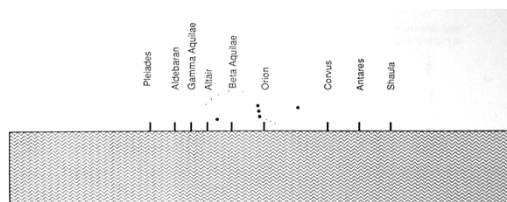


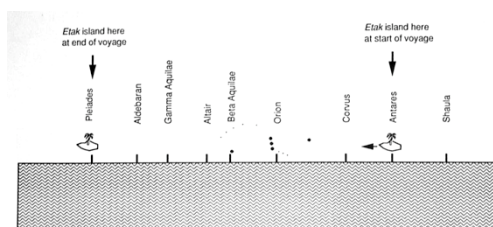
Imagining Computational Media

How powerful computations are performed by the cultural practices of seeing things that are not actually present!

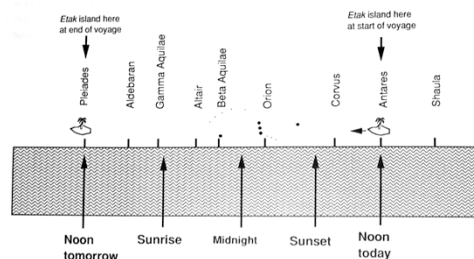
Horizon with Star Points



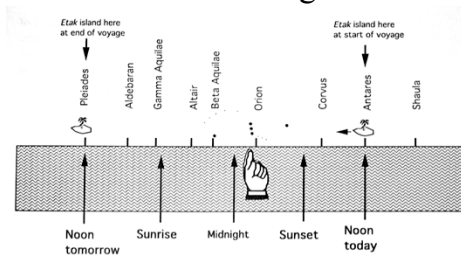
Etak bearings on the Horizon



Horizon with temporal landmarks



Pointing to the Etak island just before midnight

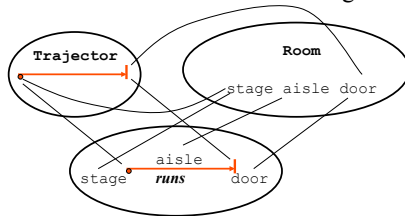


Fictive Motion

- “The aisle runs from the stage to the door.”
- A blend of:
 - a trajector moving between reference points
 - a static scene containing objects
- The blend creates topological correspondences between the path of the trajector and spatial features of the objects.
- It may even structure the temporal organization of the application of attention to the objects [2]

If we are seeing the room containing stage, door, and aisle, are these sentences processed identically?

- The aisle runs from the stage to the door.
- The aisle runs from the door to the stage.



Handling Conceptual Blends

- Selectively projecting structure from inputs to the blended space
- Completing the projected structure - making inferences
- Elaboration or “running the blend” - cognitive work performed within the blend.

Method of Loci

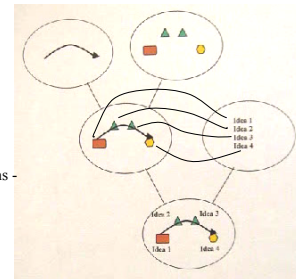
- The Method Loci originates with a story: an ancient Greek poet Simonides was at a banquet given by a nobleman, Scopas. A message was brought to him that two people were waiting outside for him. While he was trying to find them, the roof of the banquet hall fell down killing Scopas and his guests. Afterwards, relatives seeking to bury the bodies could not identify who was who. Simonides saved from the disaster, however, could remember the dining places where they sat and so identify them [24](#).
- 24. Simonides and the Method of Loci: (Cicero, De oratore, II, lxxxvi, 351-354).

Blends in the Method of Loci

Emergent properties -
Sequences of locales
Control of idea sequence

Cognitive ecology -
Remembering a speech

Different Functional systems -
In the space
Remembering a space
Imagining a space

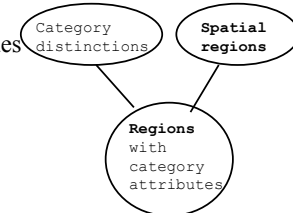


Intelligent use of Space

- “How we manage the space around us is not an afterthought; it is an integral part of the way we think, plan, and behave, a central element in the way we shape the very world that constrains and guides our behavior.”
David Kirsh

Establishment of categories^[3]

- Sorting tasks. E.g., laundry
- Files and Piles
- Recording grades



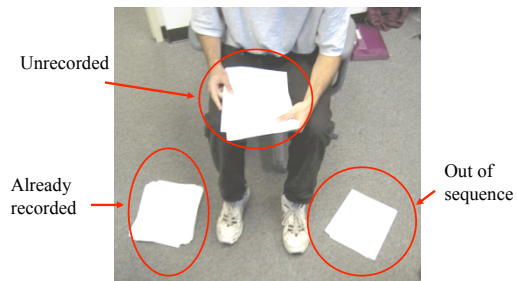
Doing the Laundry



Piles

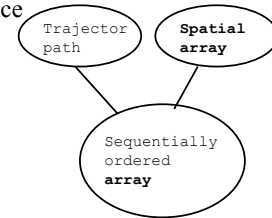


Ad hoc piles

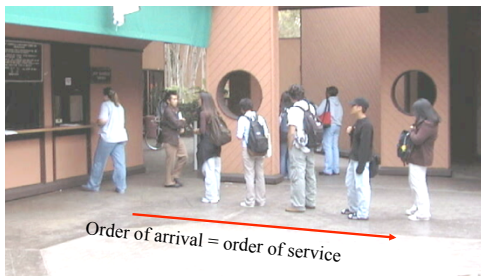


Controlling Mundane Action Sequences^[4]

