week

06

Ambient Media

At the periphery of our awareness

Lecture Outline

- Peripheral Awareness
- Ambient Media
- Signs and Representational Fidelity

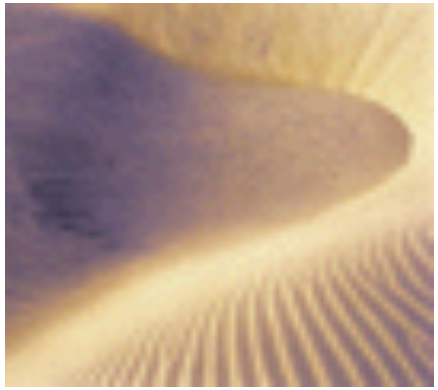
Peripheral Awareness

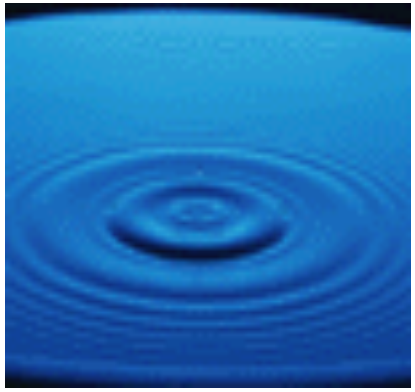
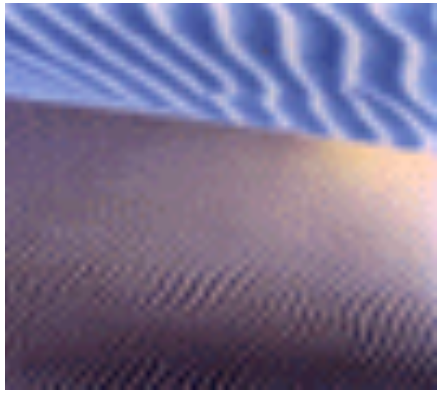
What we are attuned to without attending to explicitly

[Weiser, 1995]

www.chromasia.com

www.brainsinchains.com



Locatedness: Calm Technology

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

[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]

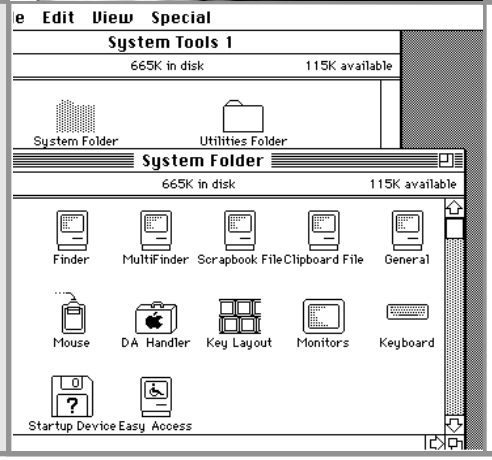
Tasks in Foreground and Background

[Buxton, 1995]

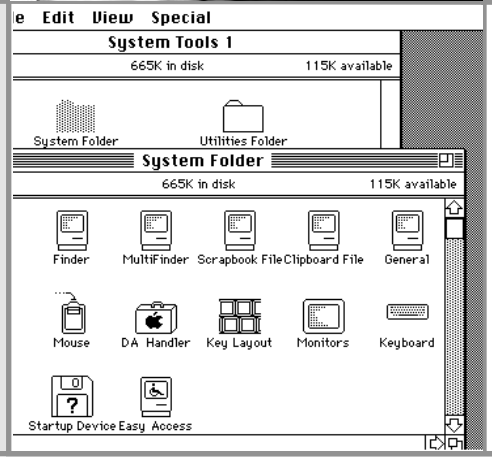
[Buxton, 1995]

FOREGROUND bursty	BACKGROUND persistent

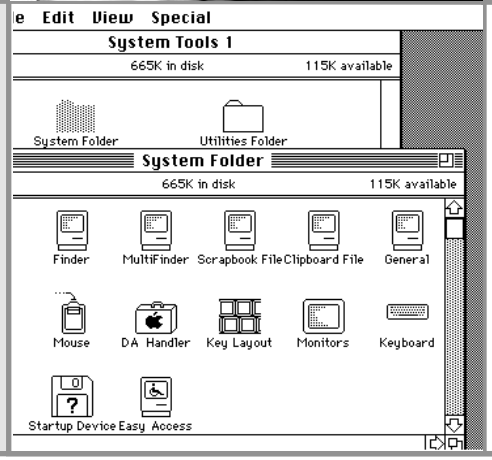
[Buxton, 1995]

