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Situating Cognition through Conceptual Integration

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Understanding Human Cognition

Classical View

Internal symbol processing

Formal syntactic operations

Reference to world or possible worlds

Understanding Human Cognition

Classical View

SHIFT

Situated View

Understanding Human Cognition

Situated View

Coupling of internal and external in an interactive process.

Mediated by:

- internal plans or programs
- functioning of body / fit to environment
- artifacts and structure in the setting
- dynamics of events
- interaction with other agents

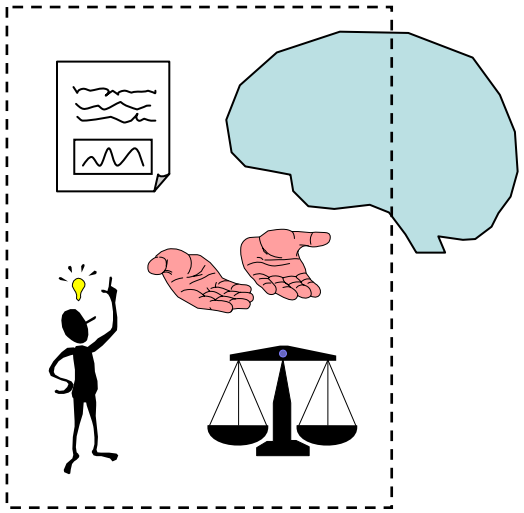
…

Distributed Cognition

(Hutchins 1995, 2001)

A “classical” view…

- Cognitive processes are those involved in memory, decision-making, inference, reasoning, learning, etc.
- Cognitive processes are characterized by the propagation and transformation of representations.

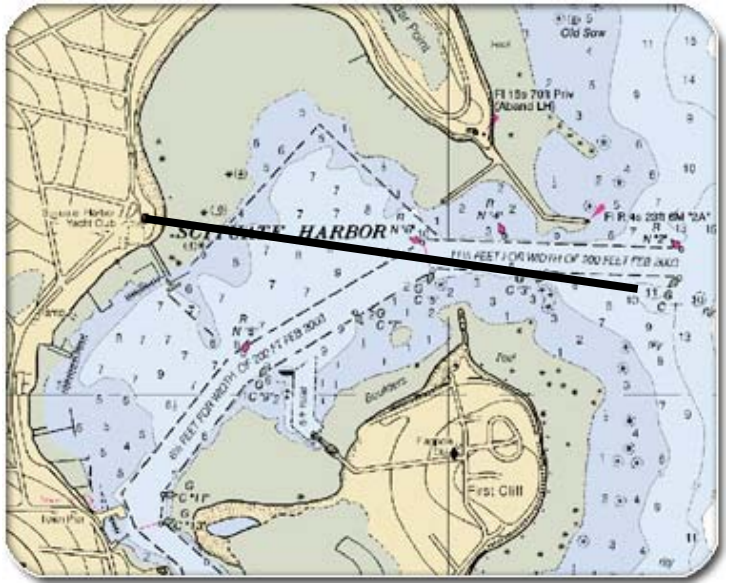


…with a “situated” twist:

- Cognitive processes may be *distributed* across:
  - internal and external structure;
  - members of a social group;
  - multiple scales of time.
- Cognitive “functional systems” operate by bringing representational media into *coordination* with one another.

Example: Ship Navigation

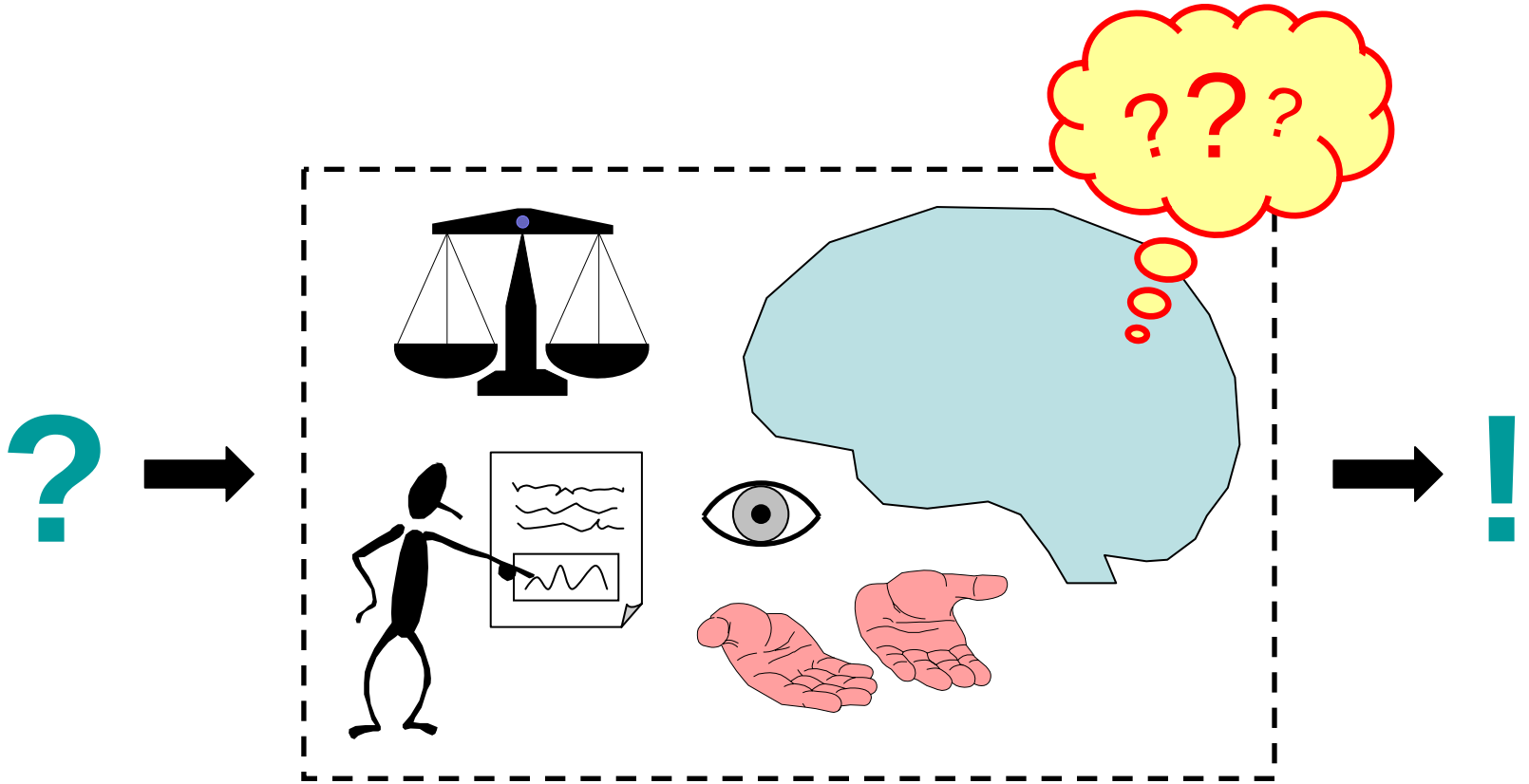
(Hutchins 1995)



Drawing a line on the chart executes a computation that depends on:

- the cultural history of people and tools whose activity went into the making of the chart
- the activities of the navigation team that measured the bearing reproduced in the line