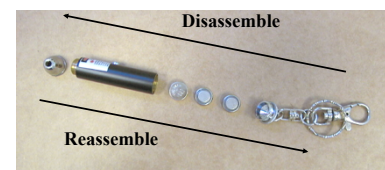
- Standing in line
- Assembly sequence



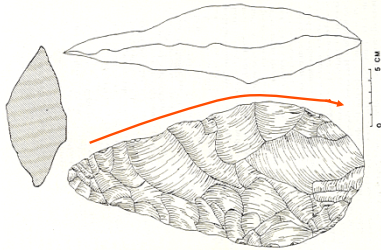
Standing in Line



Remembering Assembly Sequence



300,000 years ago (Wynn, 1989) imagining a trajectory of attention to produce an ordered sequence of blows



Key Properties of Material Anchors

- One input space is a conceptual space in the usual sense.
- Another input is a structured configuration of perceptible material elements.
- Conceptual relations are mapped onto relations among the material elements.
- Stability of conceptual representation is one possible emergent property of the blend.

- Giving meaning to spatial structure is an ubiquitous, effortless, and very **old** process.
- How does it work?

Wind Rose



Ancient Tide Charts

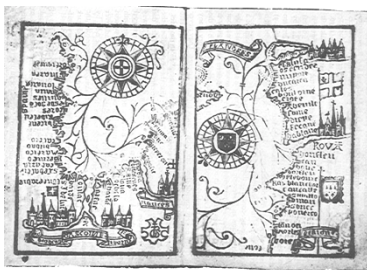
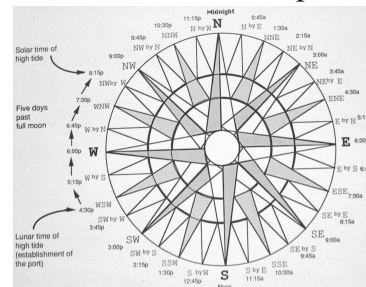
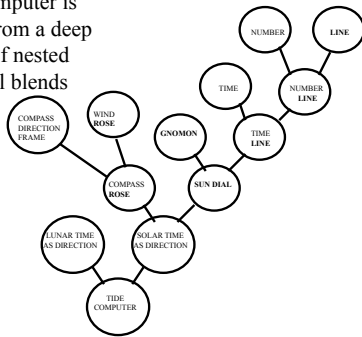


FIGURE 2. Tide chart of G. Braccio.

Medieval Tide Computer



The tide computer is constructed from a deep sequence of nested conceptual blends



Japanese Hand Calendar

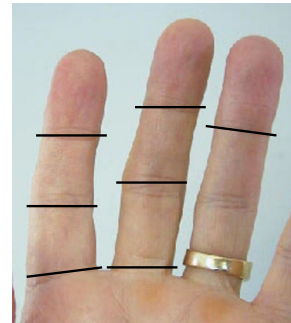
(from Nakahara, 1996)

- Computing the day of the week for any date this year.
- Cognitive ecology: school placement exams
- Observe the construction of a functional system that turns a difficult conceptual task into an easy one.
- Watch for sources of stability.

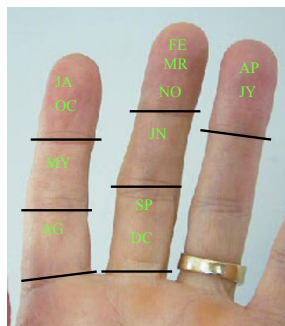
A handy material anchor



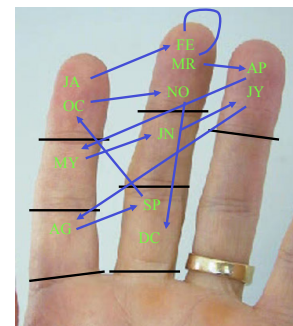
Imagine seven boxes defined by joints on fingers.



Imagine the names of the months in the boxes.



