
Mindreading & Joint Action
4. What Is Modularity?
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Outline

Why we need a notion of modularity (§0)

There is a problem—current accounts of modularity are inadequate (§1).

I have a solution (§2).

This solution implies a constraint on how modules might explain cognitive development (§3).

Illustration: speech perception (§4).

Why we need a notion of modularity (§0)

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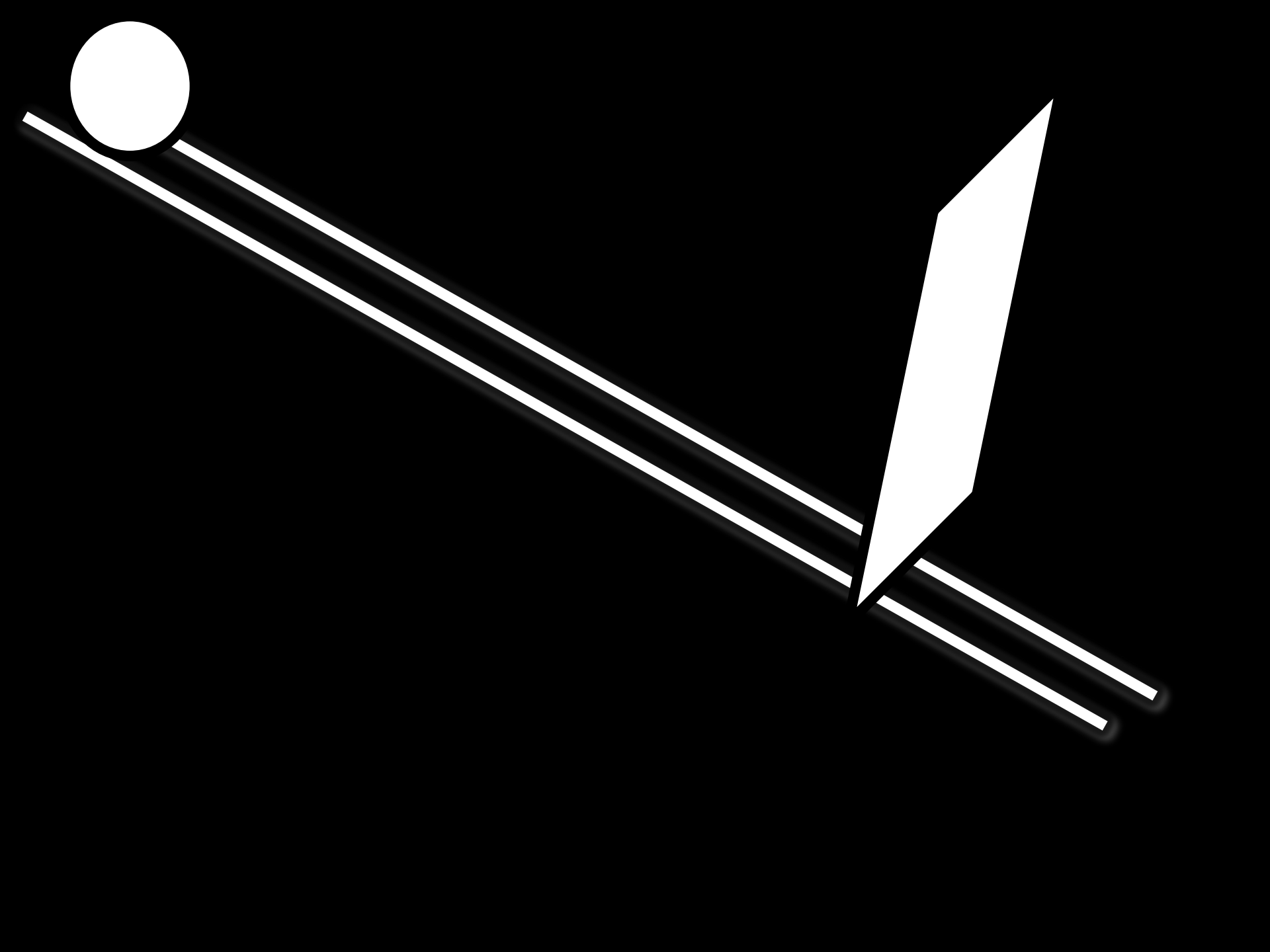

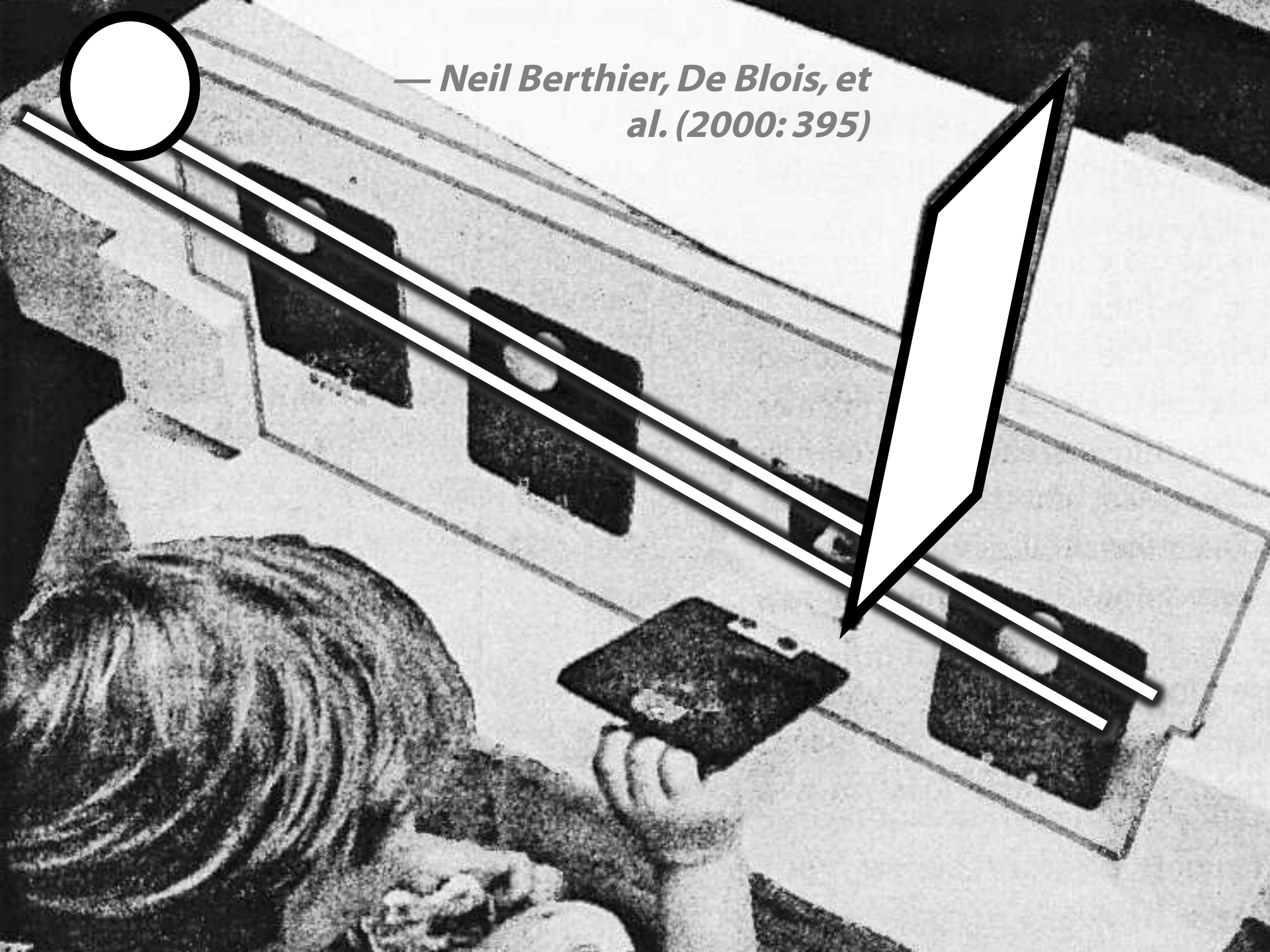
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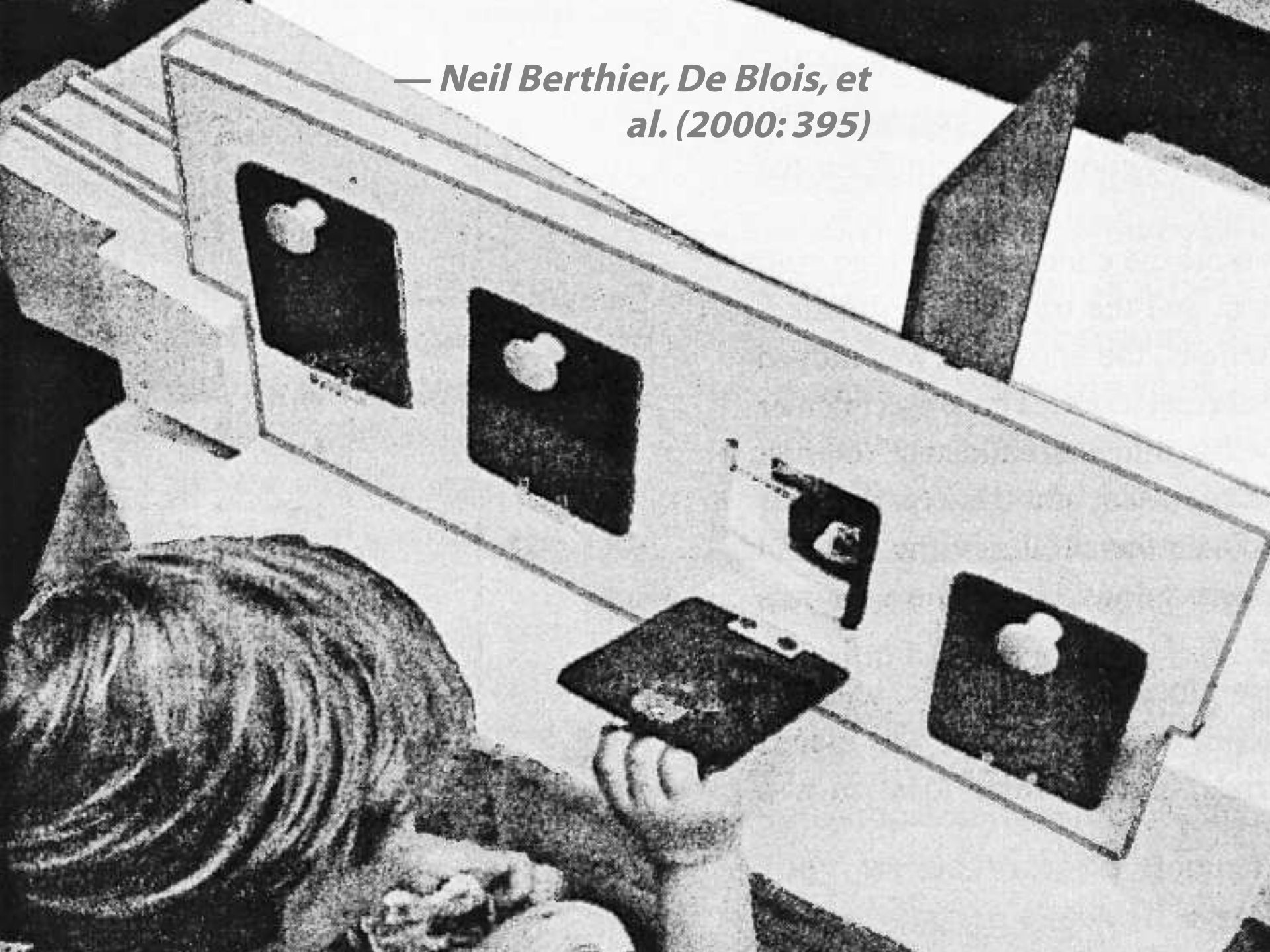