	FOREGROUND bursty	BACKGROUND persistent
HUMAN– HUMAN		
HUMAN– COMPUTER		

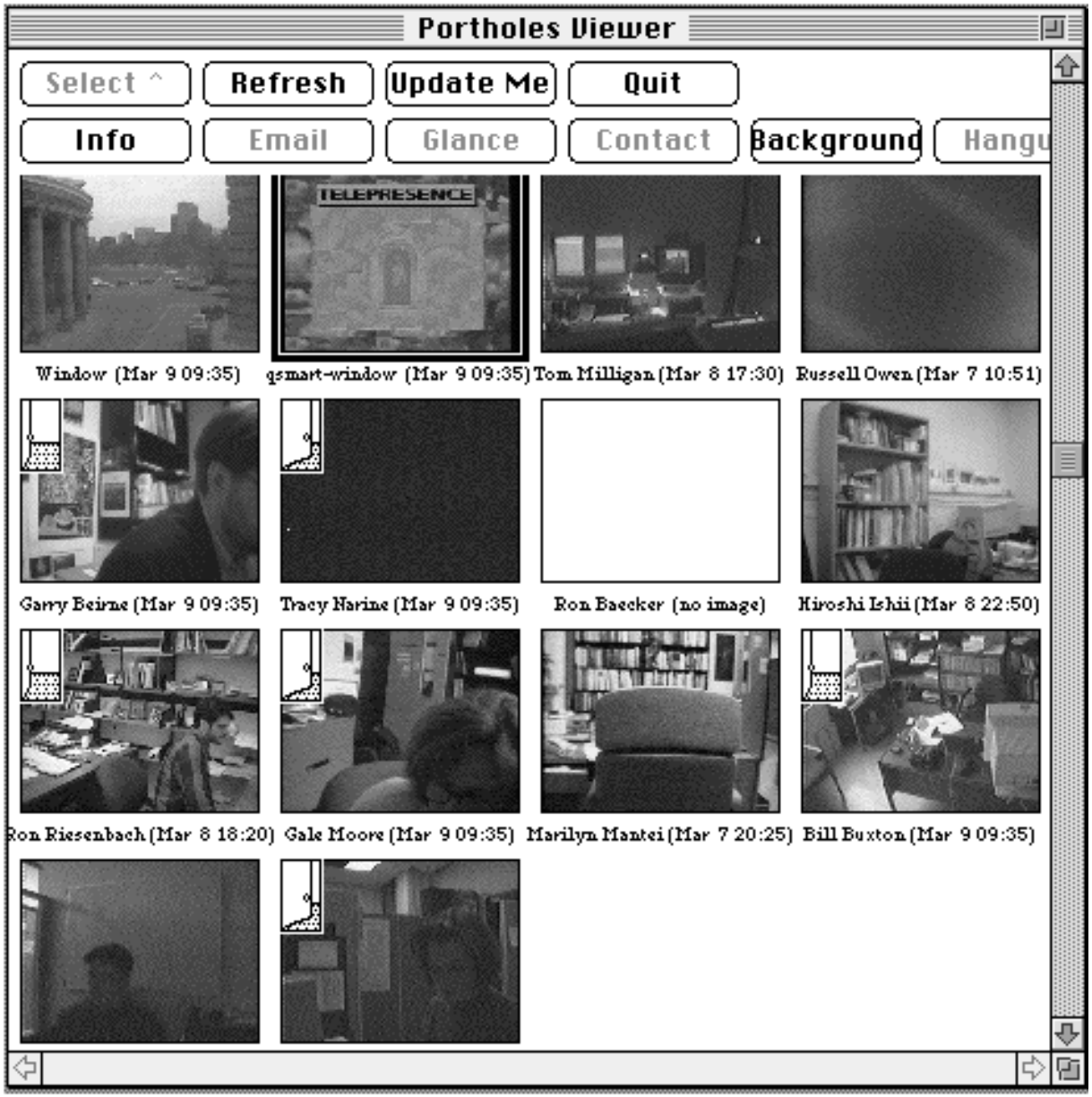
[Buxton, 1995]

	FOREGROUND bursty	BACKGROUND persistent
HUMAN– HUMAN		
HUMAN– COMPUTER		

[Buxton, 1995]

	FOREGROUND bursty	BACKGROUND persistent
HUMAN–HUMAN		“Portholes”
HUMAN–COMPUTER		

[Dourish & Bly, 1992]



[Buxton, 1995]

	FOREGROUND bursty	BACKGROUND persistent
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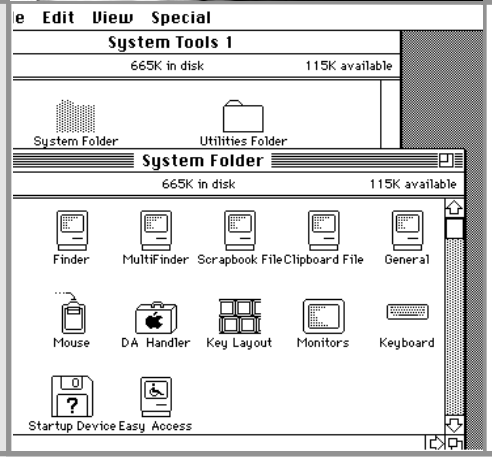
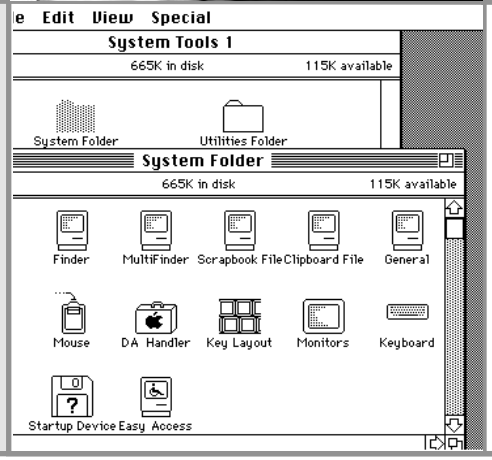
HUMAN–COMPUTER		

[Buxton, 1995]

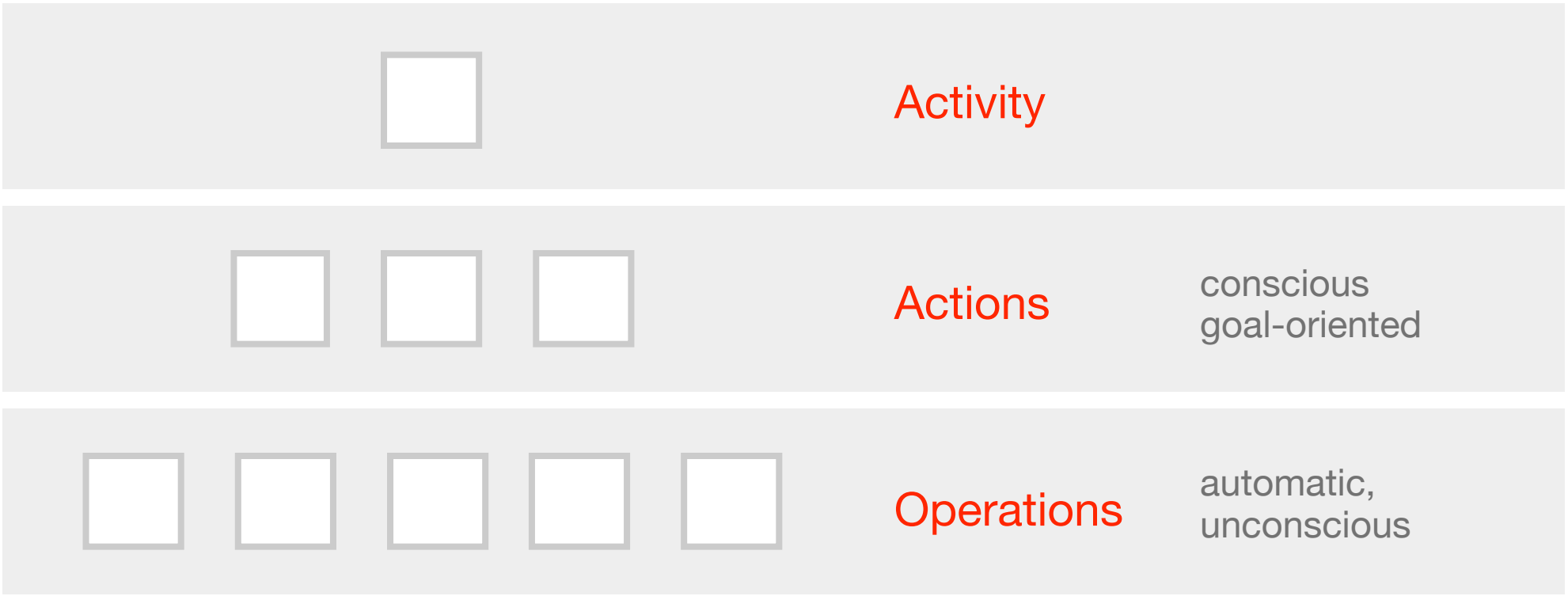
	FOREGROUND bursty	BACKGROUND persistent
HUMAN–HUMAN		“Portholes”
HUMAN–COMPUTER		smart house technology