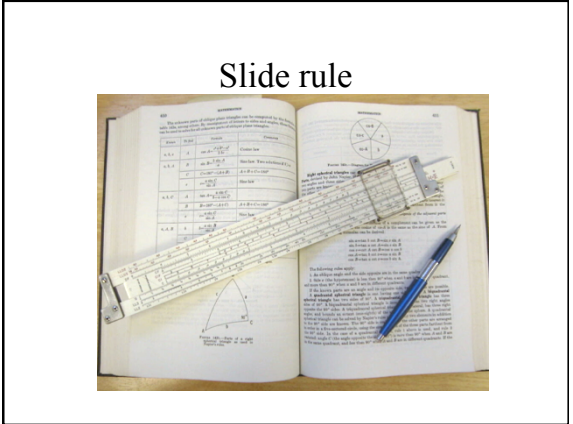
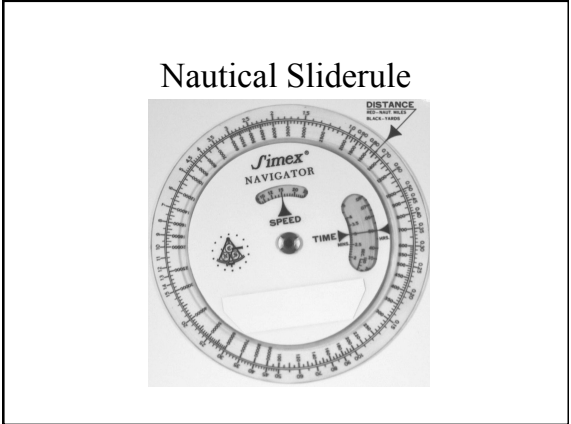
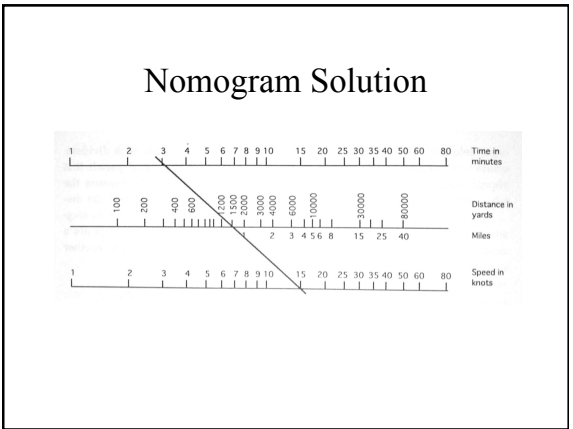
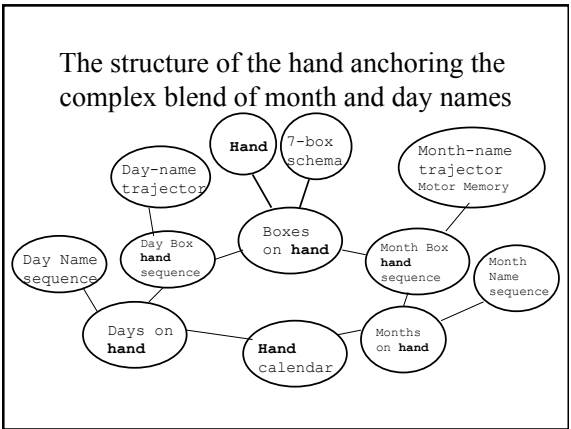
Rhythmic tapping with the thumb establishes the trajectory in motor memory^[5]



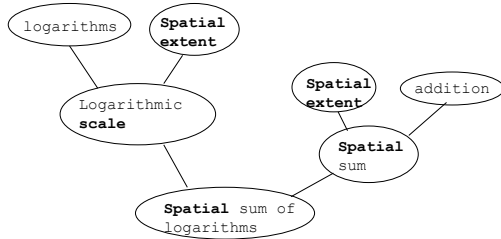
Now imagine the names of the days of the week in the boxes.

The arrangement of names of days of the week shown works for 2009.

Ready to compute (modulo 7).



Slide rule Blend



- You can use a slide rule
- You can imagine using a slide rule
- But you cannot imagine the slide rule accurately enough to usefully imagine the computational outcome. For that, you need to manipulate the material anchor itself.

Using the Three Minute Rule

1500 yds in 3 minutes
 15⁰⁰ knots

100 yds = 1/20 nautical mile
 3 minutes = 1/20 hour
 100 yds in 3 minutes = 1 nautical mile per hour
 N x 100 yds in 3 minutes = N knots

BRAINBOUND vs. EXTENDED

- Ecological control systems
- Deictic pointers and just in time info access
- Open perceptual channels (organism – environment coupling)
- Bodily incorporation of tools and sensory substitution
- Material symbols
- Intelligent use of space and epistemic actions

- “Such ploys and stratagems all conform to a principle of Ecological Assembly according to which the canny cognizer often recruits, on the spot, whatever mix of problem-solving resources will yield an acceptable result with minimum effort.

- This recruitment process looks to be systematically insensitive to the nature and location of the resources concerned, which may include just about any mix of calls to neural resources (including biological memory) external resources (including external encodings), and real-world actions and operations.

Notes

- [1] Are there other sources of stability?
- [2] Does fictive motion guide the construction of mental imagery?
- [3] What cognitive processes underlie the ability to effortlessly assign meaning to regions of space?
- [4] How do we associate trajectors with regions of space? What are the neuro and computational characteristics of these processes?
- [5] Motor memory is another source of stability
- The watch has human scale materially, but not temporally.