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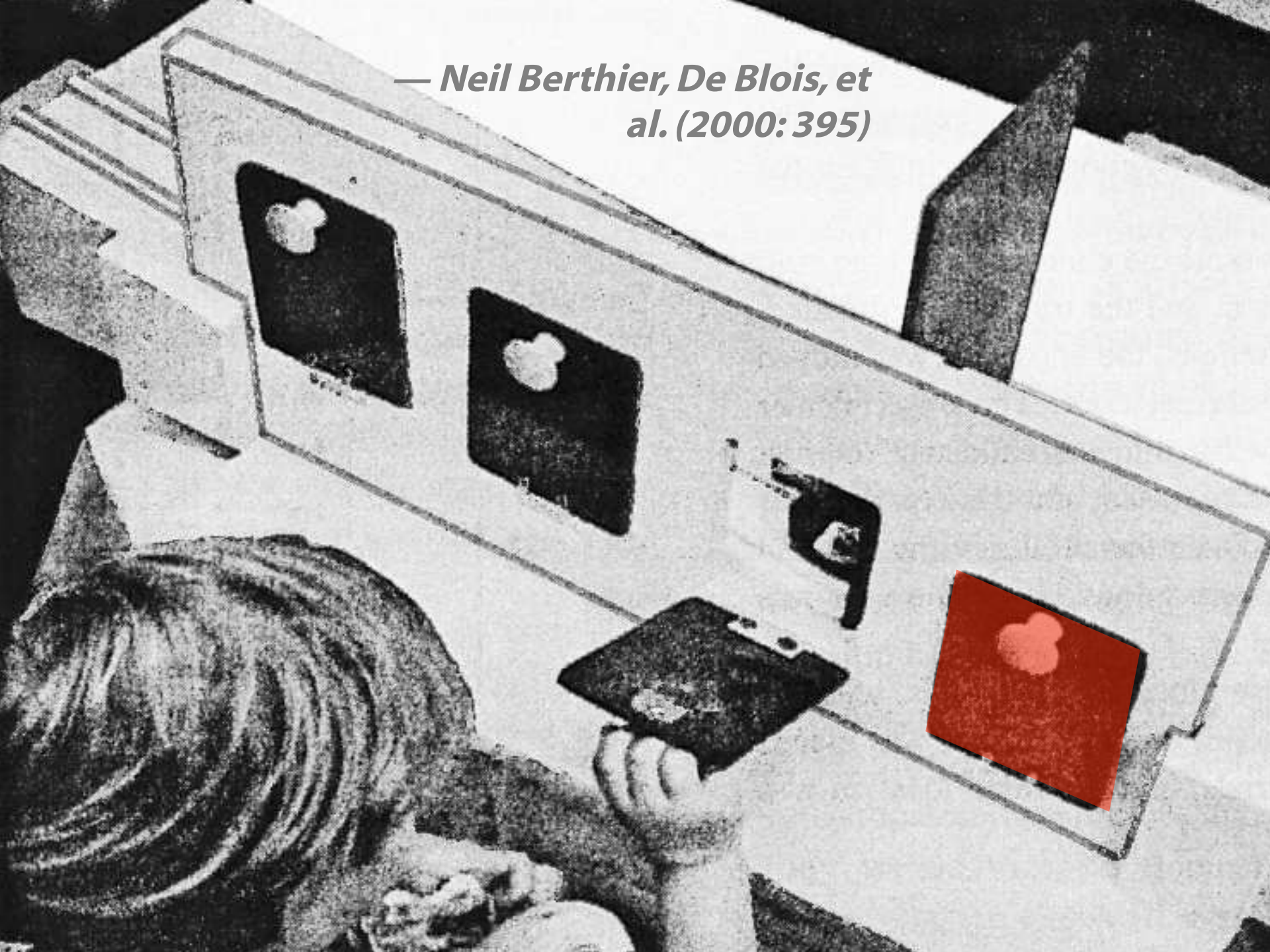

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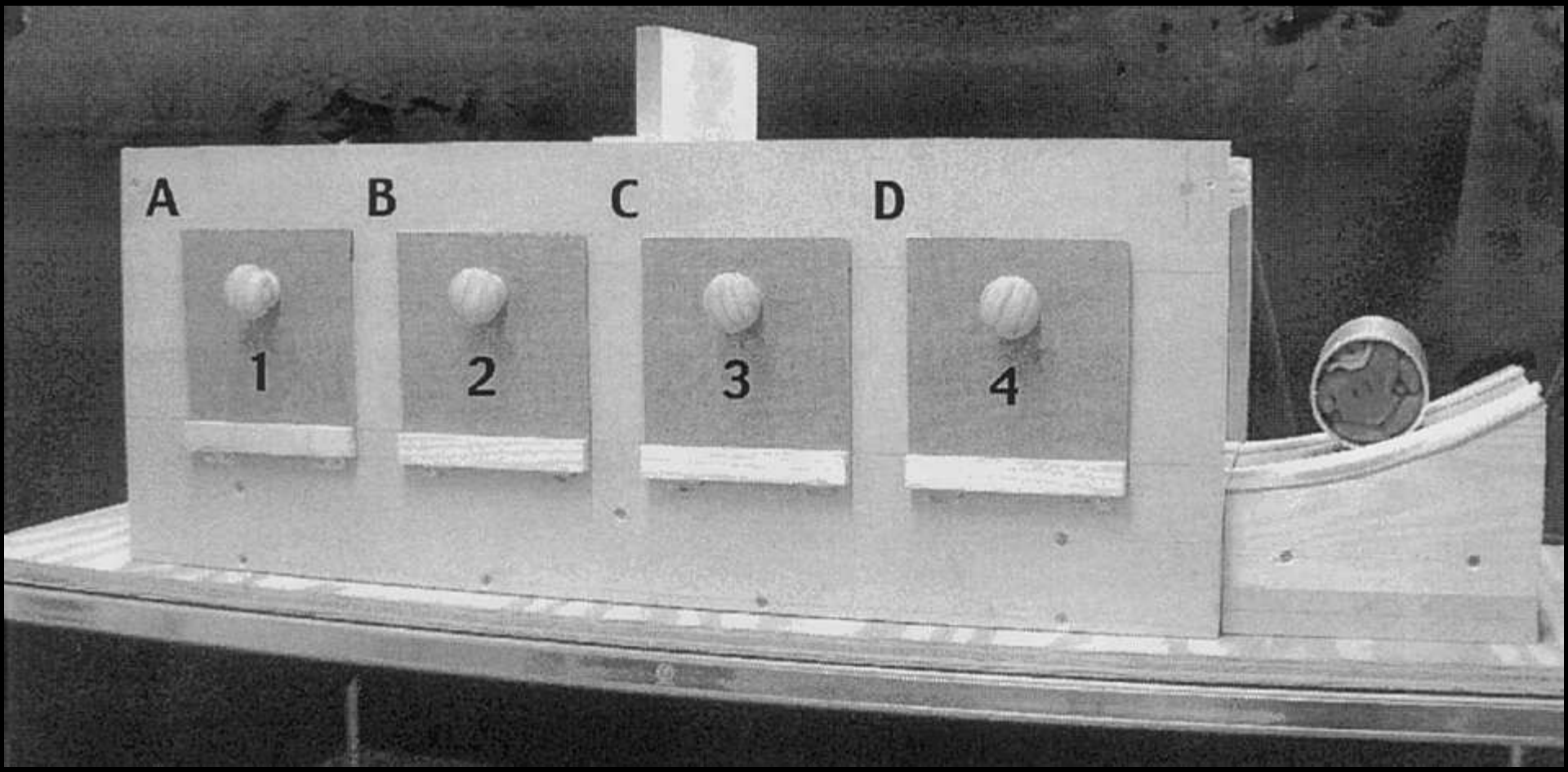


(Hood et al, 2003)

