

week 05



Ambient Media

At the periphery of our awareness

Announcements

- Midterm project proposal due today Tue Sept 25
- Crash course on programming by Dave and Ryan

Lecture Outline

- Peripheral Awareness
- Ambient Media
- Signs and Representational Fidelity

Peripheral Awareness

What we are attuned to without attending to explicitly

[Weiser, 1995]

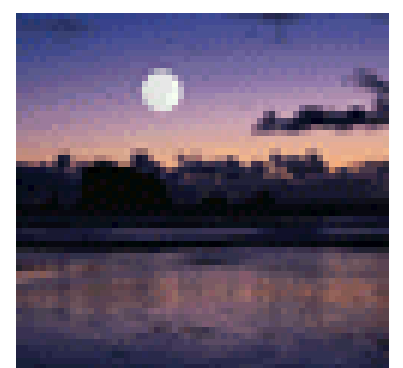
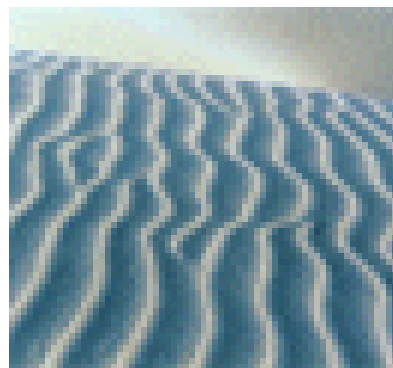
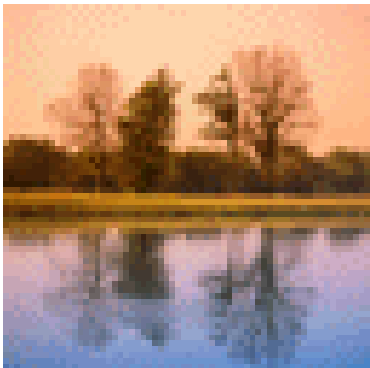
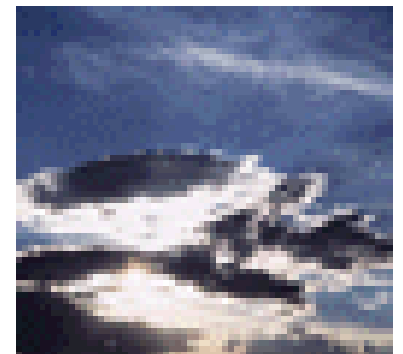
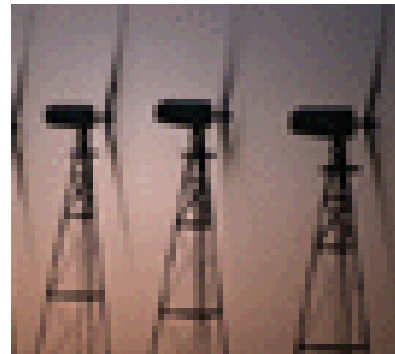
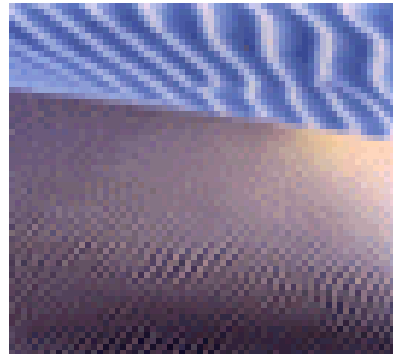
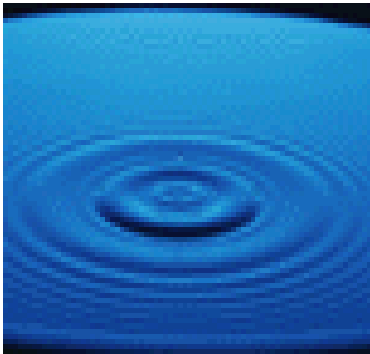
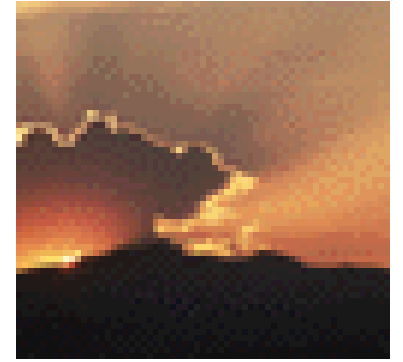
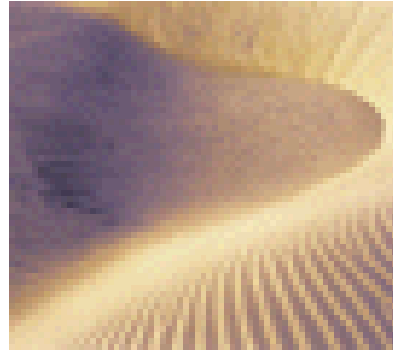
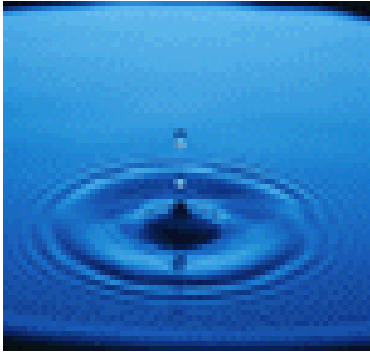








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Periphery

What we are attuned to without attending to explicitly.