Cognitive Functional Systems

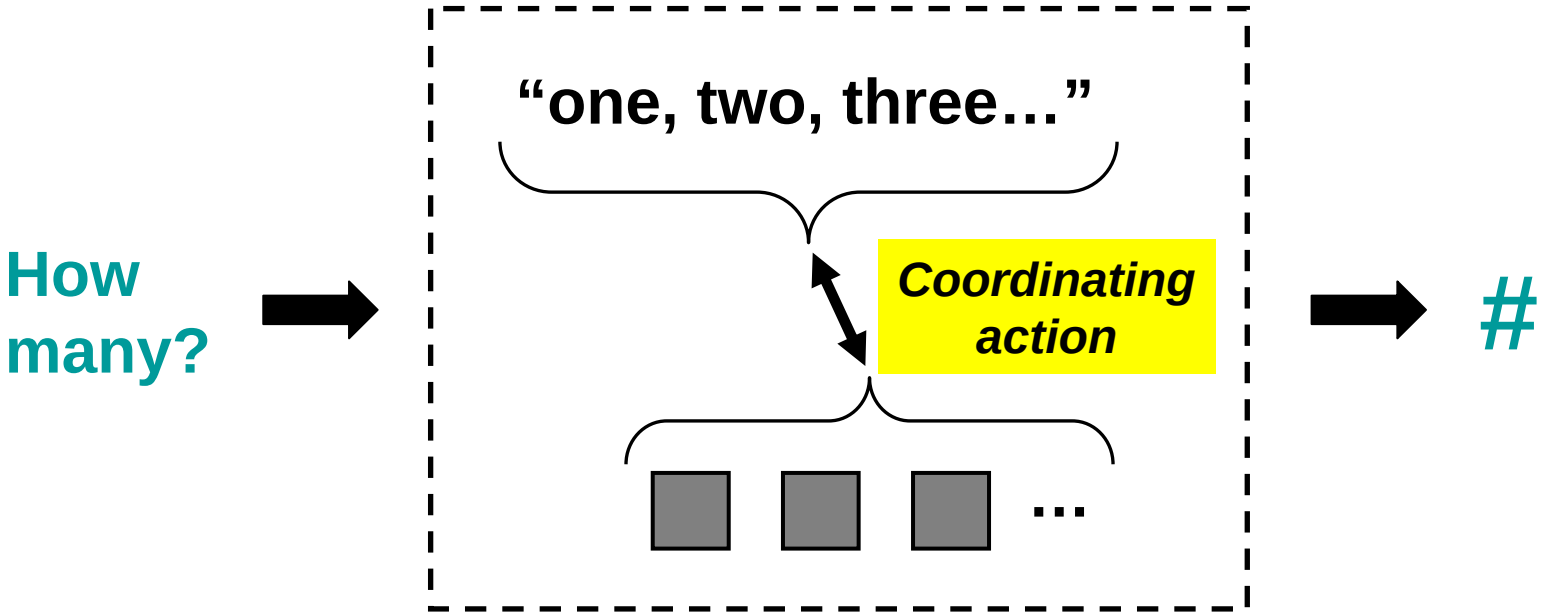


Computation
(Coordination)

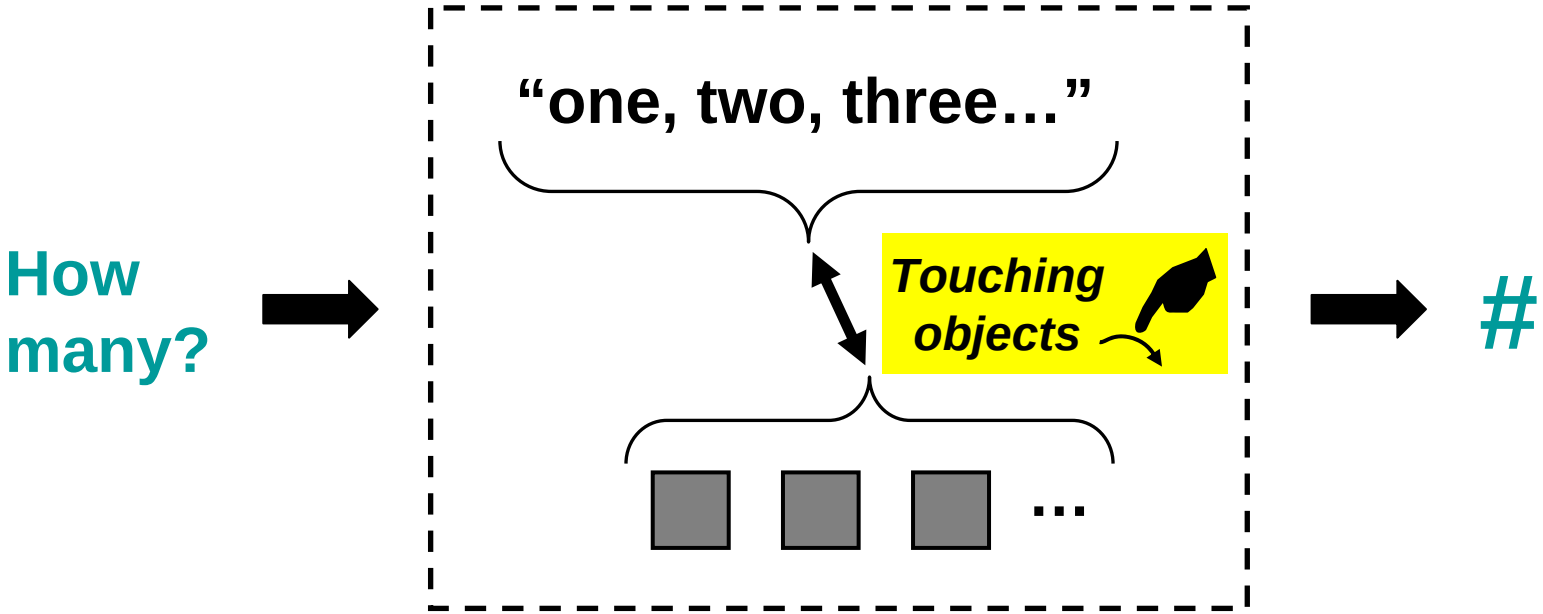
Conceptualization
(Integration)

How are these interrelated?

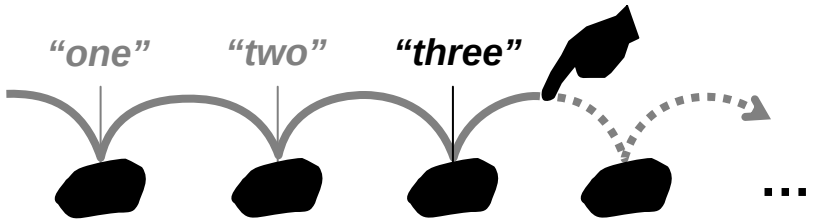
Sample Domain: Counting Objects



Functional System #1



System #1: Coordination



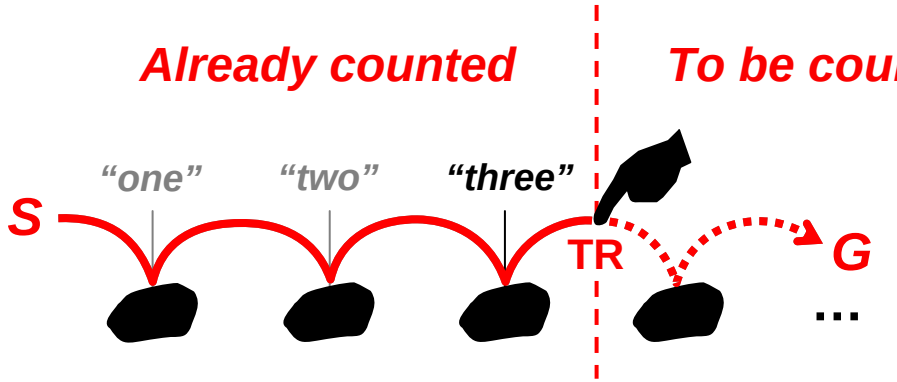
Successful

Video montage of counting by touching

Unsuccessful

Video montage of miscoordination or losing track

System #1: Conceptualization



SOURCE-PATH-GOAL image-schematic structure:

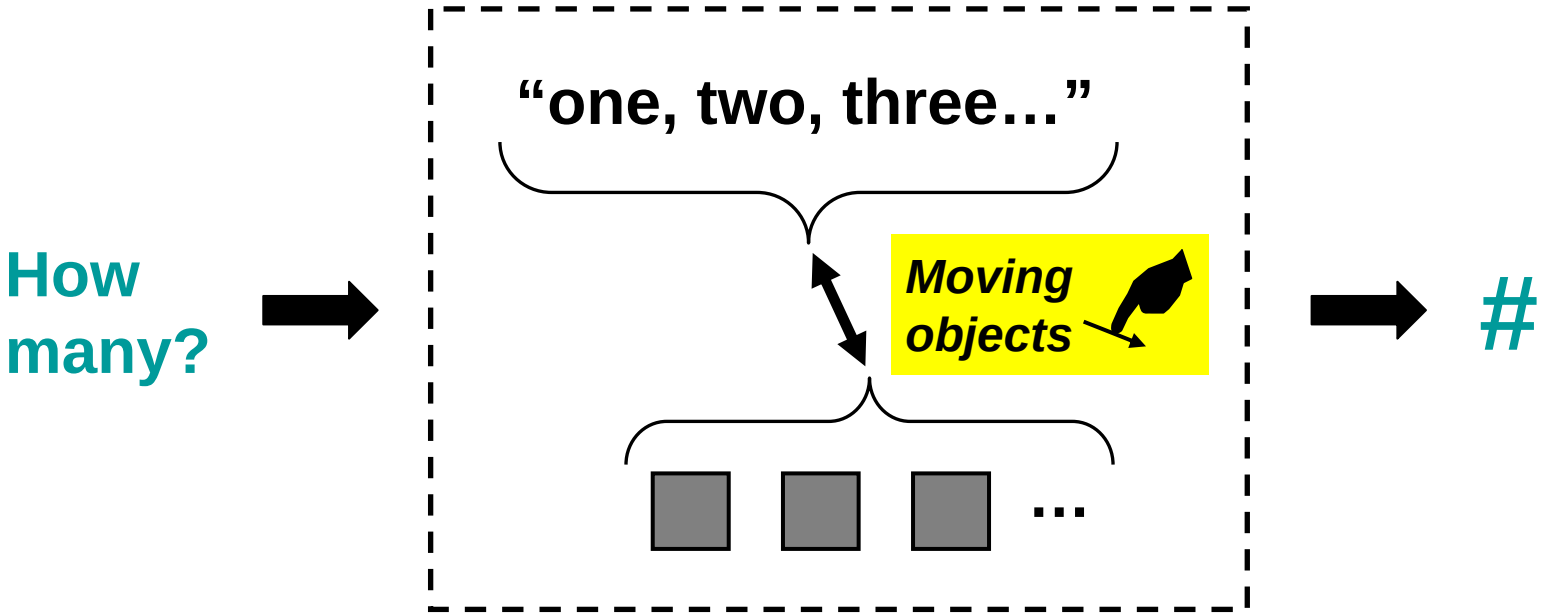
- Counting path must incorporate every object, each only once

Trajector (TR = tip of finger) marks conceptual boundary:

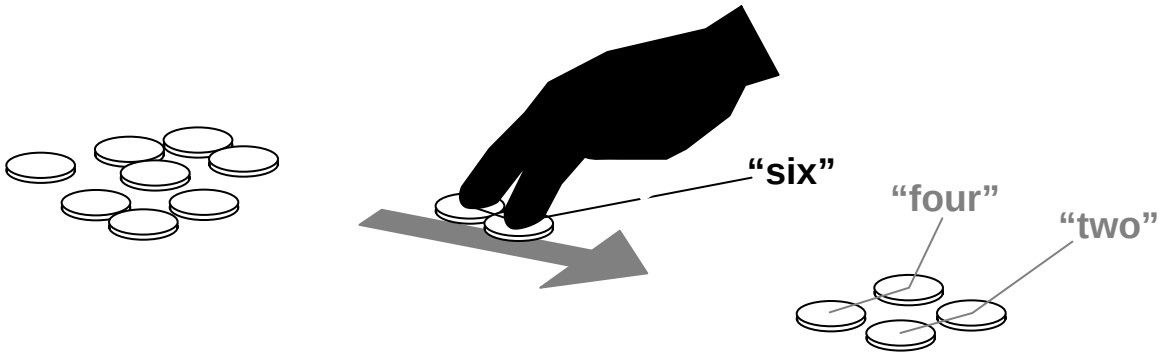
- From Source to TR = Objects already counted
- From TR to Goal = Objects yet to be counted