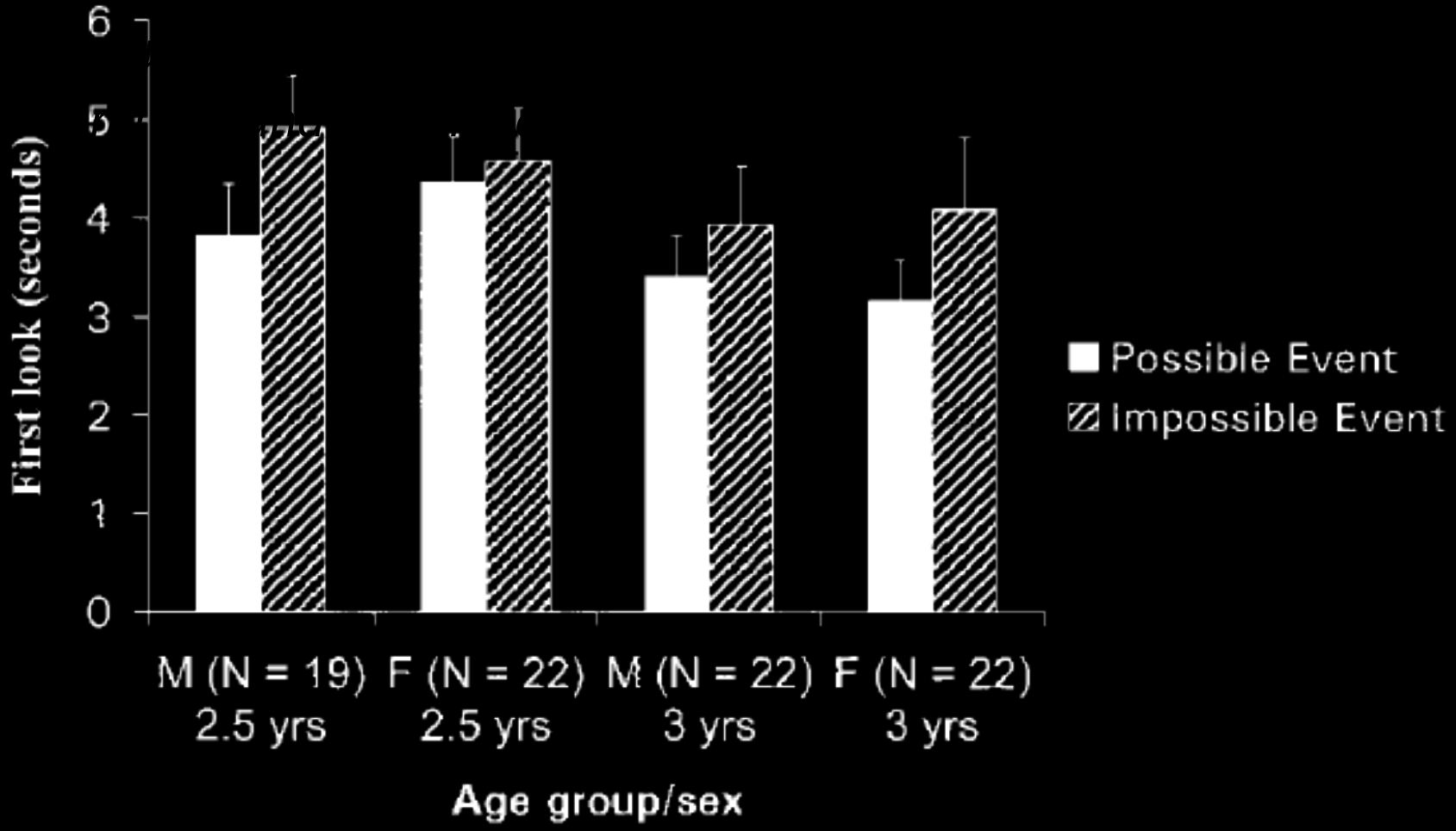
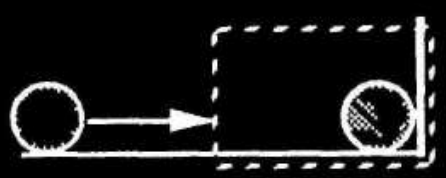


Figure 2. Mean durations of first looks to possible and impossible outcomes, by age and sex. M = male; F = female.

(Hood et al, 2003)

habituation



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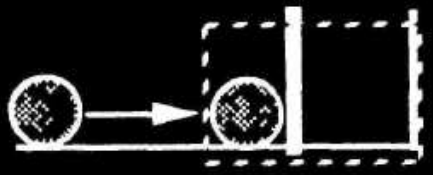

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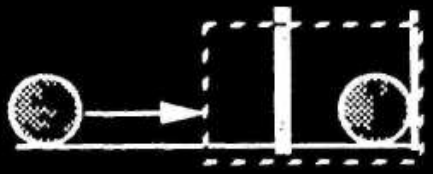

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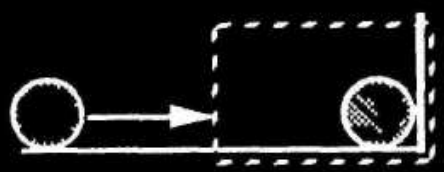

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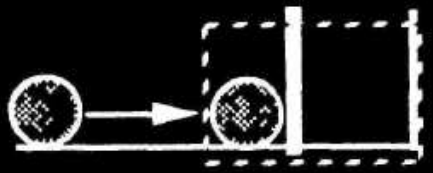

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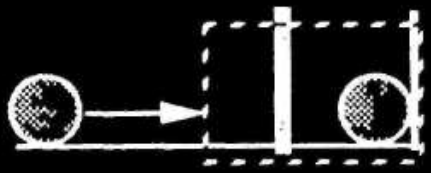

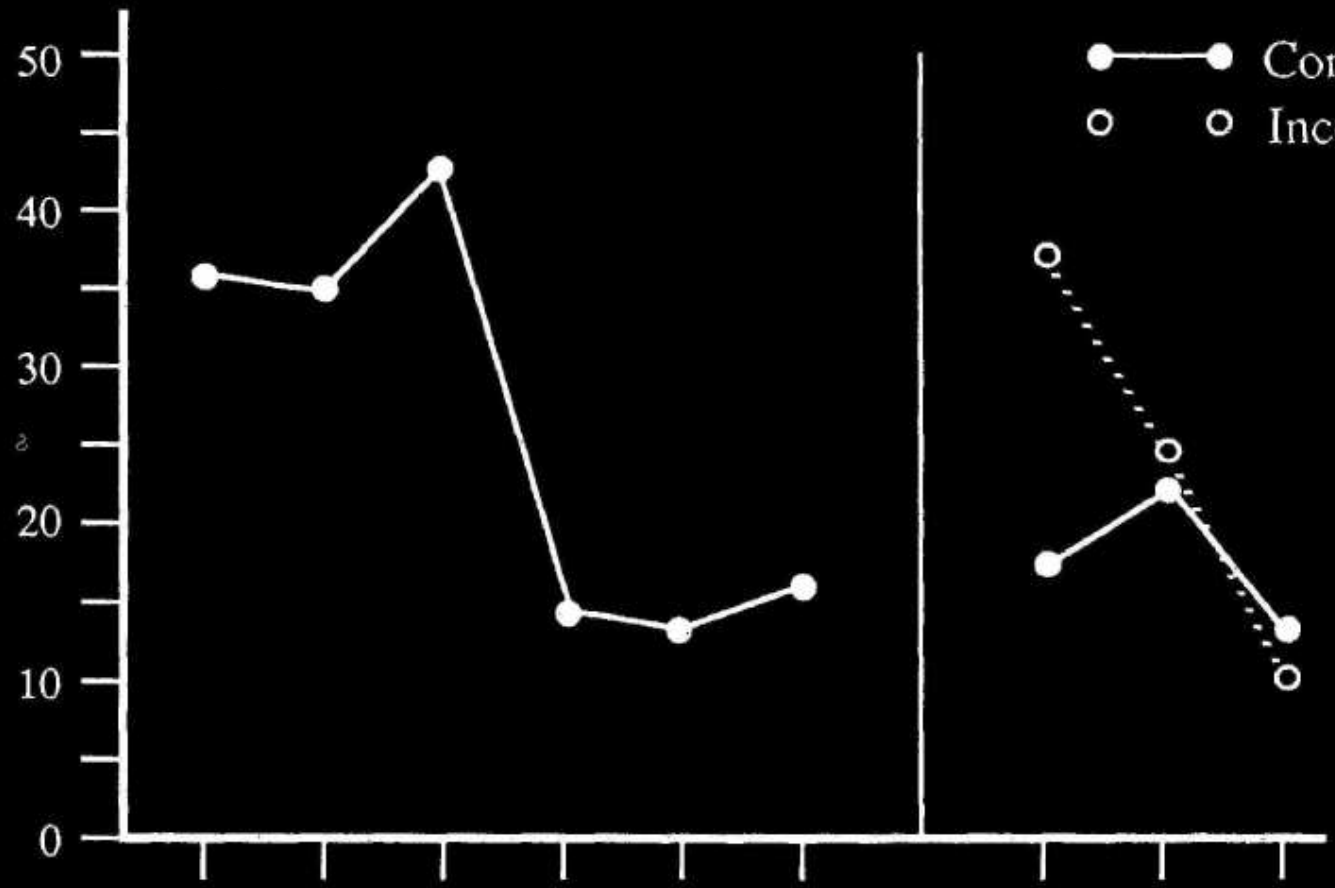

Sources Spelke 1991, Gergely, Csibra & Biro 1995, Csibra 2003 p. 125 fig. 6, Mark Steyvers' web page for PSYCH 140C