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 Theory

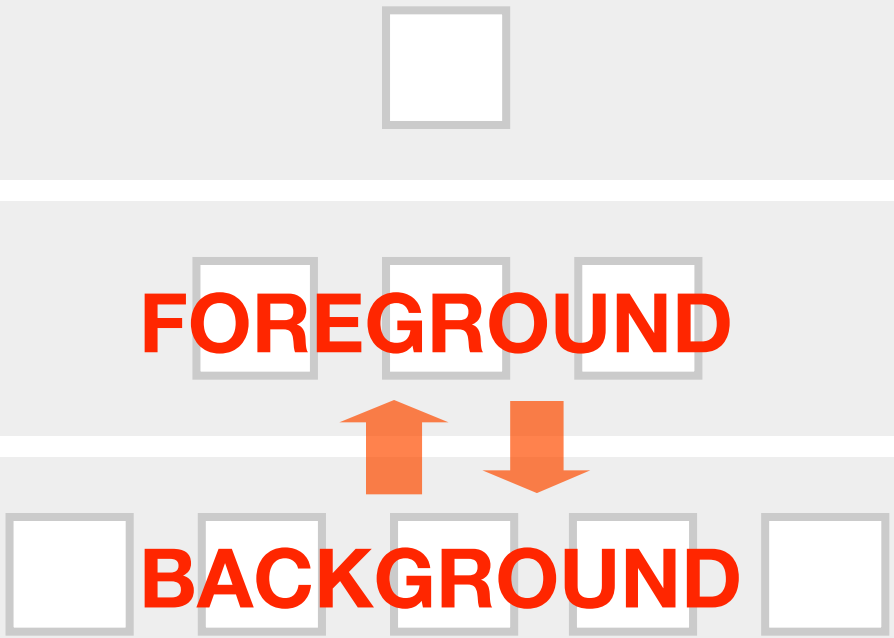
Hierarchical Structure

Example

Activity Theory

Hierarchical Structure

Foreground and background in calm computing



Activity

Actions

conscious
goal-oriented

Operations

automatic,
unconscious

Ambient Media

Ambient Media

Information is 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]

