

Perception-Based Representation

General Importance of Representation

determination of actions is not just current inputs

capture of information in environment:

what is not captured

is not available for appropriate action

HCI Issues:

dual coding

using imagery

spatial vs. visual imagery

navigation

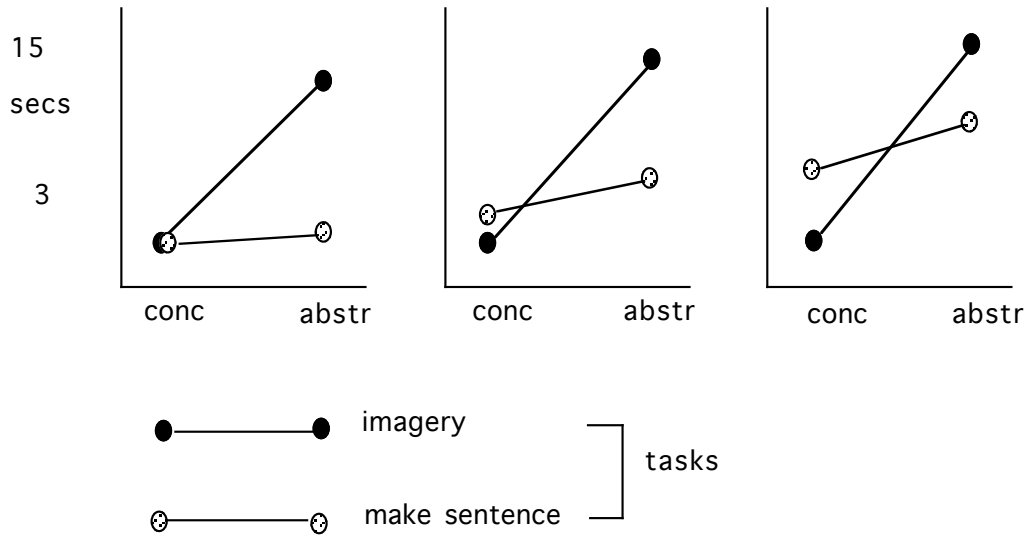
cognitive maps

hierarchical structures

Dual Coding Hypothesis, Paivio, 1971

Paivio- Dual Coding

serial vs parallel
abstract vs concrete



Santa 1977

related demonstration of visual vs. verbal

Roland & Friberg, 1985

physiological evidence

rehearse words vs. spatial path

different areas of brain activation

Visual and Spatial Imagery:
nature of processing on...

Mental Rotation

Shepard & Metzler, 1971

RT is a linear function of degrees rotated

Interference Effects:

Brooks, 1968

scanning diagrams vs. sentences

different kinds of responses

stimulus	pointing	tapping	vocal
diagrams	28.2	14.1	11.3
sentences	9.8	7.8	13.8

interference is spatial rather than visual

use tactile pointing

Baddeley & Lieberman, 1976

letter image task +

brightness judgement

blinded pendulum following

Mental Comparisons

Moyer, 1973

Kosslyn CRT Model

Nature of Perception Based Representations

Spatial vs. Visual Information

spatial - cross modal

visual- parietal lobe
 (e.g., color) unique to visual modality,
 details of objects
 temporal lobe

Farah et al. 1988-

similar pattern for imagery

subject with bilateral temporal damage

-> problems with imagery tasks

judgements of color, size, lengths, shapes

no problems with spatial tasks

mental rotation, image scanning,

letter scanning, judgments of relative positions

Visual Images vs. Visual Perception

Finke et al. 1989

manipulation of mental images

Wallace 1984

imaginary illusions (Ponzo illusion)

Chambers & Reisberg 1985

reversible images

show briefly -> one interpretation

ask for other -> can't

draw figure -> can

Peterson et al. 1992

instructions help subjects do it

Cognitive Maps

route maps -> survey maps

egocentric vs allocentric representations

Hierarchical Structure of Images

Stevens & Coupe 1978 distortions in cognitive maps

Johnson 1970

learn lists of letters (paired associate learning)

chunking induced with pauses

transitional error probabilities

high at chunk boundaries

low within boundaries

higher at higher chunk boundaries

chunks as opaque containers

address of chunk vs content of chunk

since content can overlap,

must be unique code for each new chunk

predicts?

after error, relearn new string with new

character at error point

original

xxxx ABCD zxxx

mistake

xxxx AB-----

relearn modified

xxxx ABEF zxxx

relearn new

xxxx GHIJ zxxx

TEPs:

A=G, B=H, etc. all high error rates