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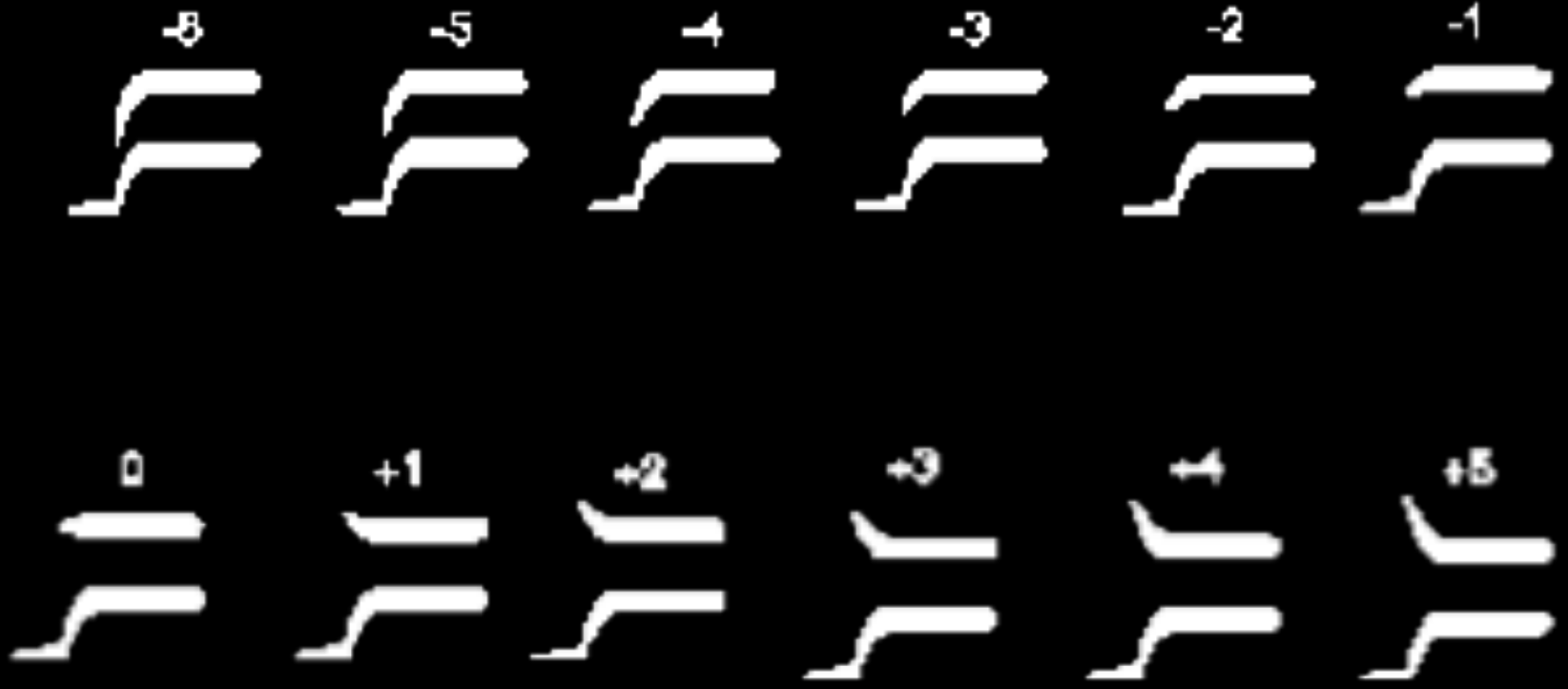

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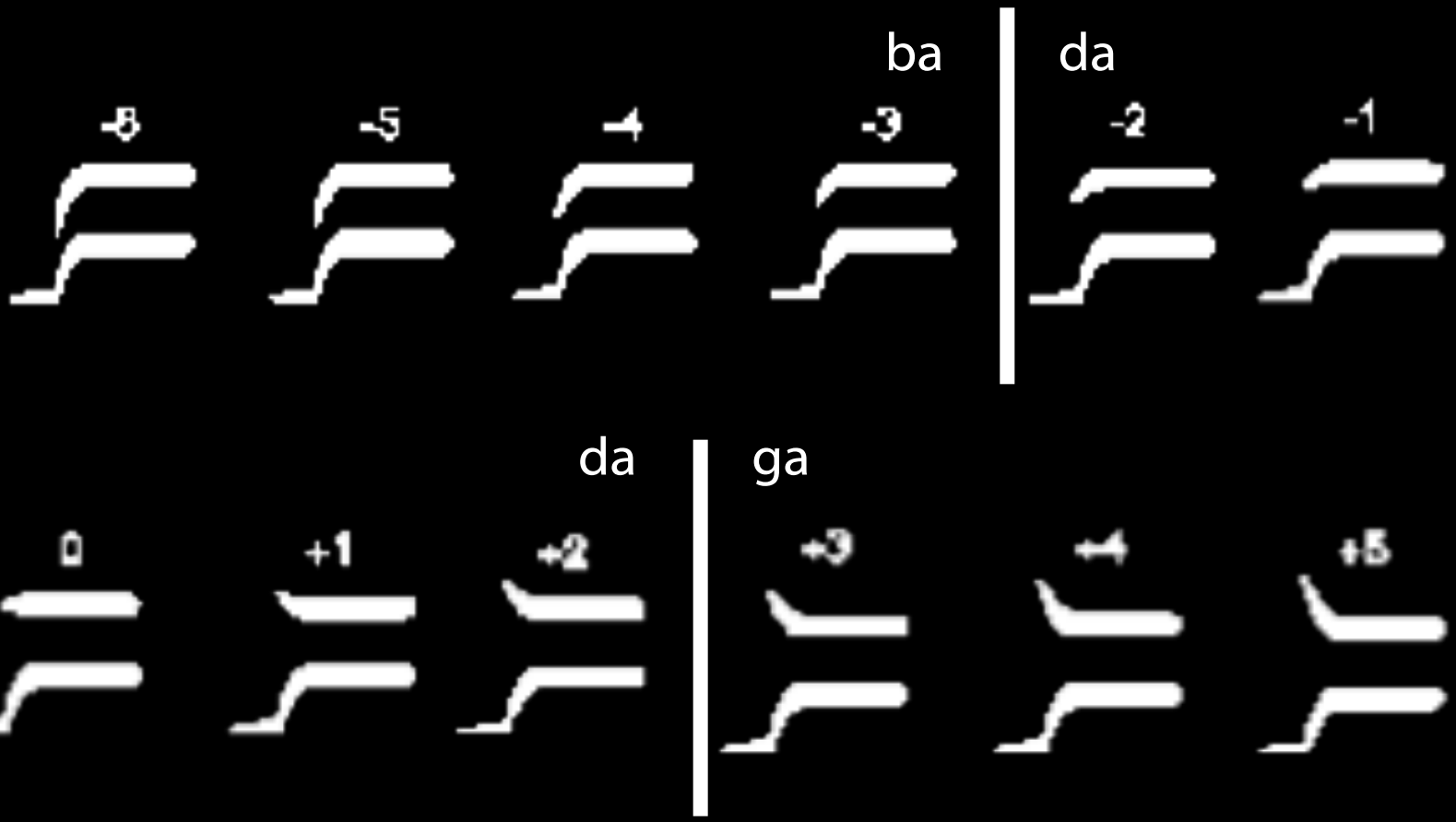

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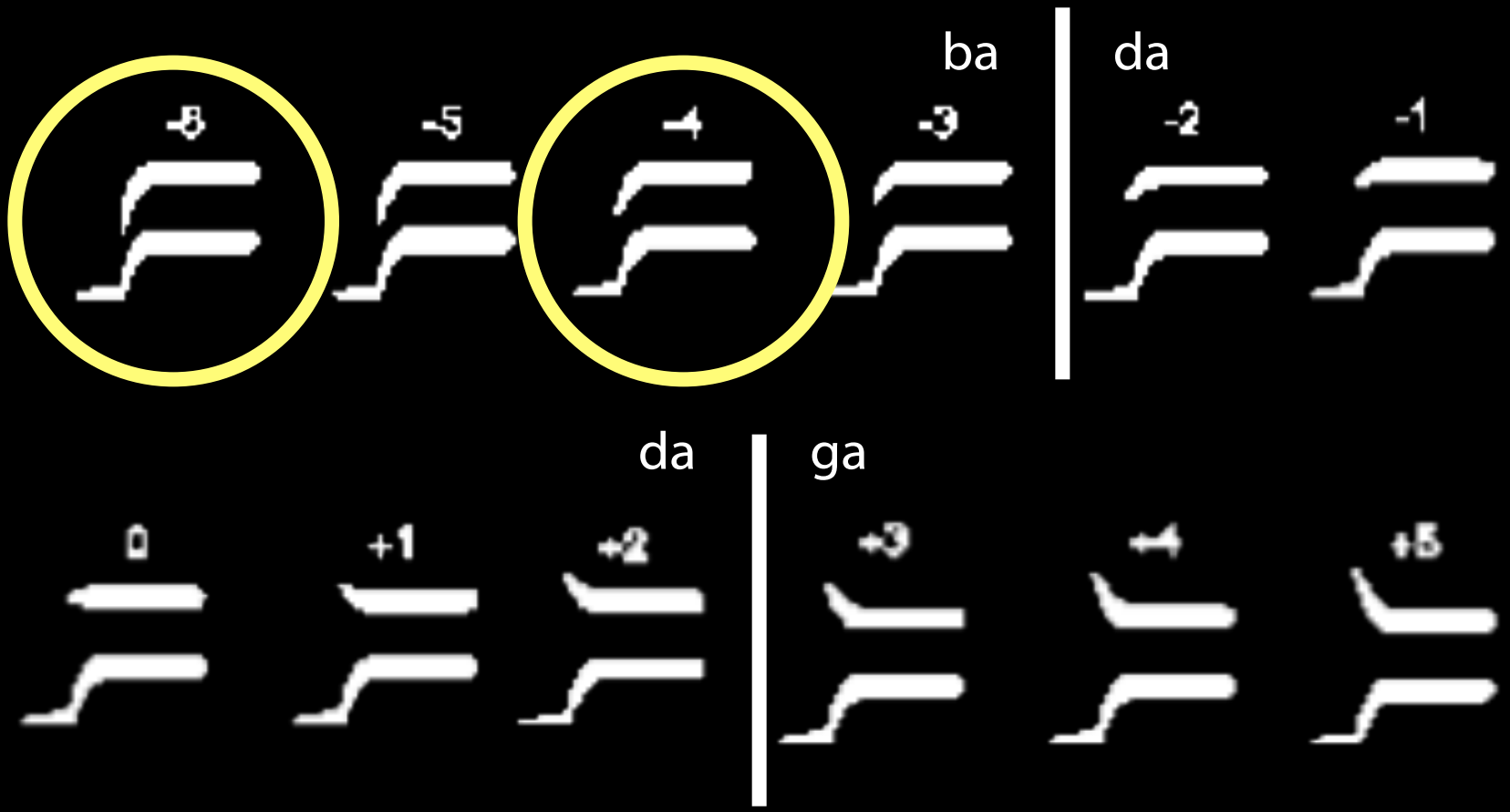