When TR reaches Goal, last label uttered becomes total count

Functional System #2

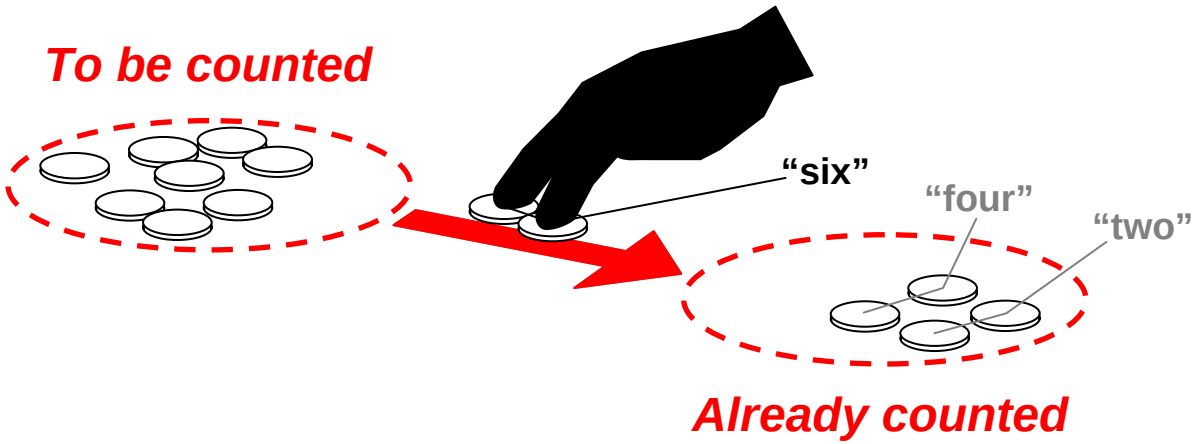


System #2: Coordination



Video montage of counting by moving

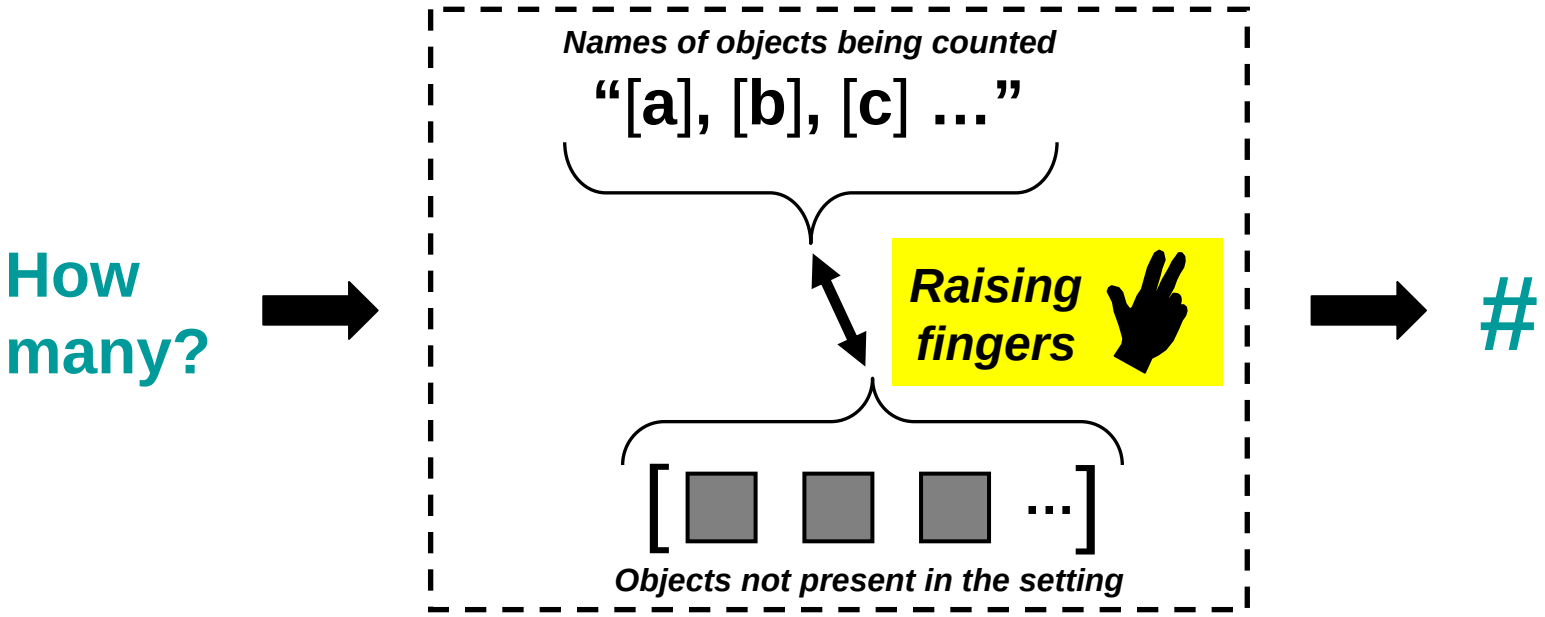
System #2: Conceptualization



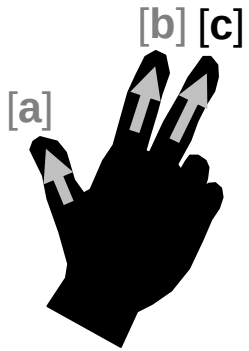
PROXIMITY / CONTAINER image-schematic structure:

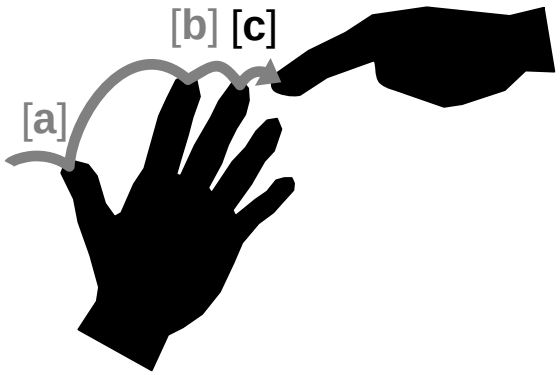
- Spatially distinct groups for already-counted and to-be-counted objects
- Moving object from location #1 to location #2 changes its categorization
- When last object moved, *TBC* container becomes empty (anchor disappears)
- When that happens, last label uttered becomes total count

Functional System #3



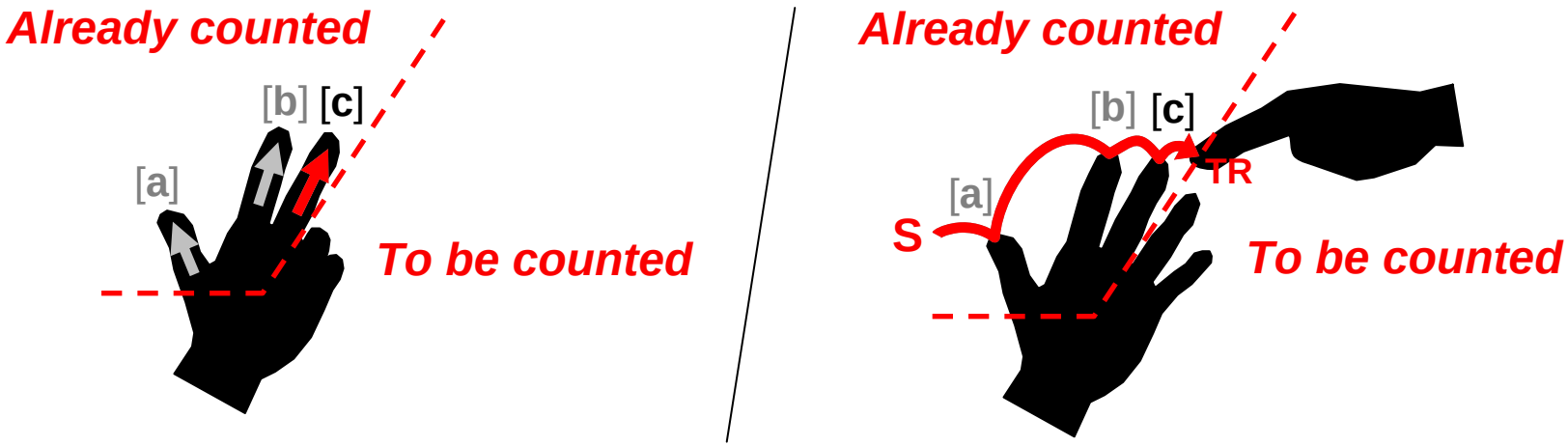
System #3: Coordination





Video montage of counting objects not present

System #3: Conceptualization



Fingers become proxies for objects being counted:

- Fingers raised or touched as objects named
- Every object must be named, each only once

Conceptual distinction marked by:

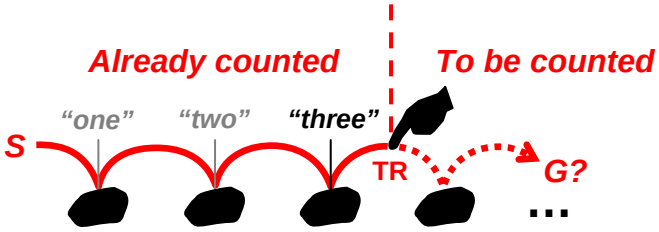
- Distinct finger state (*e.g.,* raised = already counted) *-or-*
- Position of *TR* as in system #1

After last object named, total count determined by:

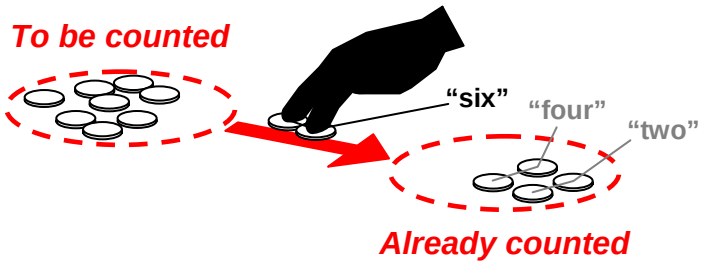
- Finger pattern recognition and naming *-or-*
- Re-counting the finger proxies (reciting counting labels)

Functional Systems for Counting

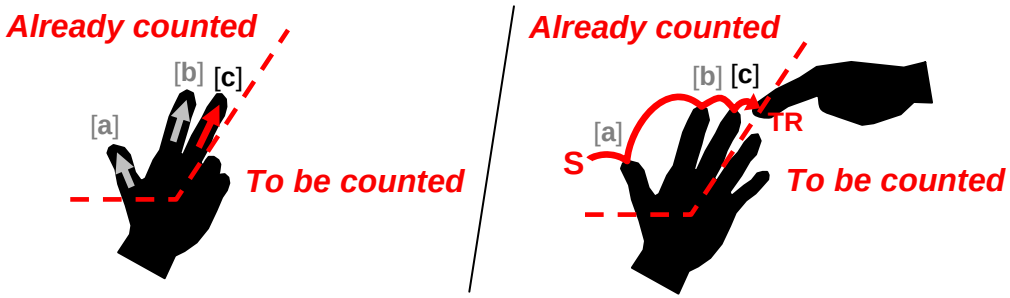
TOUCHING OBJECTS



MOVING OBJECTS



USING FINGER PROXIES



Conceptual aspects:

1. Addition of image-schematic structure (SOURCE-PATH-GOAL, PROXIMITY, CONTAINER)
2. Material anchoring of spatially distinct conceptual categories

Counting as Situated Practice

Video of counting on the clock

Transcript (1)

4 Teacher: now ***another*** way that we sa:y it

5 (1.0)

6 is we count by ***fi:ves***

7 (0.3)

8 when we move this,

9 from *number* to *number*=there's ***five minutes***

10 between each ***number***

11 (0.6)

Transcript (2)

12 so if we were going to count by ***fives*** it would be:

13 (0.5)

14 ***fi:***ve

15 S: five

16 (0.6)

17 Ss: te::n

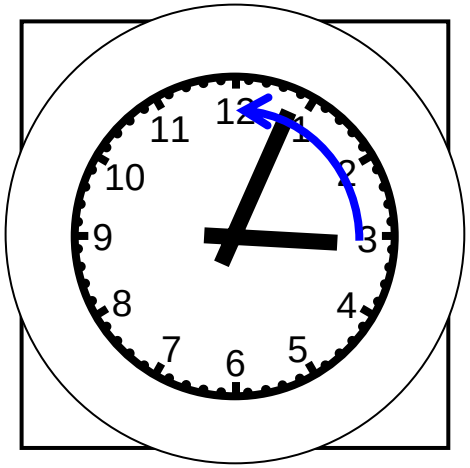
18 Teacher: ***te:n***

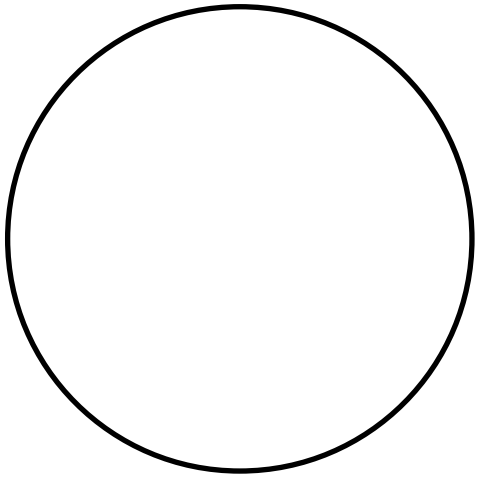
19 (0.4)