Tangible Media Group

ambientROOM

Hiroshi Ishii
Matt Gorbet
Scott Brave
Brygg Ullmer
Andrew Dahley
Craig Wisneski

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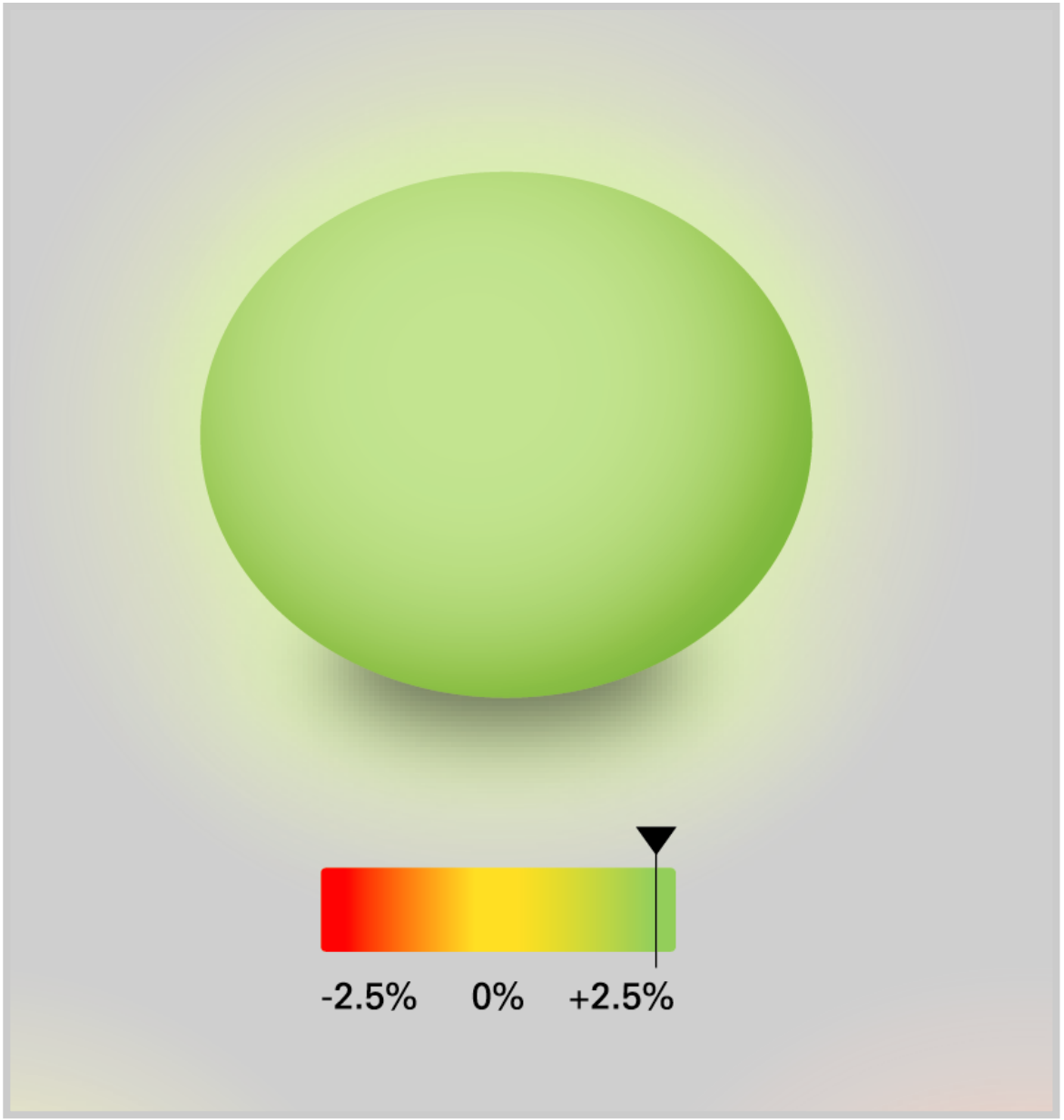
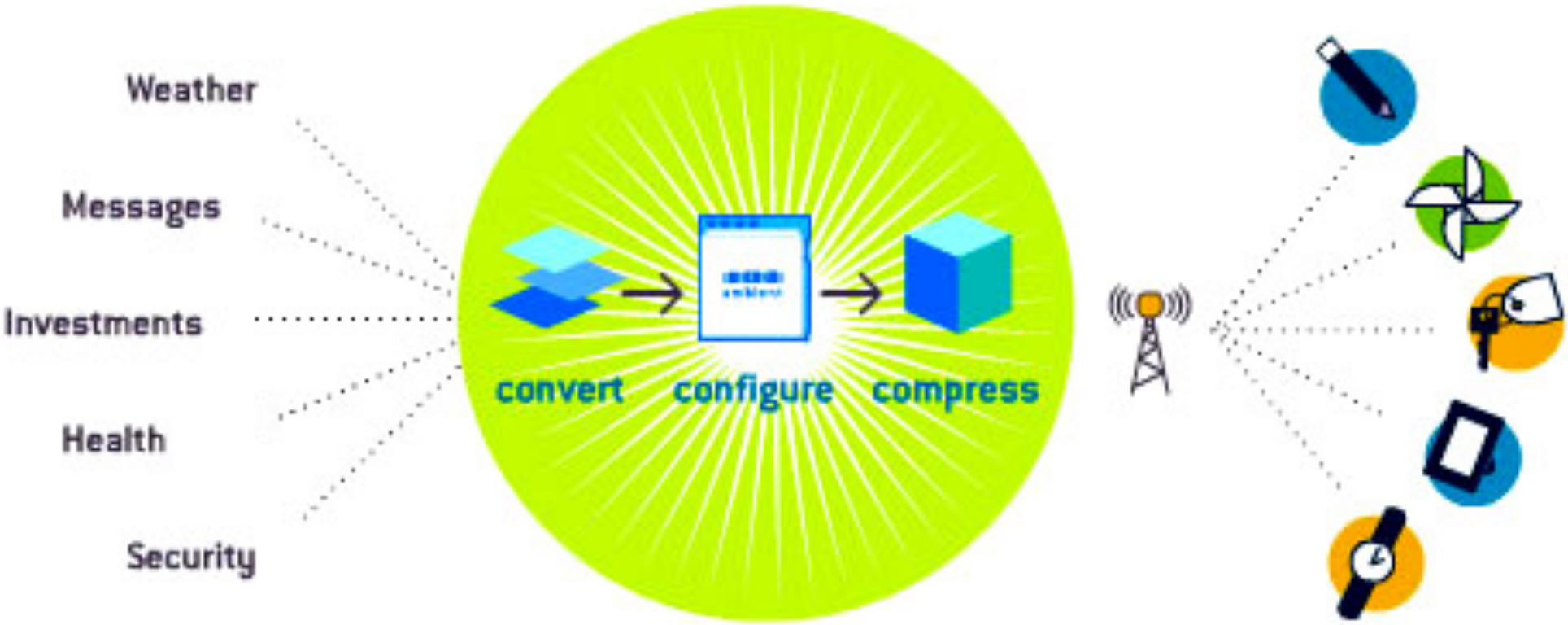
Orb

[Ambient Devices]



