt or not?
- If so, when (now or later)?
- And whom (individual, group, a delegate)?

- And, how can we remember where we were?

Interruptions: policies

	Disruption?	Delay?
Immediate	X	
Negotiated		X
Scheduled	X	X
Mediated	x	x

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	Disruption?	Delay?
Immediate	X	
Negotiated		X
Scheduled	X	X
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No perfect solution (McFarlane 99)

Must know utilities to quantify tradeoffs

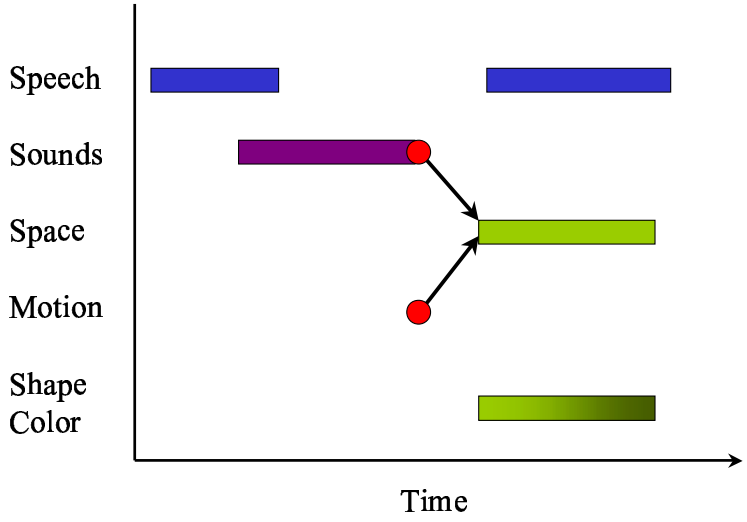
Cutrell: Interrupting List Search

- **Task**
  - **Subjects search a list of book titles**
  - **Given either a title or a description (gist)**
  - **While being interrupted**
- **Conditions (2 x 2 x 2)**
  - **Title vs. gist search**
  - **Cursor vs. no cursor**
  - **Interruptions vs. no interruptions**
- **16 subjects**

Findings

- **Gist search has a high reaction time**
- **Title search has a high recovery time**
- **Interruptions are more disruptive early in the primary task**
  - **More reminders requested**

Design Principles for Attention:
Conveying information



Design Principles for Attention:
Interrupting Users

- **Don't interrupt early in the primary task.**
- **Focus the interruption on whom it affects.**
- **Assist swap-in.**
  - **Record the context before the interruption.**
- **Create a virtual secretary.**
  - **E.g., knows the priority of the current meeting.**
- **Group interruptions by topic.**

Further Reading

Psychology

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Horvitz, Jacobs, and Hovel. Attention-sensitive alerting. UAI '99. http://www.research.microsoft.com/~horvitz/

Nowell, Hetzler, and Tanasse. Change blindness in information visualization. Proc. IEEE Symposium on InfoVis 2001.

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