20 Ss: fiftee:n

21 Teacher: ***fifteen***=

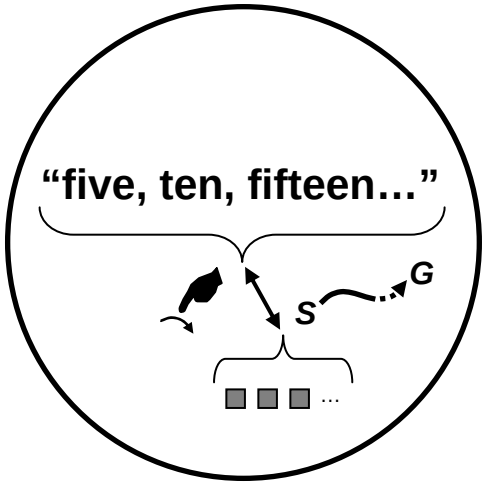
Prompting for a New Space



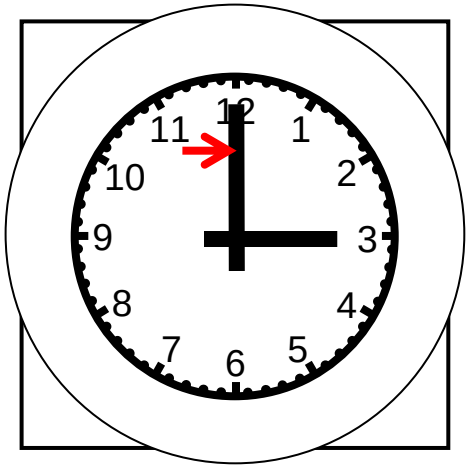


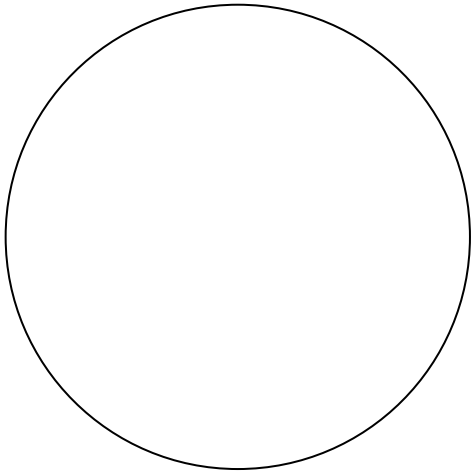
now ***another*** way that we sa:y it

Activating the Counting Input



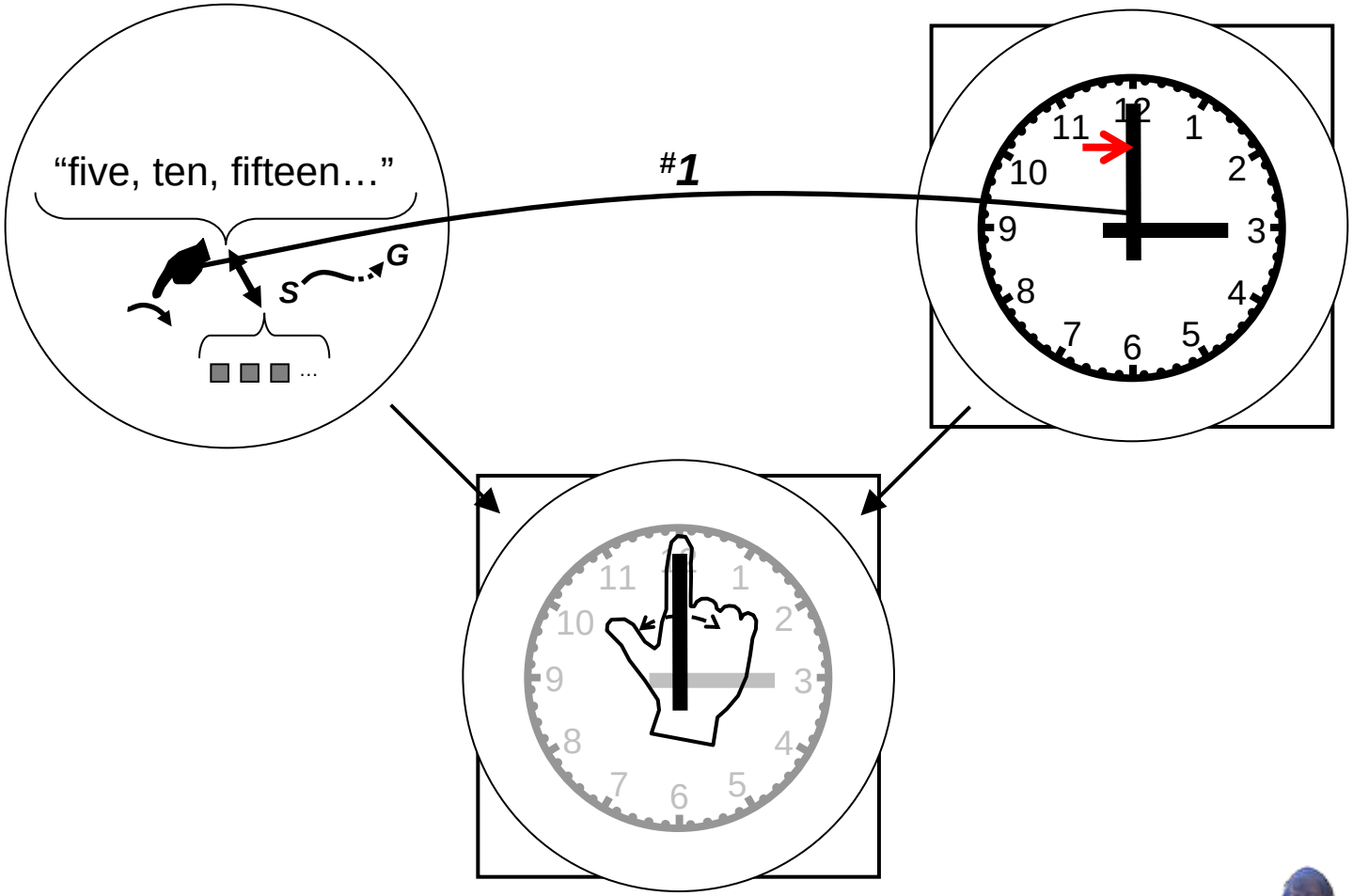