[Weiser, 1995]

Calm Technology

Engages both the center and the periphery of our attention, and moves back and forth between the two.

[Weiser, 1995]

Live Wire

[Jeremijenko , 1995]



Locatedness: Calm Technology

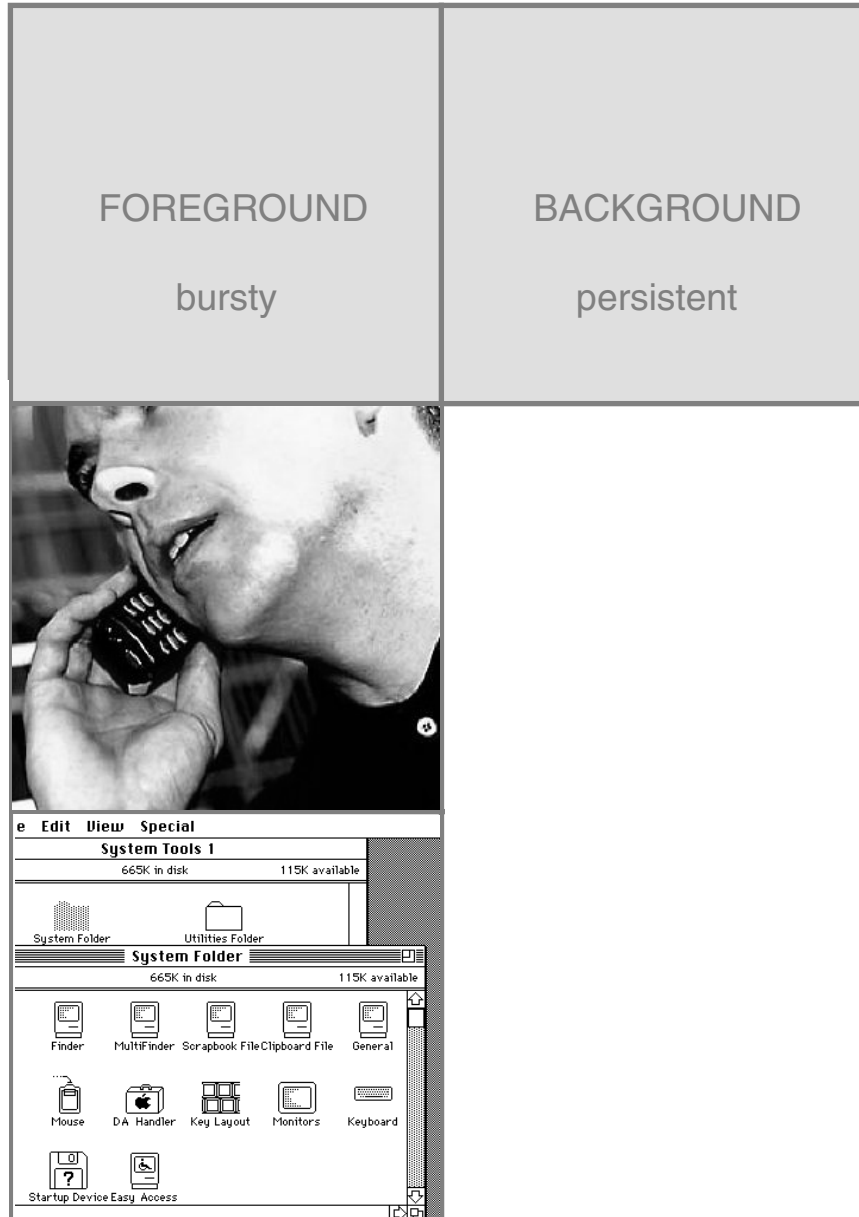
We are connected effortlessly to a myriad of familiar details of the world around us.