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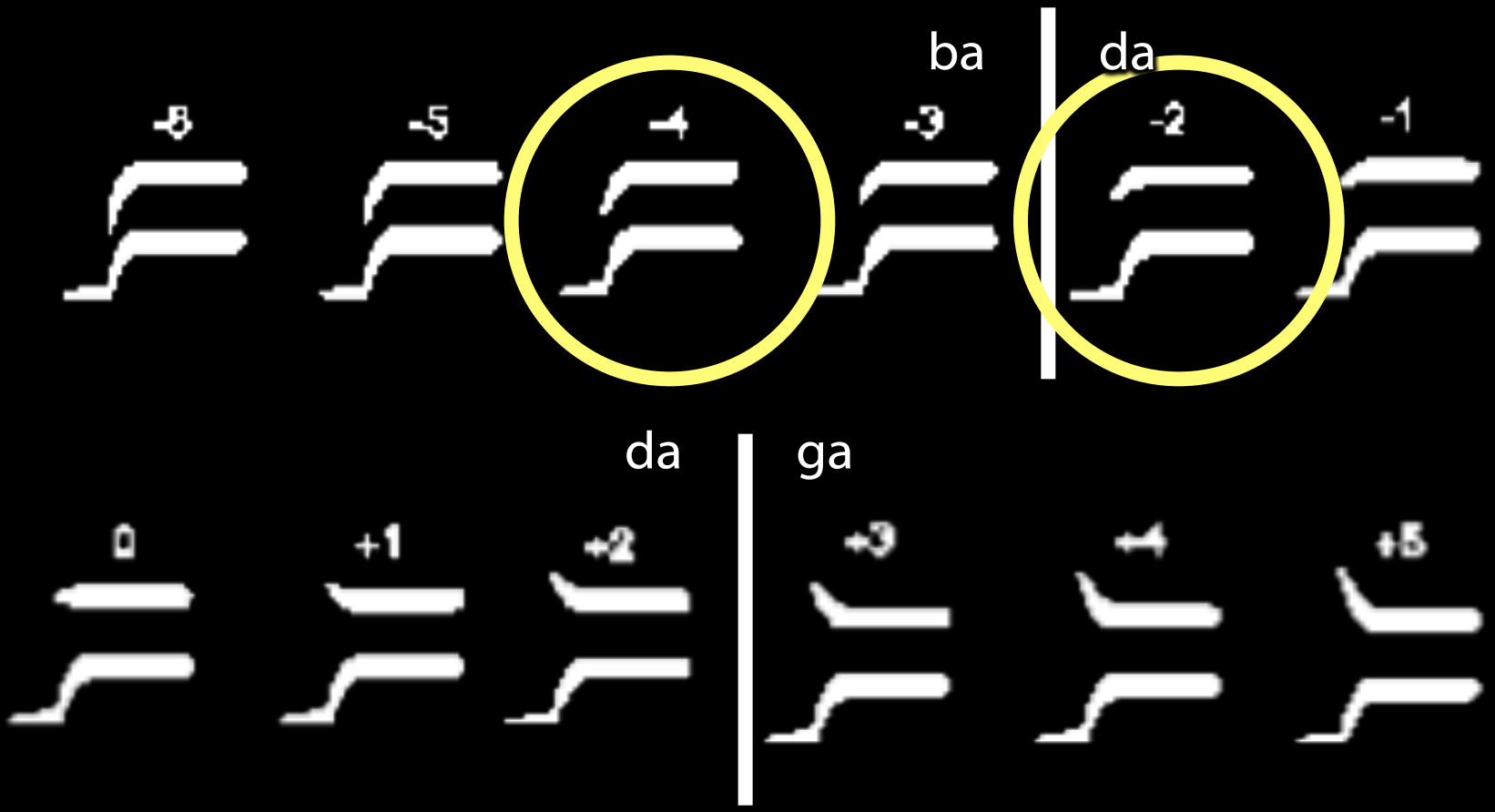

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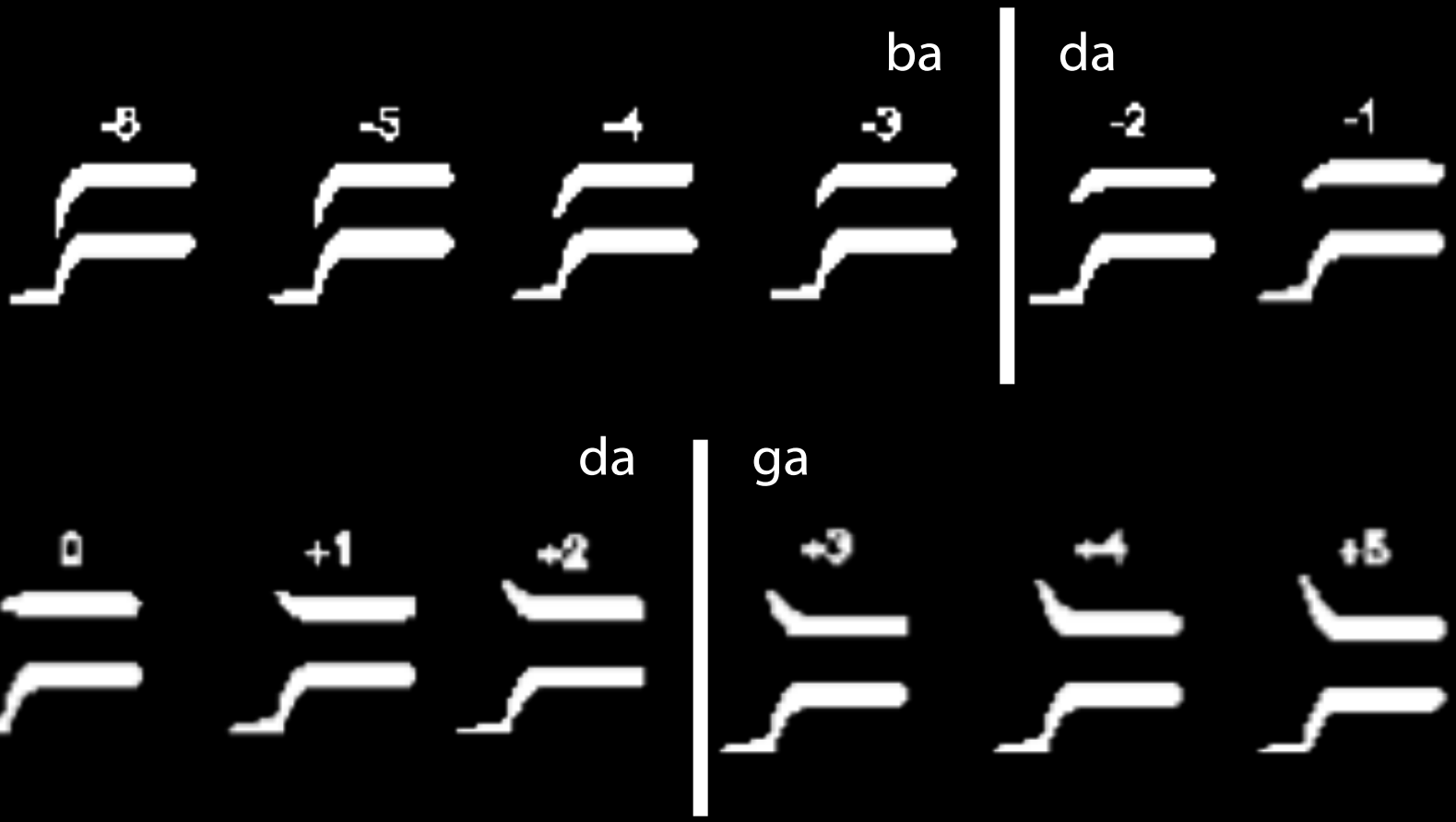