Counting by Fives





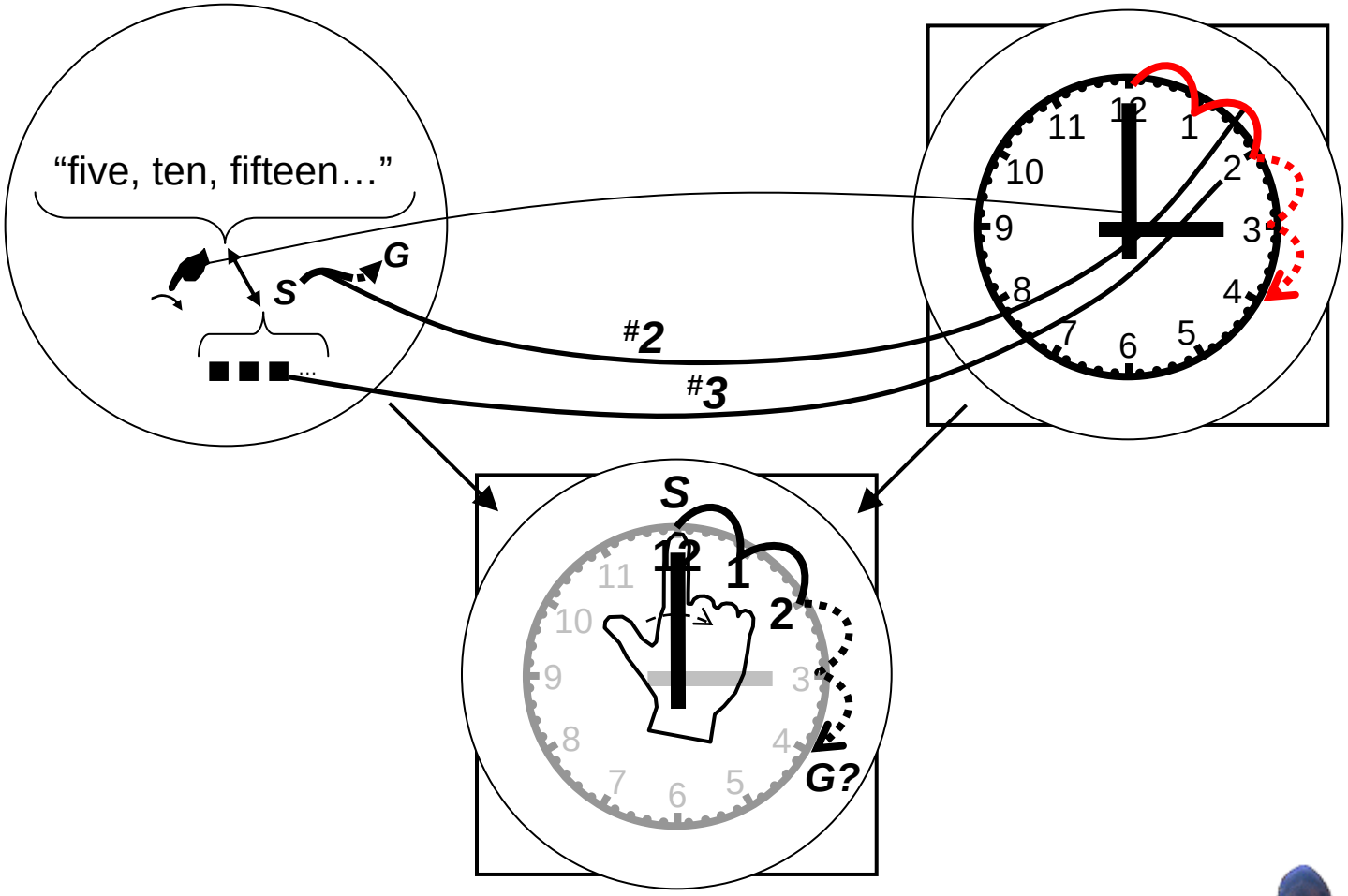
is we count by ***fi:ves***

Conceptual Mapping #1



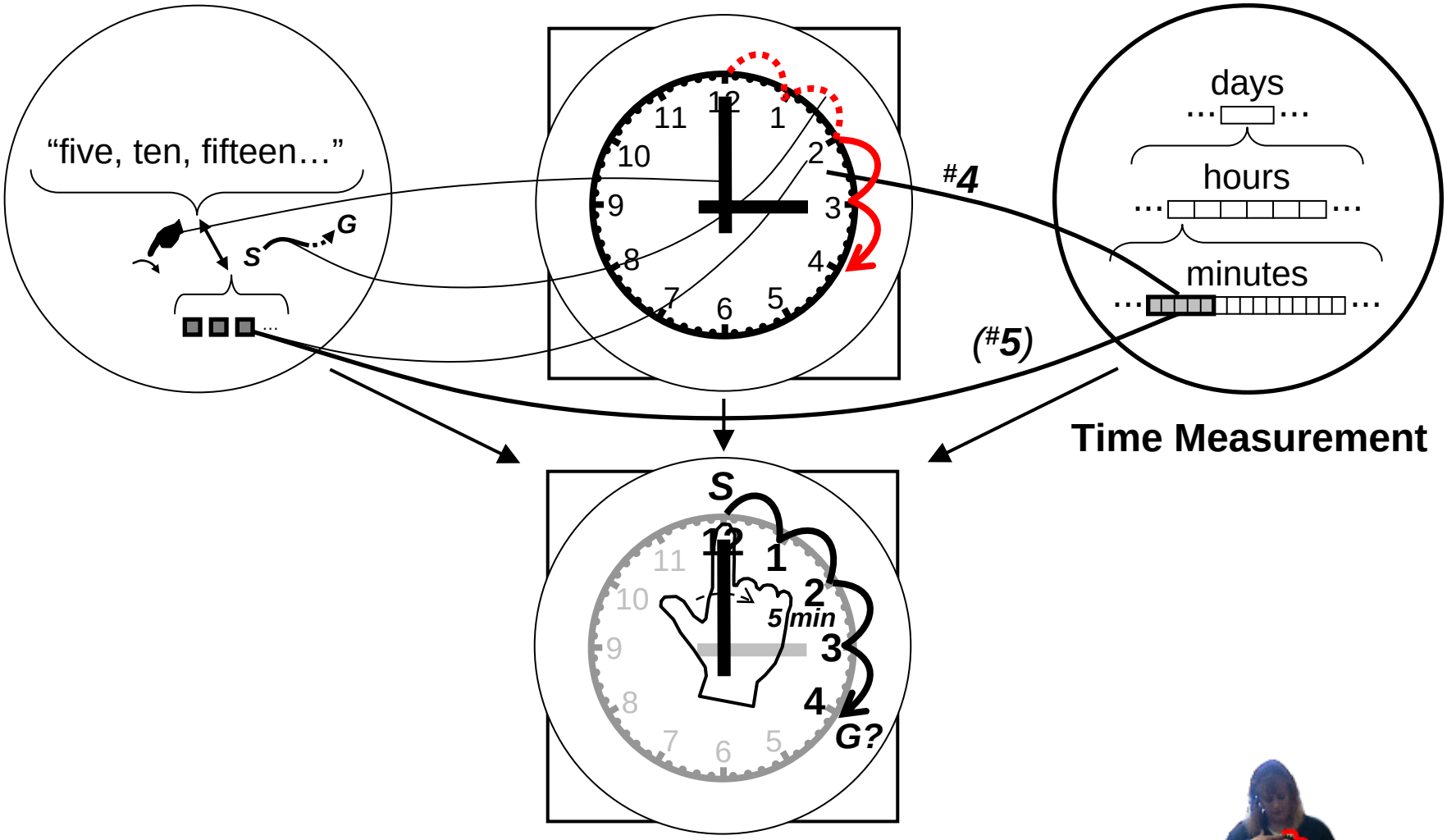
when we move this,

Conceptual Mappings #2 and #3



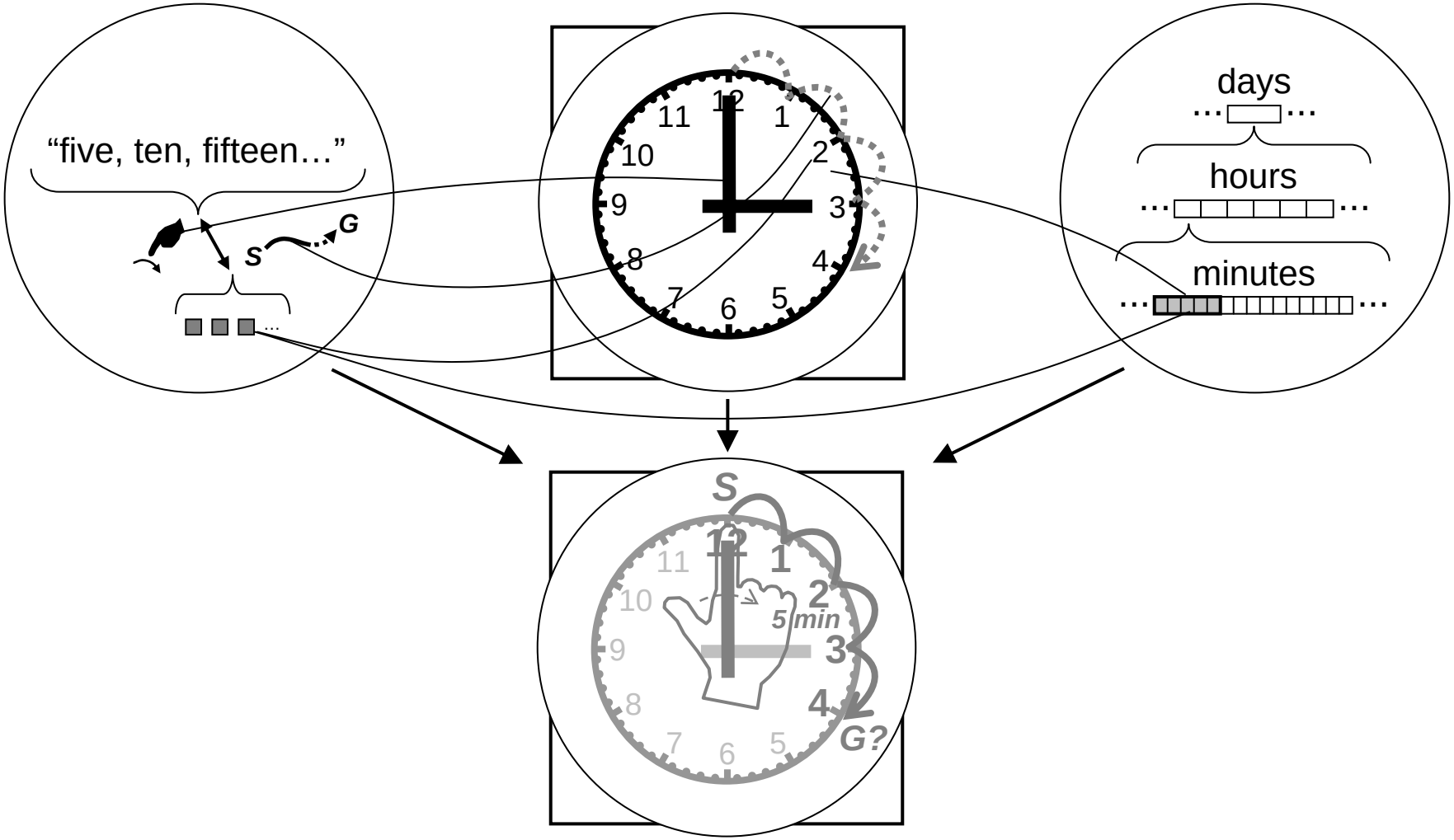
from *number* to *number*=

Conceptual Mapping #4 (and #5)