[Weiser, 1995]

Tasks in Foreground and Background

[Buxton, 1995]

[Buxton, 1995]



[Buxton, 1995]



[Buxton, 1995]



[Dourish & Bly, 1992]



[Buxton, 1995]



Foreground and background

Calm technology engages both the center and the periphery of our attention, and moves back and forth between the two. [Weiser, 1995]

Activity Theory

Hierarchical Structure



Activity



Actions

conscious
goal-oriented



Operations

automatic,
unconscious

Activity Theory

Hierarchical Structure

Example



Activity

Building a house



Actions

Putting the roof up, transporting bricks by truck



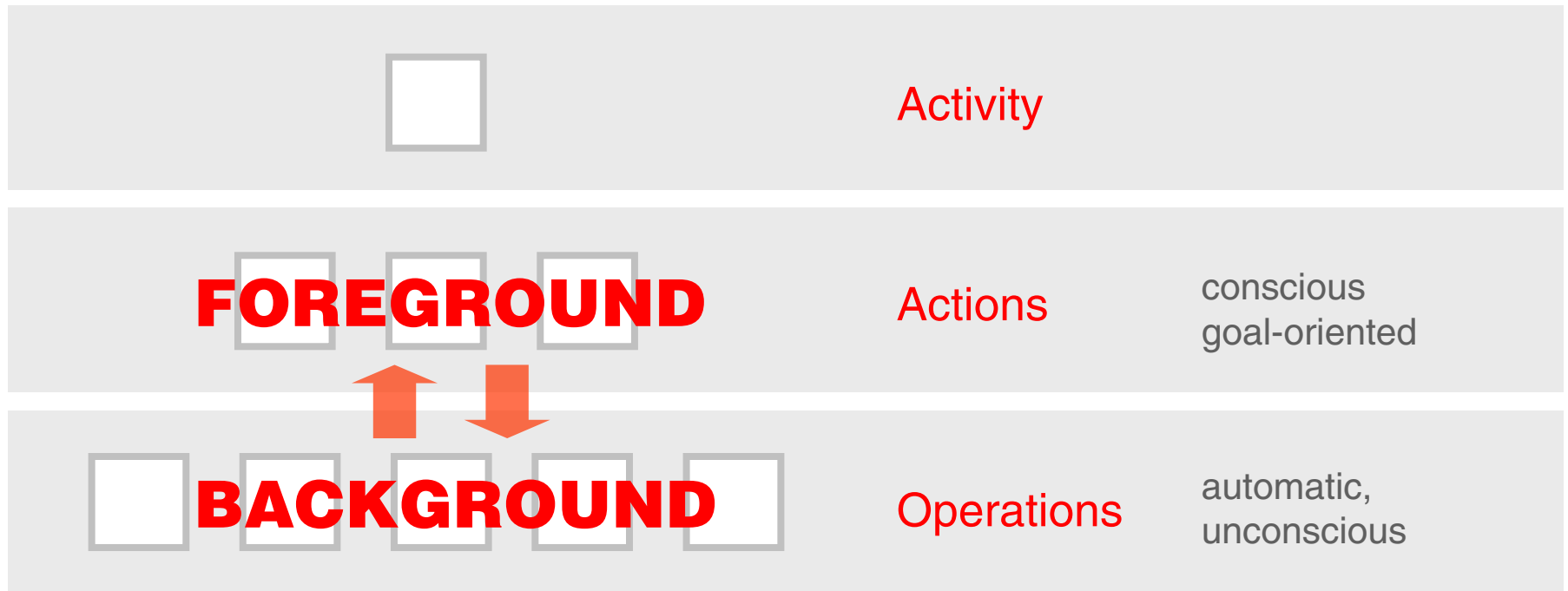
Operations

Hammering, changing gears when driving

Activity Theory

Hierarchical Structure

Foreground and background in calm computing



Ambient Media

Ambient Media

Information conveyed via calm changes in the environment so that users are more able to focus on their primary tasks while staying aware of non-critical but important information that affects them.

[Pousman & Stasko, 2006]

Pinwheels: wind of bits

[Ishii et al., 1997]