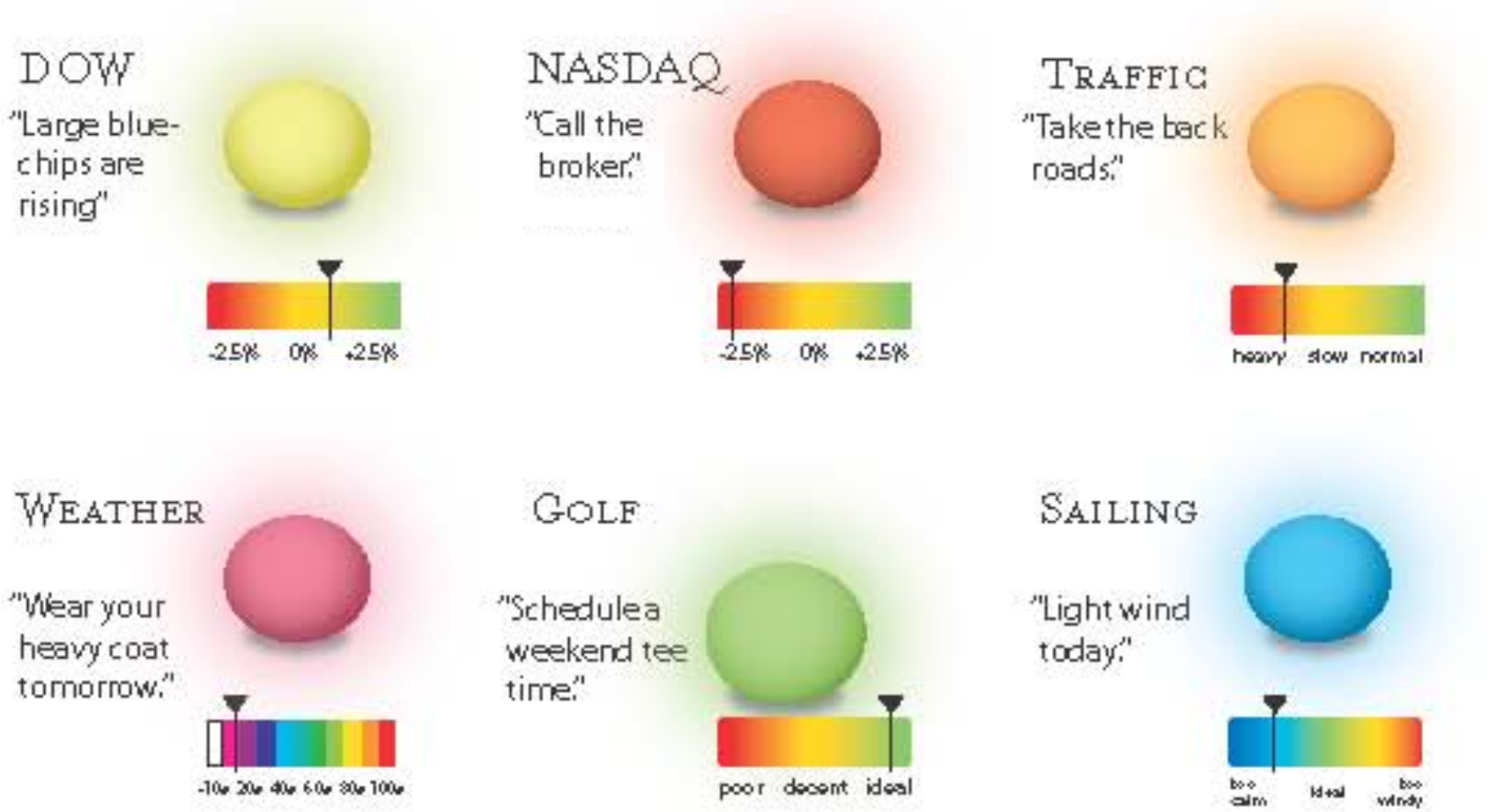
Orb

[Ambient Devices]



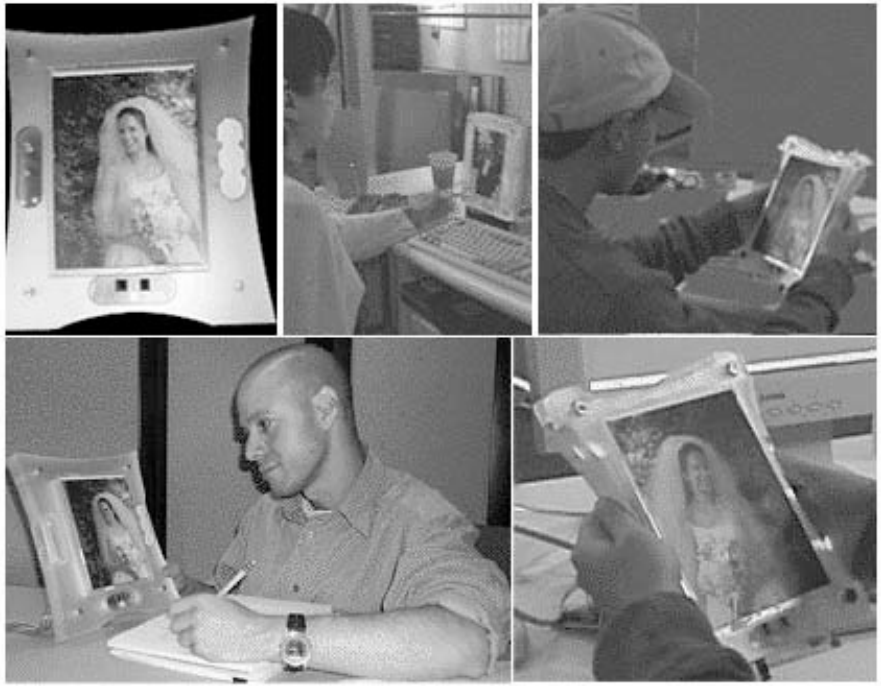
Orb

[Ambient Devices]



LumiTouch

[Chang, Resner et al., 2001]