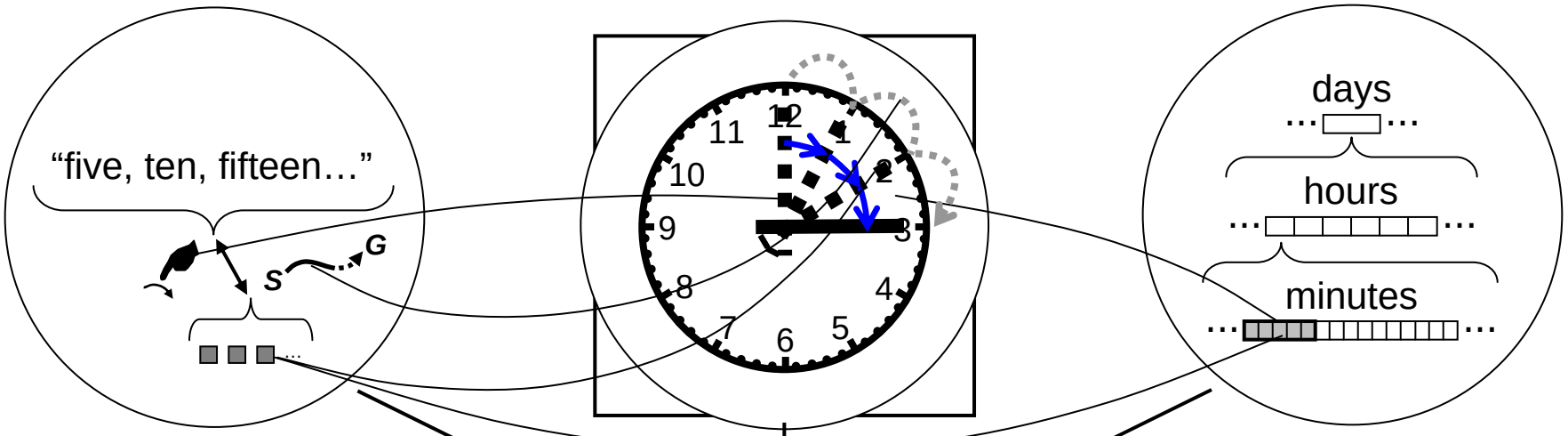
there's ***five minutes*** between each ***number***

Transition to Running the Blend



so if we were going to count by ***fives*** it would be:

Running the Blend: Counting on the Clock

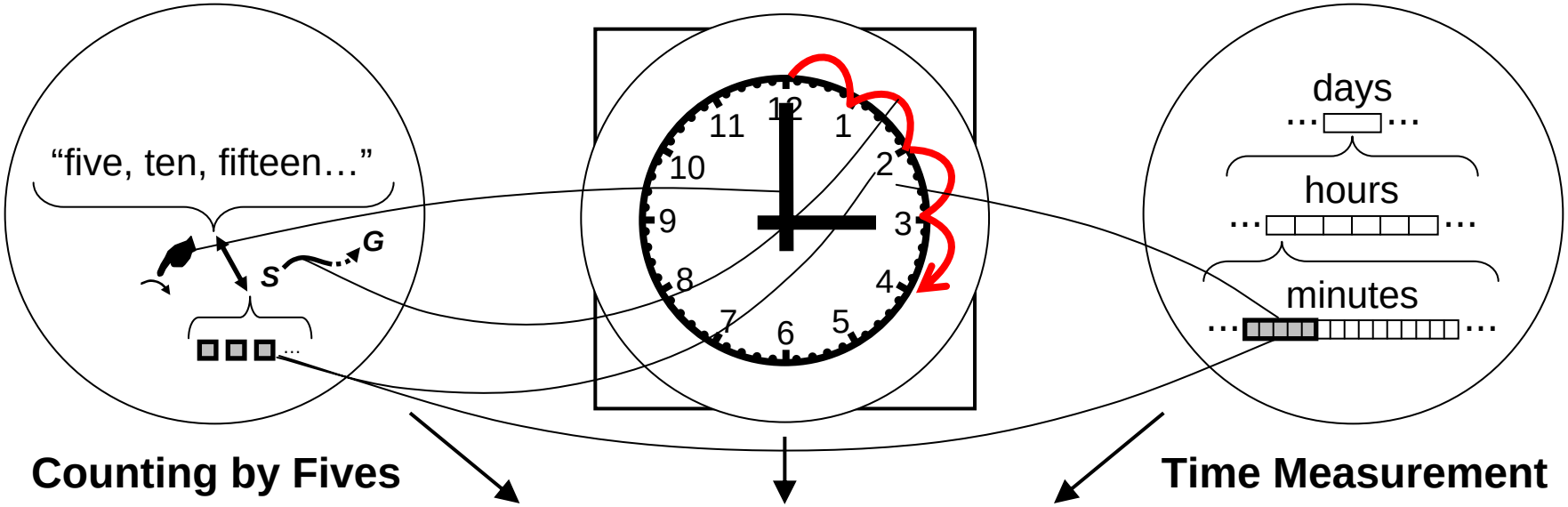


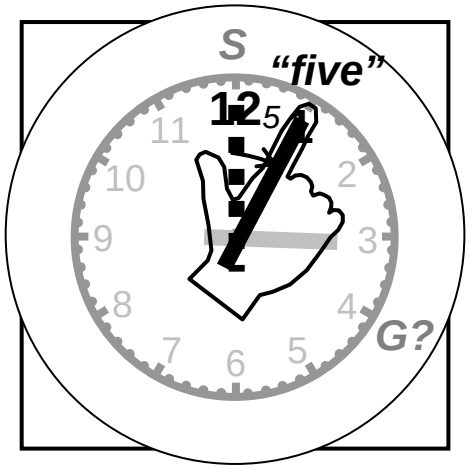
(0.5) ***fi:ve***

(0.6) ***te:n***

(0.4) ***fiftee:n***=

Conceptual Integration Network





Counting on the Clock

Twin Aspects of Functional Systems

Computation

- Cognitive functional systems operate by bringing media into coordination with one another. (Hutchins)
- Humans make these systems function by:
  - Generating structures, and
  - Bringing structures into coordination.

Conceptualization

- The operation of functional systems may depend on:
  - imposing specific image-schematic structure, and
  - anchoring conceptual distinctions in blended mental spaces.
- Situated instantiation of a functional system may require novel mappings from conceptual inputs to structures present (or absent) in the setting.

References

Fauconnier, G. & Turner, M. (1998). Conceptual integration networks. *Cognitive Science*, 22(2): 133-187.

Fauconnier, G. & Turner, M. (2002). *The Way We Think: Conceptual Blending and the Mind's Hidden Complexities*. New York: Basic Books.

Hutchins, E. (1995). *Cognition in the Wild*. Cambridge, MA: MIT Press.

Hutchins, E. (2001). Distributed cognition. In N. J. Smelser & P. B. Baltes (eds.), *The International Encyclopedia of the Social and Behavioral Sciences*. New York: Elsevier.

Hutchins, E. (2005). Material anchors for conceptual blends. *Journal of Pragmatics*, 37(10): 1555-1577.

Williams, R. F. (2007). Counting and conceptual blending. *10th International Cognitive Linguistics Conference*, Krakow.

Williams, R. F. (2008). Gesture as a conceptual mapping tool. In A. Cienki & C. Mueller (eds.), *Metaphor and Gesture [Gesture Studies 3]* (pp. 55-92). Amsterdam: John Benjamins.