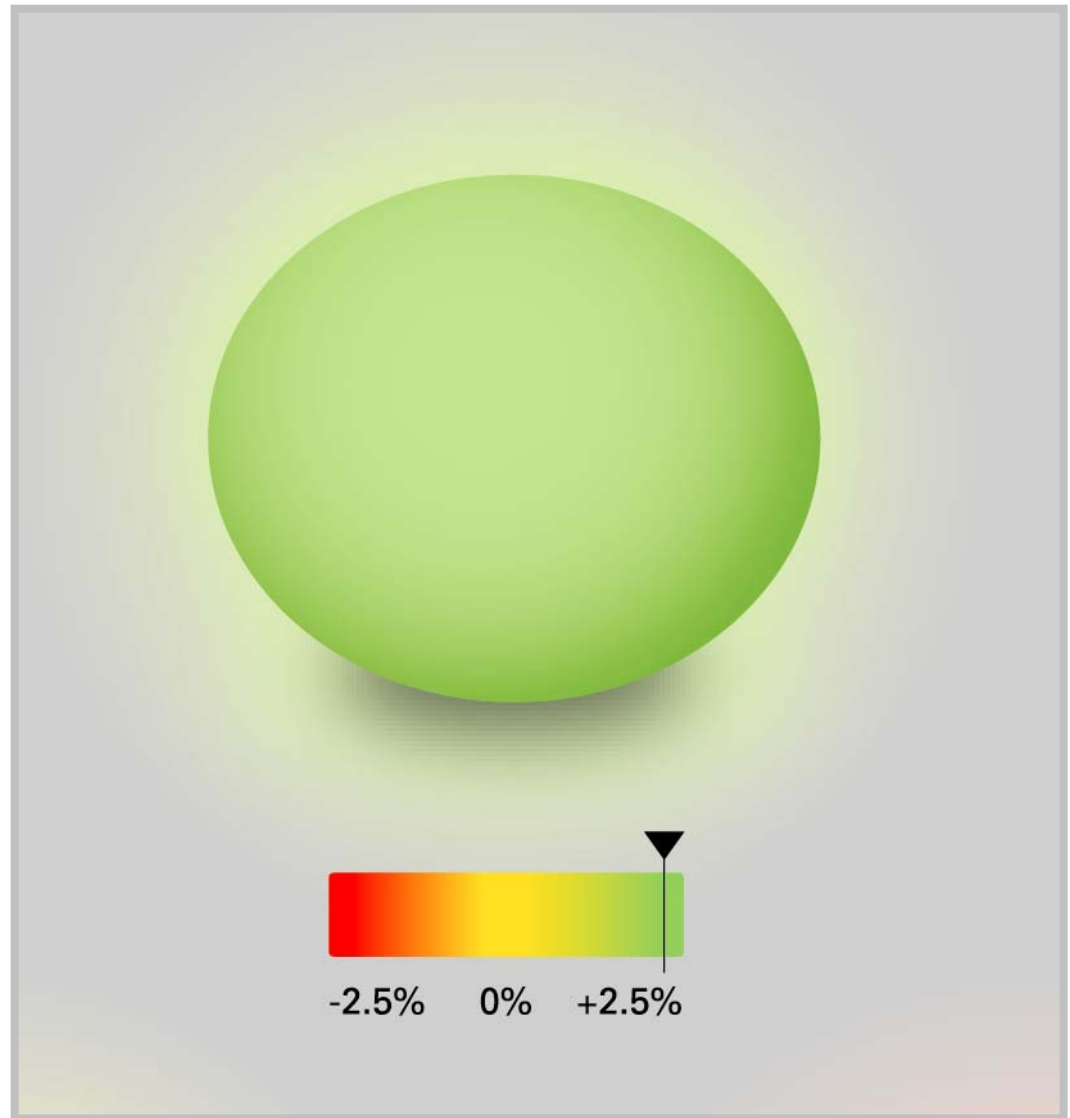
ambientROOM

[Ishii et al., 1997]