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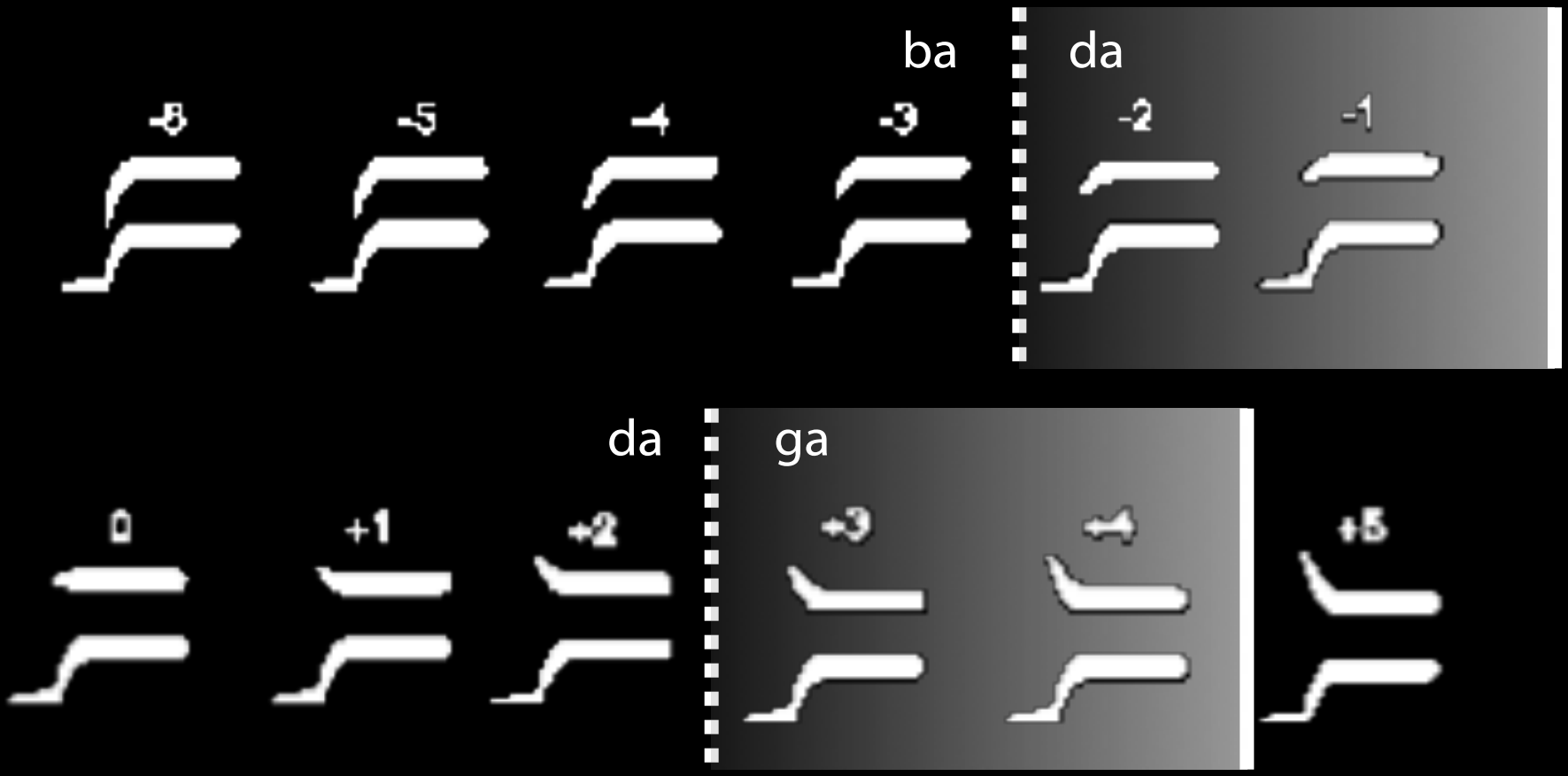

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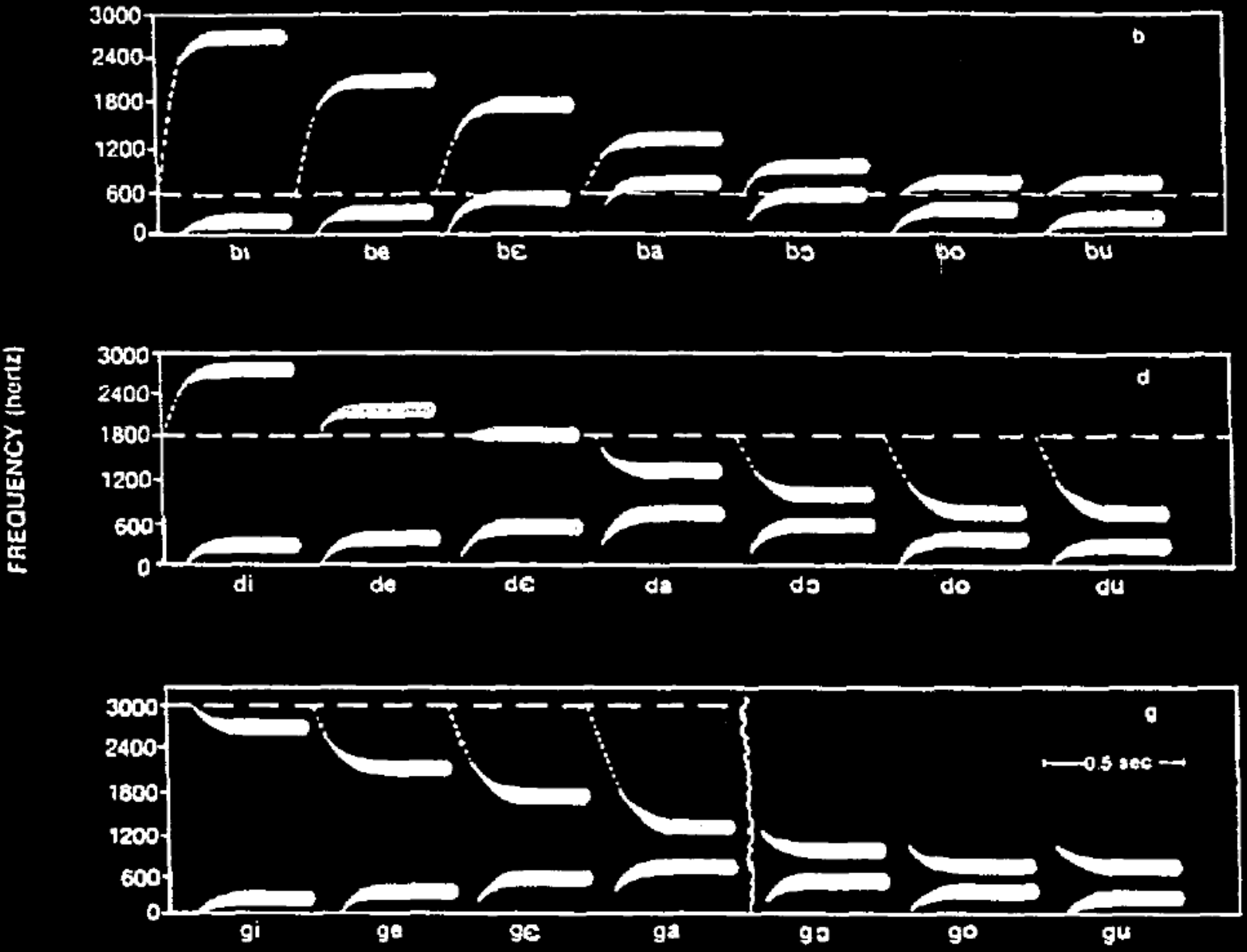

source Jusczyk (1997: 44)

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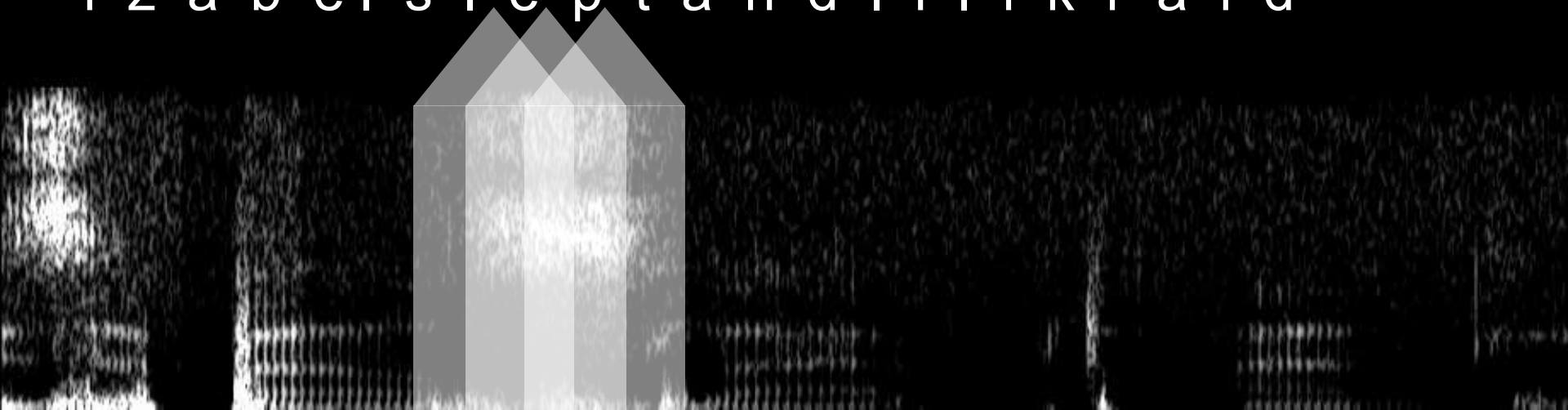
i z a b e l s l e p t a n d l i l i k r a i d



The objects of speech perception are ‘the intended phonic gestures of the speaker’ (Liberman and Mattingly 1985)