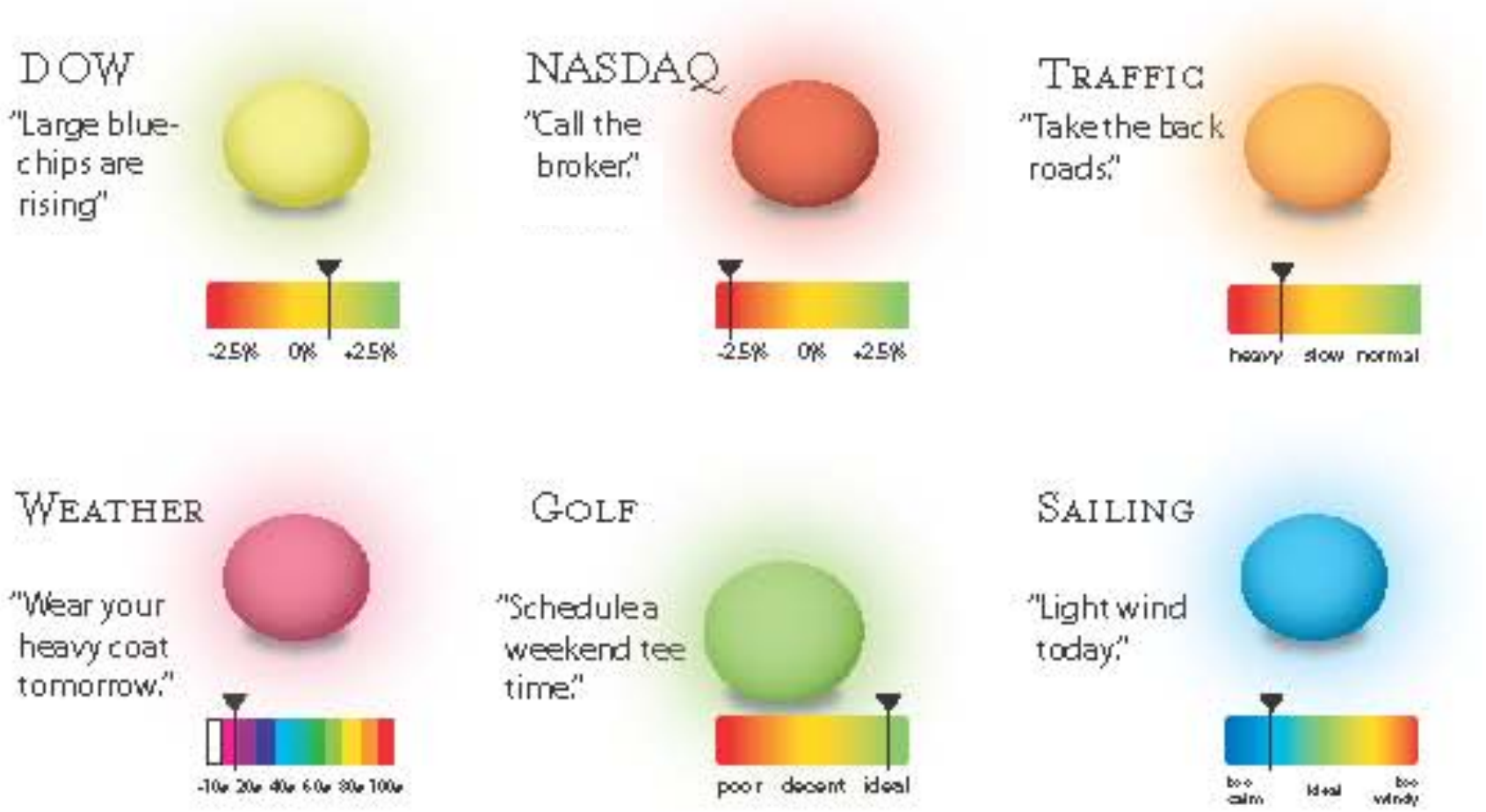
Ambient Media: Design Principles

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]

Orb

[Ambient Devices]



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

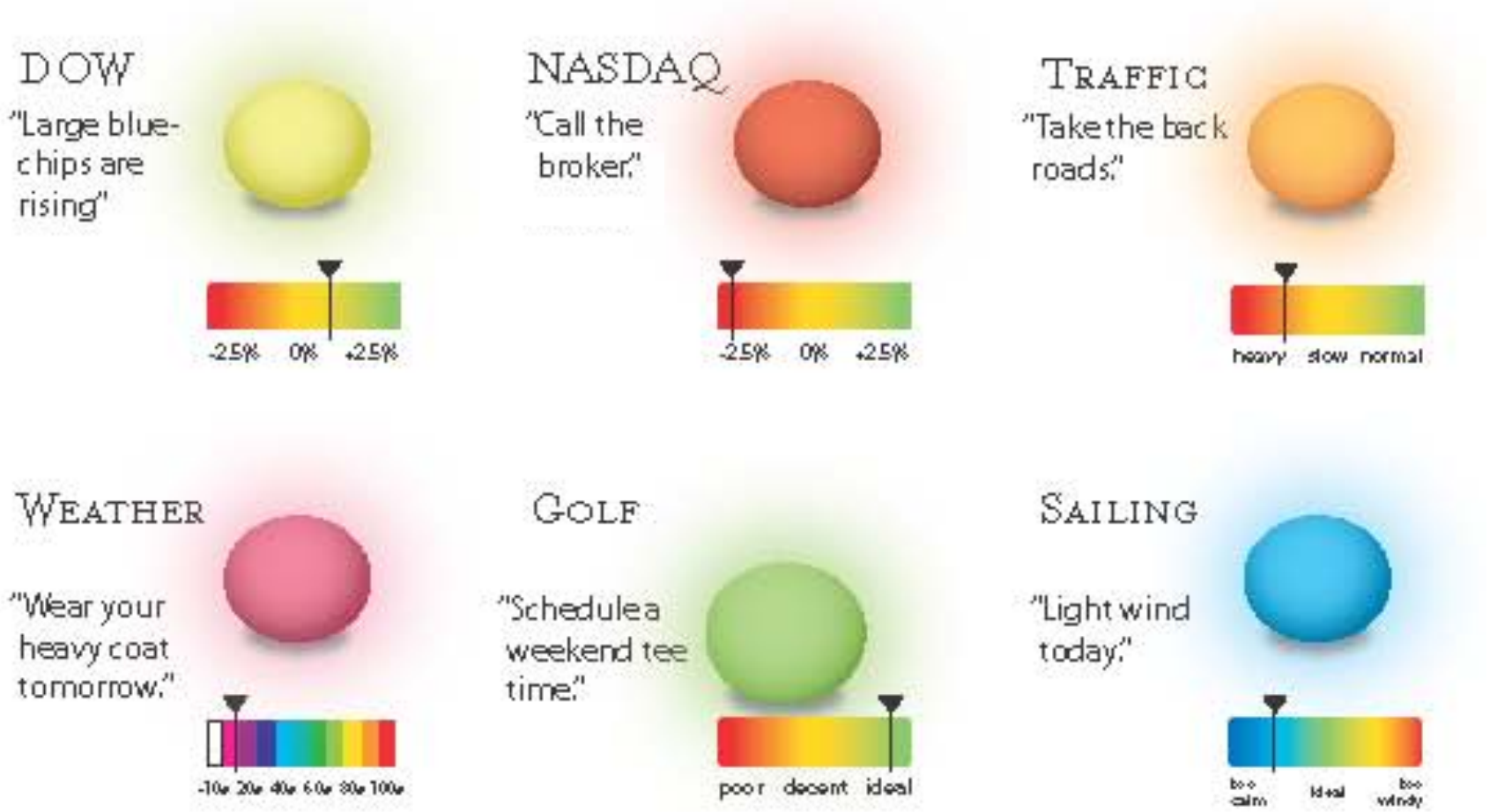
Based on code or rule-following conventions.
Fundamentally arbitrary, so the relationship must be learned.