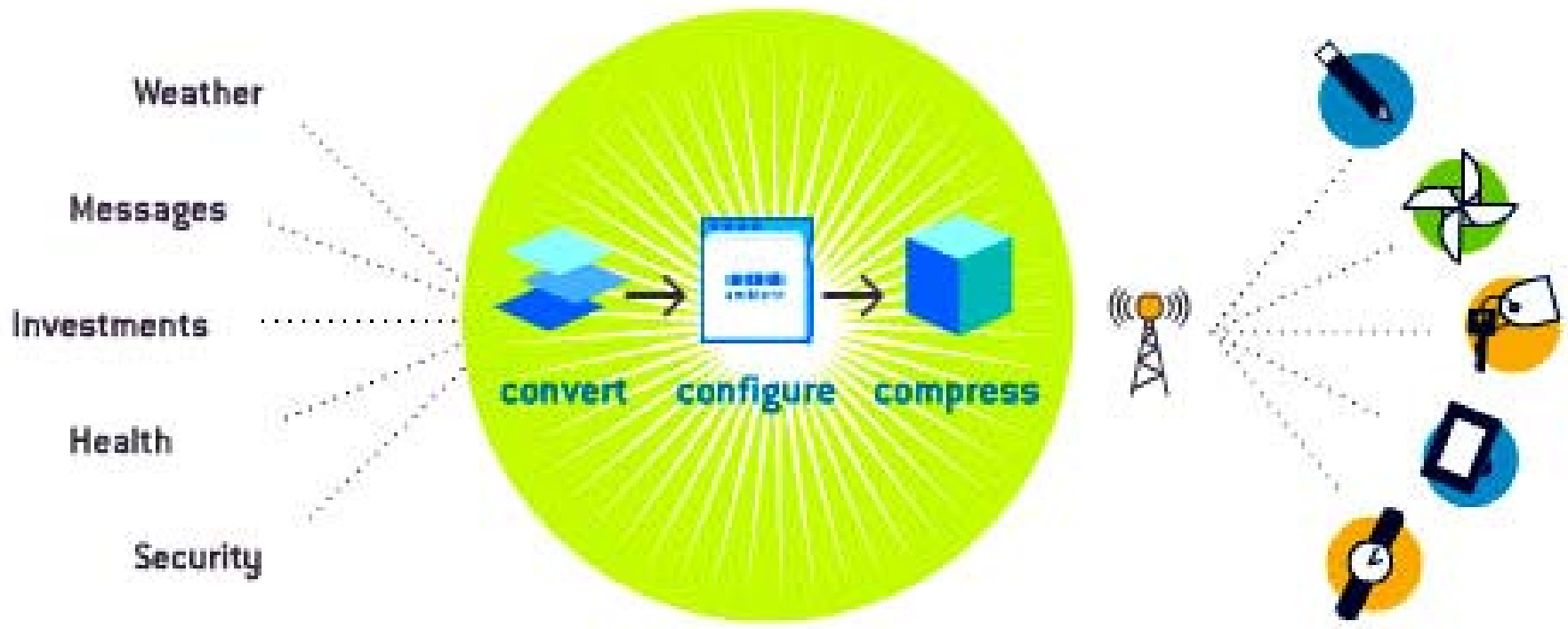
Orb

[Ambient Devices]



Orb

[Ambient Devices]



Orb

[Ambient Devices]

DOW

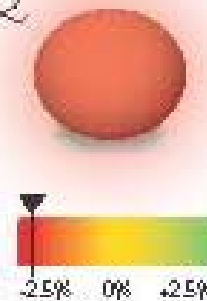
"Large blue-chips are rising"



NASDAQ

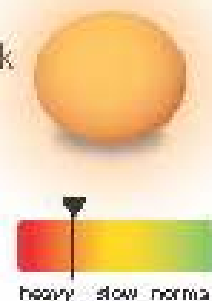
"Call the broker."

NASDAQ DOWN



TRAFFIC

"Take the back roads."



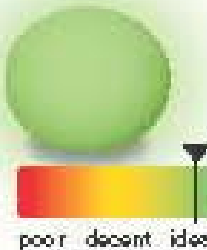
WEATHER

"Wear your heavy coat tomorrow."



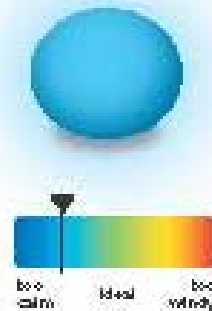
GOLF

"Schedule a weekend tee time."



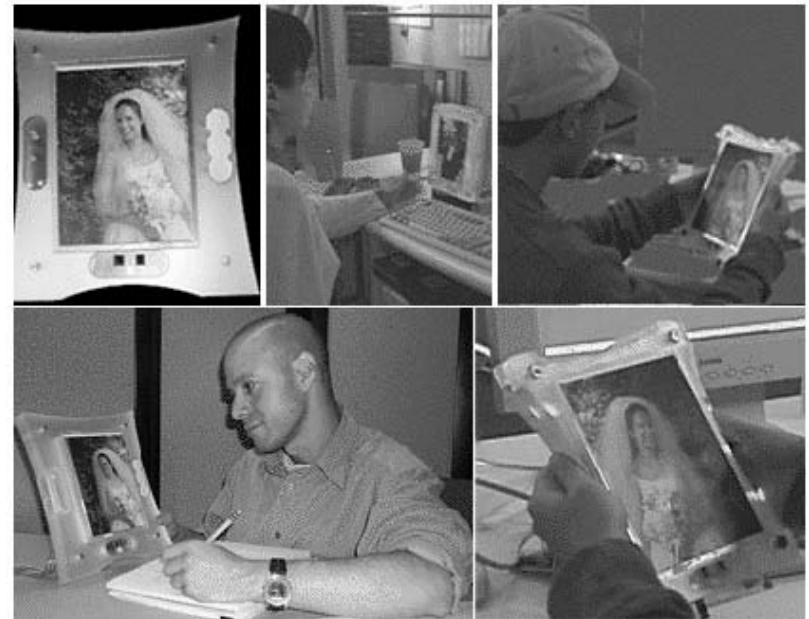
SAILING

"Light wind today."