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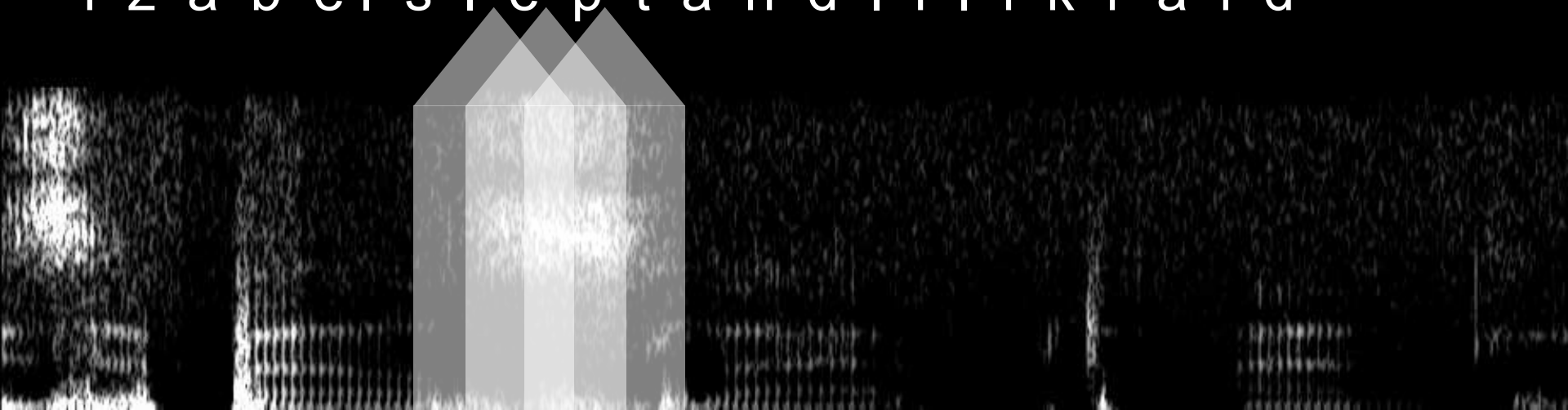
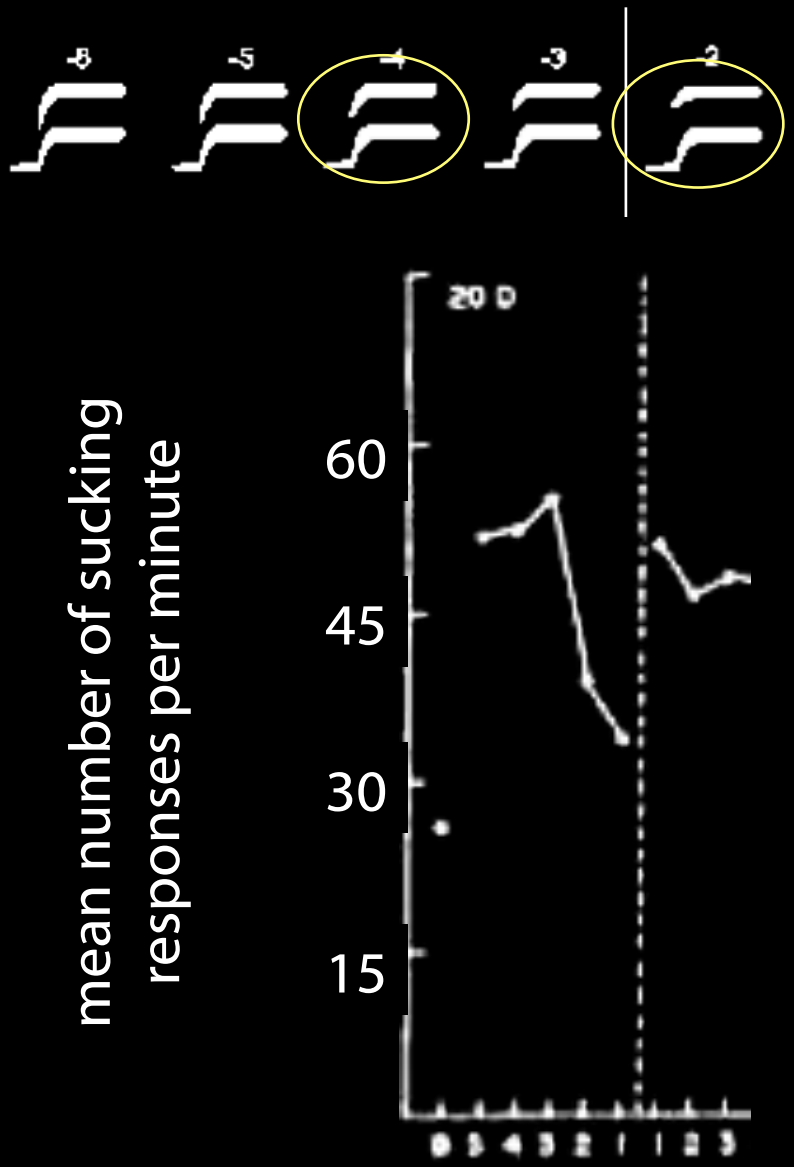
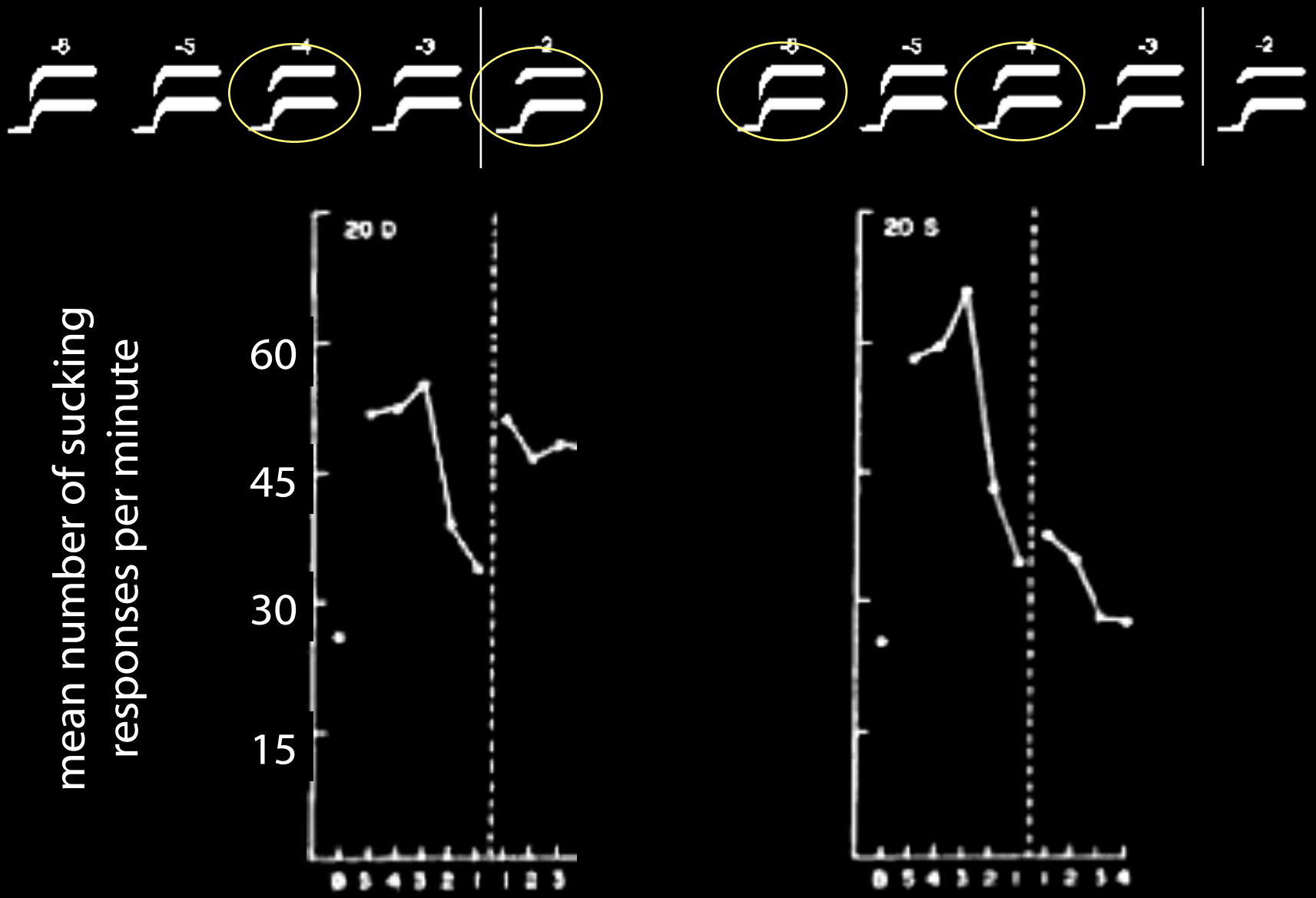




source Eimas, Siqueland, et al. (1971: 304, figure 2)



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- sorting according to initial phoneme
- tapping once per phoneme
- phoneme segmentation
- phoneme blending
- phoneme elision
- word completion

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There is a problem

Modules

1. they are 'the psychological systems whose operations present the world to thought';
2. they 'constitute a natural kind'; and
3. there is 'a cluster of properties that they have in common … [they are] domain-specific computational systems characterized by informational encapsulation, high-speed, restricted access, neural specificity, and the rest'

(Fodor 1983: 101)