Symbolic Signs

Language characters, numbers

Symbolic Signs

Abstract visual representations



Indexical Signs

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

Indexical Signs

Natural signs

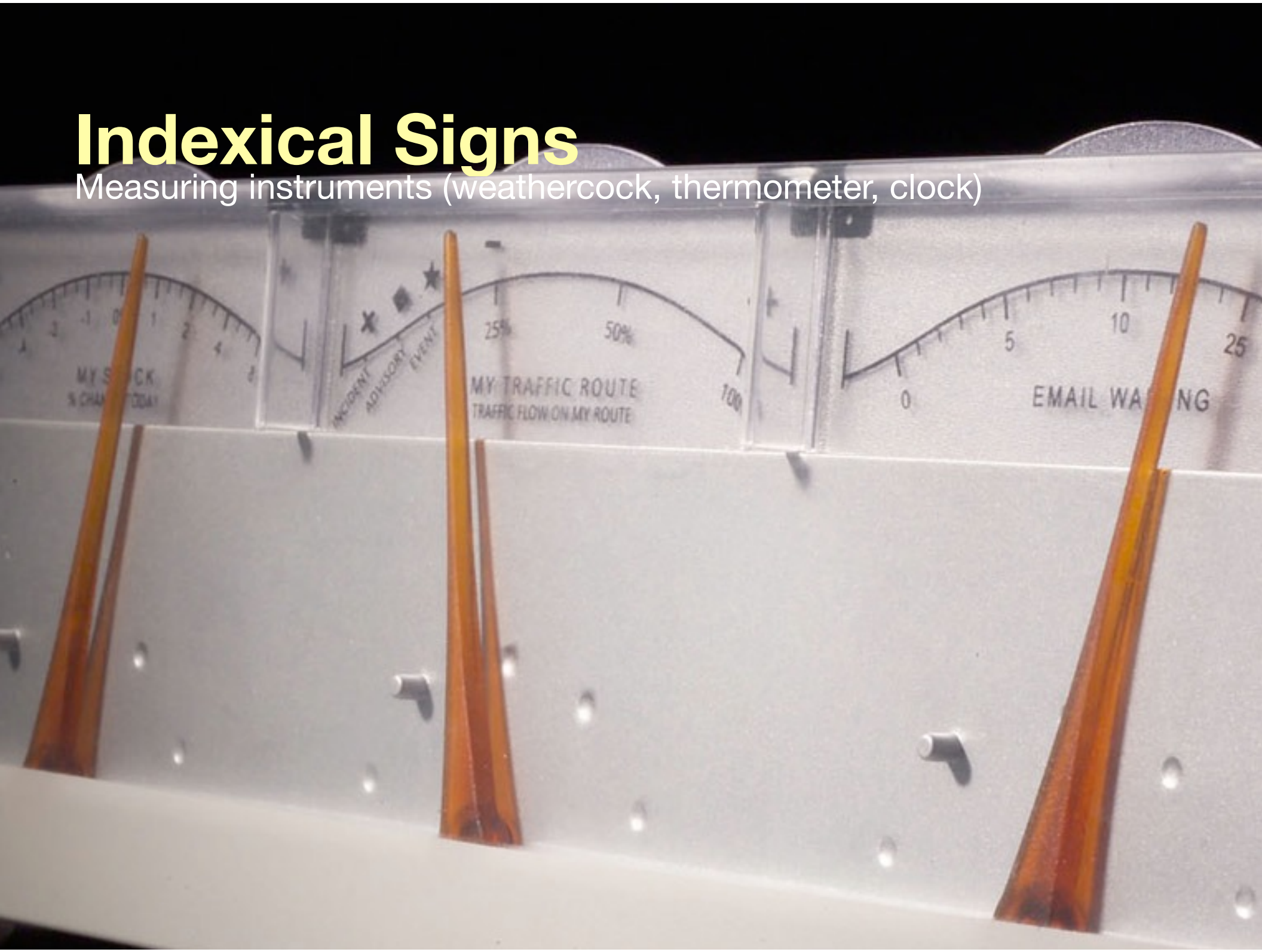
Jason Courtney http://www.perdador.com/f6update/Oc3.html

Indexical Signs

Measuring instruments (weather vane, thermometer, clock)

Indexical Signs

Measuring instruments (weathercock, thermometer, clock)



Indexical Signs

Signals

Signs in Context of Use

to represent “snow flake” ==
Iconic

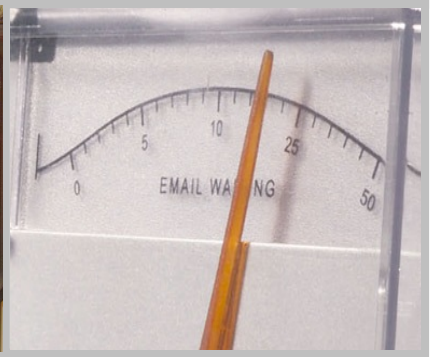
to represent “cold weather” ==
Indexical

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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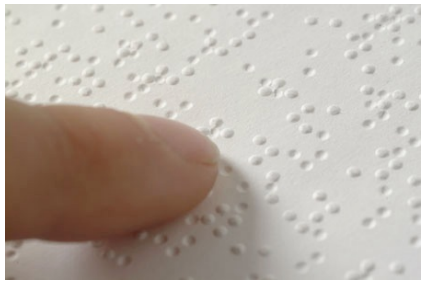

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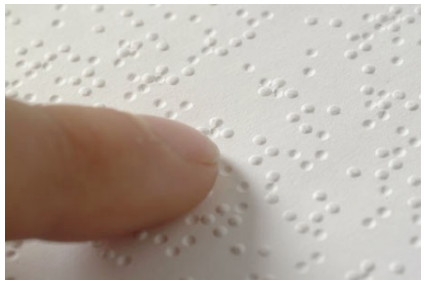

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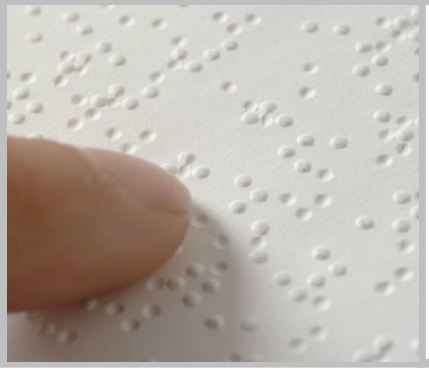
TACTILE			

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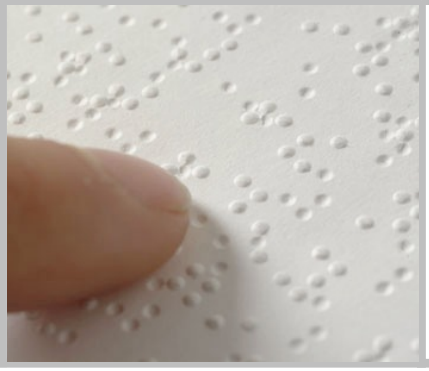
TACTILE			

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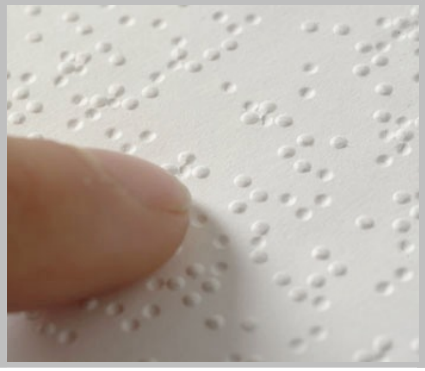
TACTILE			