LumiTouch

[Chang, Resner et al., 2001]



iCom

[Agamanolis , 2003]



Ambient Media: Design Principles

1. Display important but not critical information
2. Can move from the periphery to the focus of attention and back again
3. Focus on physical representation in the environment
4. Provide subtle changes to reflect updates in information (should not be distracting)
5. Are aesthetically pleasing and environmentally appropriate

[Pousman & Stasko, 2006]

Representational Fidelity and Signs

Representational Fidelity

How the data from the world is encoded into patterns, pictures, words, or sounds.

[Pousman & Stasko, 2006]

Sign

Sign

[Peirce 1931-58]

Signified

The physical thing or idea that the sign stands for.

Signifier

The representation of the object, which could be a word, a picture, or a sound.

Sense

The understanding that an observer gets from seeing or experiencing either the signified or its signifier.

Sign

[Peirce 1931-58]

Signified

The physical thing or idea that the sign stands for.



Signifier

The representation of the object, which could be a word, a picture, or a sound.



Sense

The understanding that an observer gets from seeing or experiencing either the signified or its signifier.

Warm, hot, burn, bright, dangerous, etc.

Types of Signs

- **Iconic**
- **Symbolic**
- **Indexical**

[Peirce 1931-58]

Iconic Signs

Signs that “resemble” or “look like” that to which they refer to.
A preference for “visual resemblance” over all other possible sorts
resemblance.

Iconic signs

Drawings and caricatures



Iconic signs

Imitative gestures and metaphors



Symbolic Signs

Based on code or rule-following conventions.

Fundamentally arbitrary, so the relationship must be learned.

Symbolic Signs

Language characters, numbers

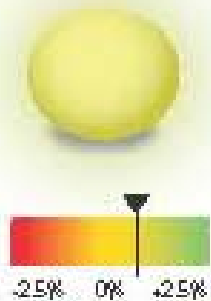


Symbolic Signs

Abstract visual representations

DOW

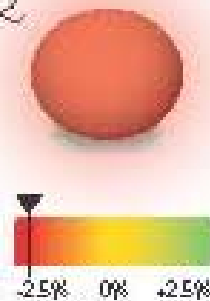
"Large blue-chips are rising"



NASDAQ

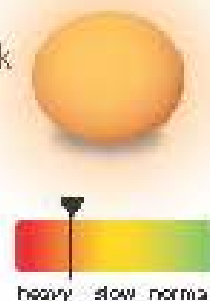
"Call the broker."

NASDAQ.com



TRAFFIC

"Take the back roads."



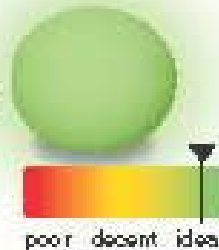
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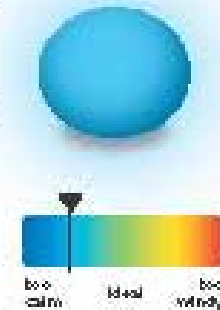
GOLF

"Schedule a weekend tee time."



SAILING

"Light wind today."



Indexical Signs

Directly connected to the signified (physically or causally).
The link can be observed or inferred.

Indexical Signs

Natural signs



Indexical Signs

Measuring instruments (weathercock, thermometer, clock)



Indexical Signs

Measuring instruments (weathercock, thermometer, clock)



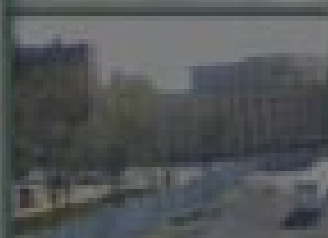
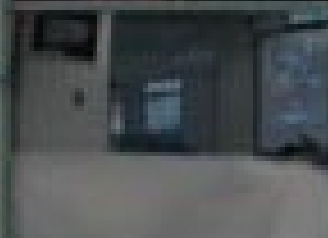
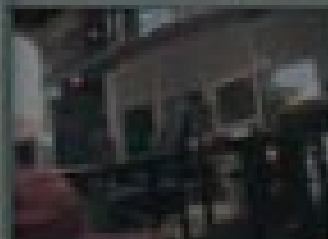
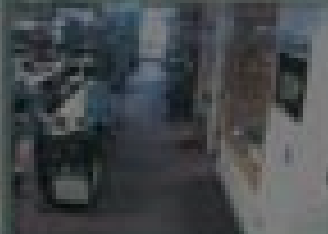
Indexical Signs

Signals



Indexical Signs

Recordings (a photograph, a film, video or television shot, an audio-recorded voice), maps, photos.



Signs in Context of Use



to represent “snow flake” == **Iconic**

to represent “cold weather” == **Indexical**

to represent “GO for ski” == **Symbolic**

ICONIC
Resembling or imitating the signified



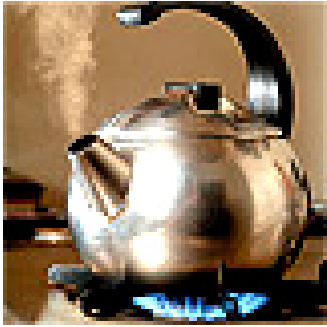
SYMBOLIC
Arbitrary, rule-following, must be learned



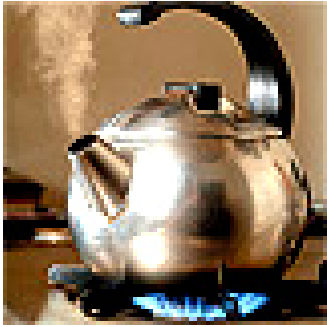
INDEXICAL
Not arbitrary and is directly connected to the signified



	ICONIC Resembling or imitating the signified	SYMBOLIC Arbitrary, rule-following, must be learned	INDEXICAL Not arbitrary and is directly connected to the signified
VISUAL			
AUDITORY			
TACTILE			



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TACTILE			



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VISUAL			
AUDITORY			
TACTILE			



	ICONIC Resembling or imitating the signified	SYMBOLIC Arbitrary, rule-following, must be learned	INDEXICAL Not arbitrary and is directly connected to the signified
VISUAL	A square pedestrian crossing sign with a black background and white LED lights forming a walking figure.	A rectangular traffic sign with a red background and yellow text that reads "DONT WALK WALK WALK".	A circular gauge with a needle pointing to the right. The text "EMAIL WAITING" is visible on the gauge face.
AUDITORY			A silver teapot on a stove with a blue flame. Steam is rising from the spout.
TACTILE			



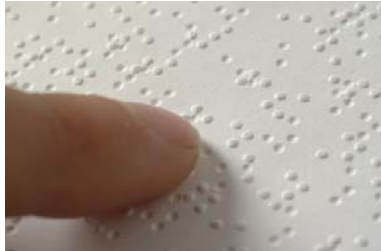
	<p>ICONIC Resembling or imitating the signified</p>	<p>SYMBOLIC Arbitrary, rule-following, must be learned</p>	<p>INDEXICAL Not arbitrary and is directly connected to the signified</p>
VISUAL			
AUDITORY			
TACTILE			



	<p>ICONIC Resembling or imitating the signified</p>	<p>SYMBOLIC Arbitrary, rule-following, must be learned</p>	<p>INDEXICAL Not arbitrary and is directly connected to the signified</p>
VISUAL			
AUDITORY			
TACTILE			



	<p>ICONIC Resembling or imitating the signified</p>	<p>SYMBOLIC Arbitrary, rule-following, must be learned</p>	<p>INDEXICAL Not arbitrary and is directly connected to the signified</p>
VISUAL	<p>A black pedestrian crossing sign with a glowing white figure of a person walking.</p>	<p>A red and yellow pedestrian crossing sign with the text "DONT WALK WALK" in yellow and blue.</p>	<p>A gauge with a needle pointing to the number 10, labeled "EMAIL WAITING".</p>
AUDITORY	<p>A desktop trash icon with a smiley face and a physical metal trash can filled with crumpled paper. The word "Trash" is written above the can.</p>	<p>A photograph of a cityscape featuring a prominent clock tower and various buildings.</p>	<p>A photograph of a silver teapot on a stove with steam rising from it.</p>
TACTILE			



	<p>ICONIC Resembling or imitating the signified</p>	<p>SYMBOLIC Arbitrary, rule-following, must be learned</p>	<p>INDEXICAL Not arbitrary and is directly connected to the signified</p>
VISUAL			
AUDITORY	<p>Trash</p>		
TACTILE			



	<p>ICONIC Resembling or imitating the signified</p>	<p>SYMBOLIC Arbitrary, rule-following, must be learned</p>	<p>INDEXICAL Not arbitrary and is directly connected to the signified</p>
VISUAL			
AUDITORY	<p>Trash</p>		
TACTILE			



	<p>ICONIC Resembling or imitating the signified</p>	<p>SYMBOLIC Arbitrary, rule-following, must be learned</p>	<p>INDEXICAL Not arbitrary and is directly connected to the signified</p>
VISUAL			
AUDITORY	<p>Trash</p>		
TACTILE			



	<p>ICONIC Resembling or imitating the signified</p>	<p>SYMBOLIC Arbitrary, rule-following, must be learned</p>	<p>INDEXICAL Not arbitrary and is directly connected to the signified</p>
VISUAL			
AUDITORY	<p>Trash</p>		
TACTILE			



	<p>ICONIC Resembling or imitating the signified</p>	<p>SYMBOLIC Arbitrary, rule-following, must be learned</p>	<p>INDEXICAL Not arbitrary and is directly connected to the signified</p>
VISUAL			
AUDITORY			
TACTILE			



	<p>ICONIC Resembling or imitating the signified</p>	<p>SYMBOLIC Arbitrary, rule-following, must be learned</p>	<p>INDEXICAL Not arbitrary and is directly connected to the signified</p>
<p>VISUAL</p>			
<p>AUDITORY</p>			
<p>TACTILE</p>			

	ICONIC Resembling or imitating the signified	SYMBOLIC Arbitrary, rule-following, must be learned	INDEXICAL Not arbitrary and is directly connected to the signified
VISUAL			
AUDITORY			
TACTILE			
OLFACTORY			
TASTE			
???			