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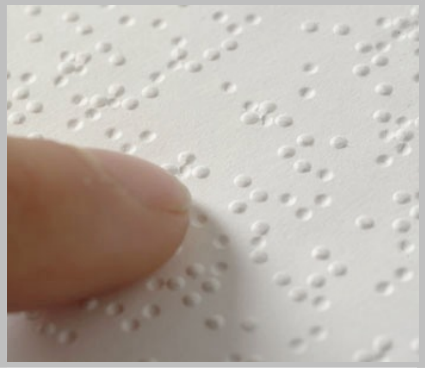
TACTILE			

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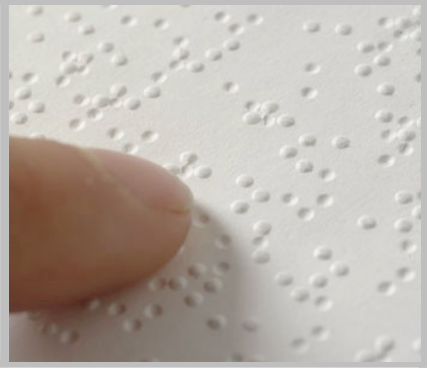
TACTILE			

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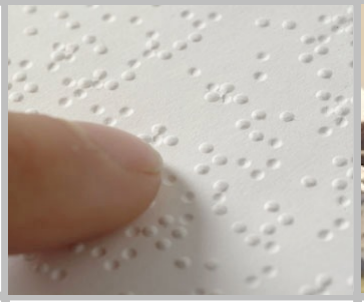
TACTILE			
OLFACTORY			
TASTE			
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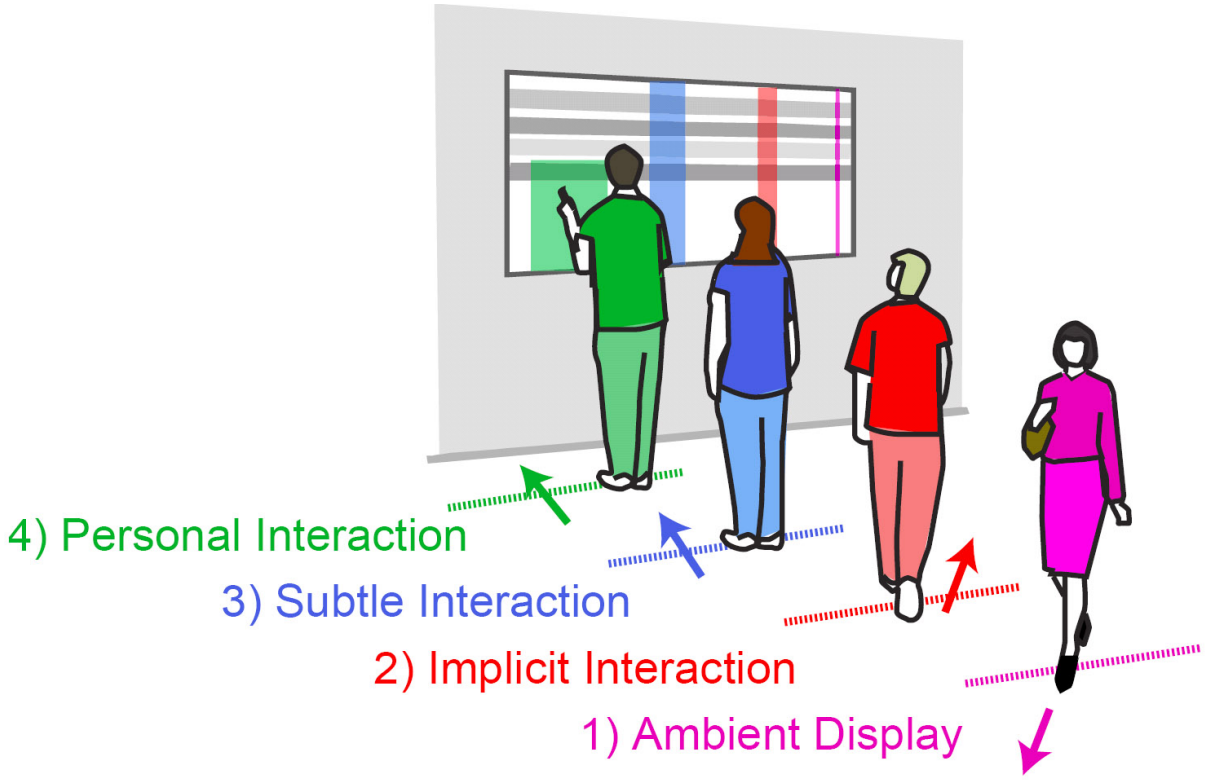
Beyond ambient displays

Ambient "input methods"

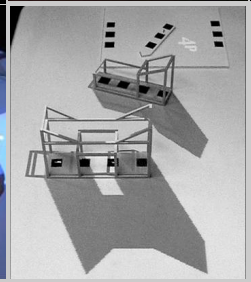
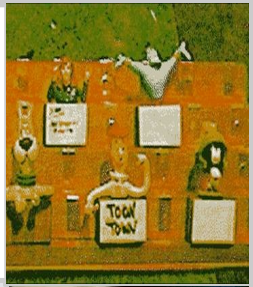
Presence and activity sensors
Gestural input
Tangible interfaces



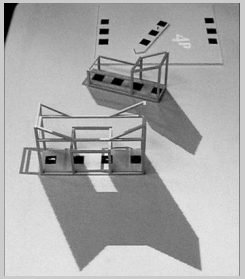
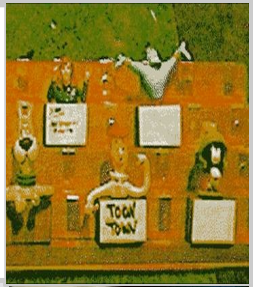
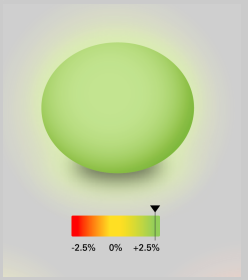
[Vogel & Balakrishnan, 2004]

Beyond fore vs. background
“Load balancing” of senses to reduce cognitive load

Ambient Media?

Embodiment \ Metaphor	None	Noun	Verb	Noun and Verb	Full
Full					
Nearby					
Environ-ment					
Distant					

Ambient Media?

Embodiment \ Metaphor	None	Noun	Verb	Noun and Verb	Full
Full					
Nearby					
Environ-ment					
Distant					

Thanks!

Midterm Project

- Next step: Meeting with Kimiko (**mandatory** for all groups)
- Sign up for your 30-minute slot via Doodle as a group