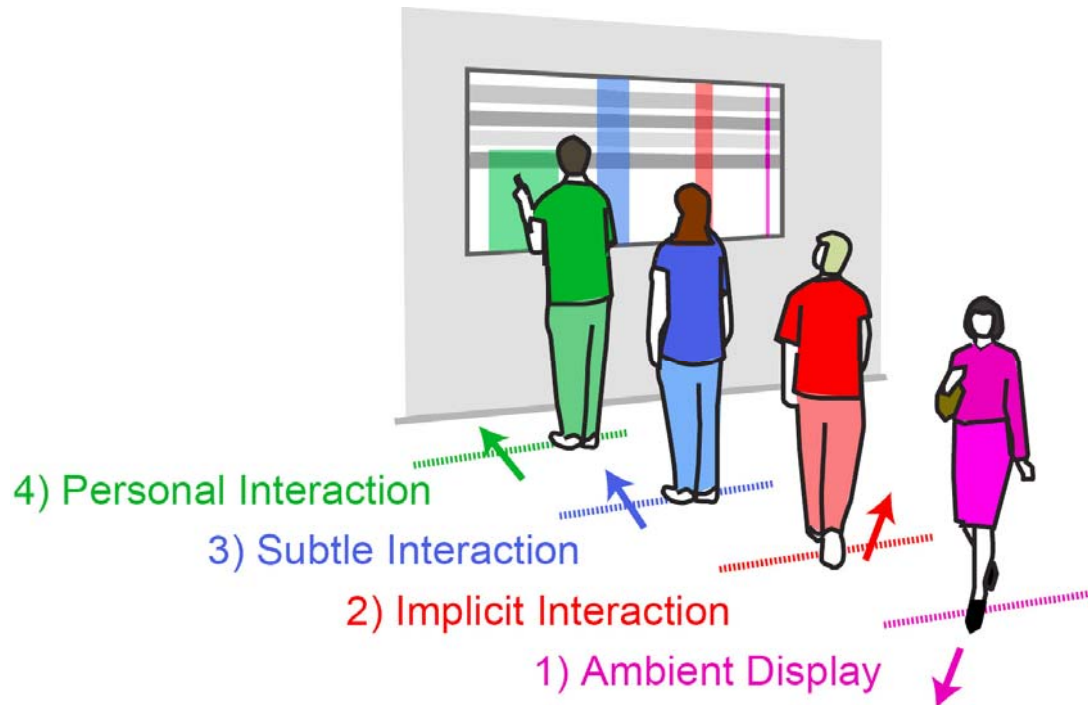
Beyond ambient displays

Ambient “input methods”

Presence and activity sensors





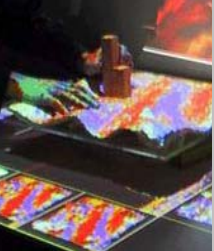

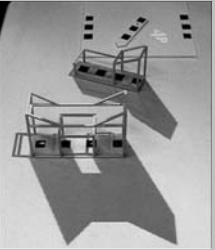






Gestural input

Tangible interfaces





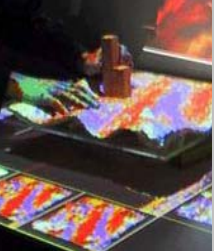

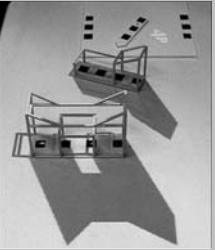


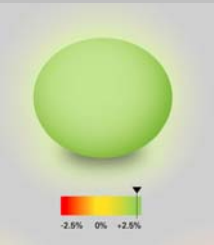





[Vogel & Balakrishnan, 2004]

Ambient Media?

Metaphor Embodiment	None	Noun	Verb	Noun and Verb	Full
Full					
Nearby					
Environment					
Distant					

Ambient Media?

Metaphor Embodiment	None	Noun	Verb	Noun and Verb	Full
Full					
Nearby					
Environment					
Distant					

Beyond fore vs. background

“Load balancing” of senses to reduce cognitive load



Thanks!