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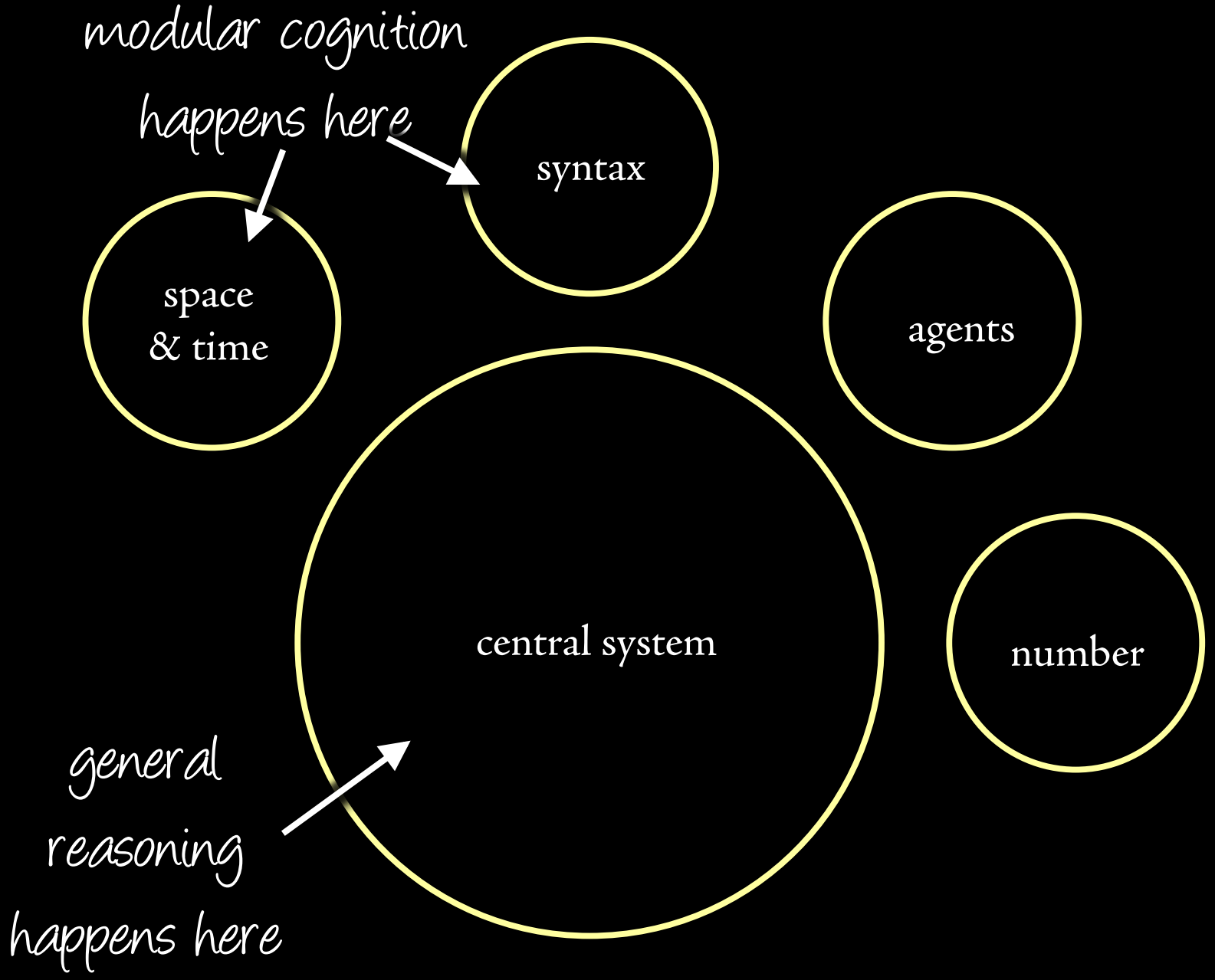
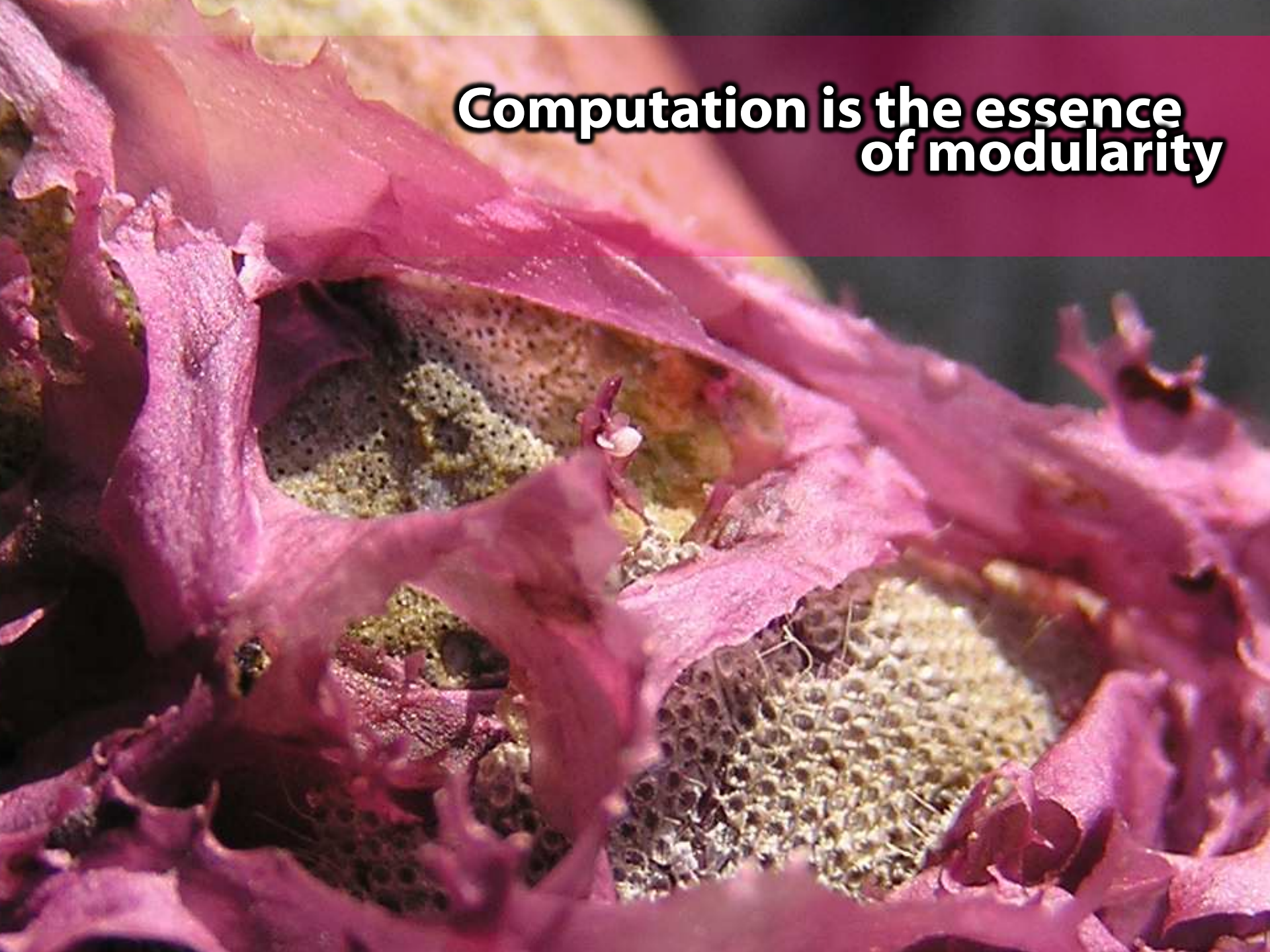

modular cognition happens here
syntax
space & time
agents
central system
number
general reasoning happens here

`it seems doubtful that the often long lists of correlated attributes should come as a package ... the process architecture of social cognition is still very much in need of a detailed theory'

(Adolphs 2012: 759)

Computation is the essence of modularity



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(b) have a systematic effect on thought and action; and

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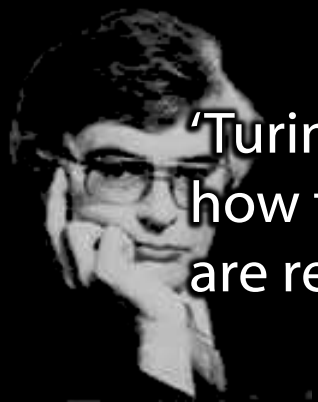

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Thought: P&Q

Representation1

Thought: Q

Representation2

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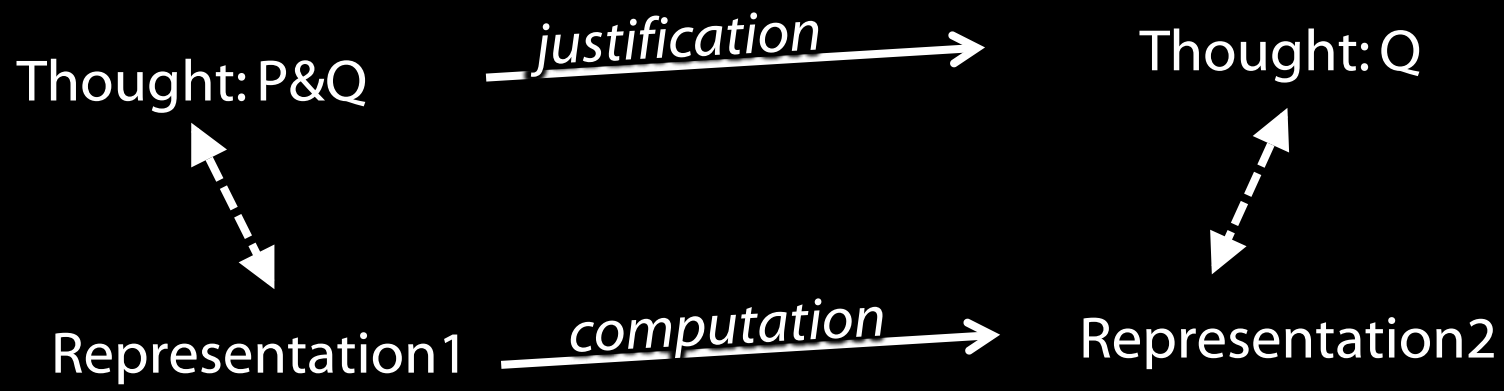

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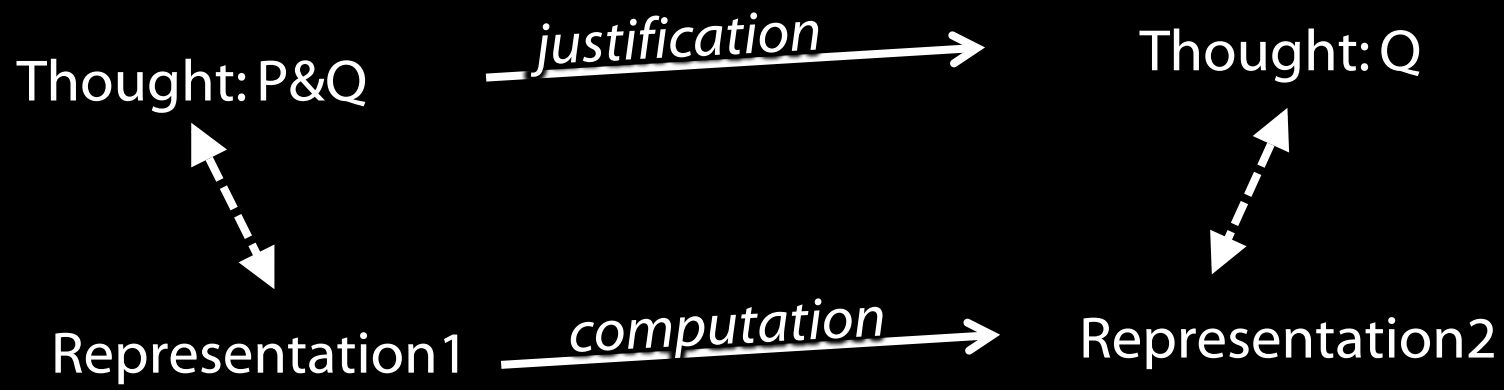

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'sooner or later, we will all have to give up on the Turing story as a general account of how the mind works'

(Fodor 2000: 47)

Fodor's (?) argument

1. Computational processes are not sensitive to context-dependent relations among representations.

2. Thinking sometimes involves being sensitive to context-dependent relations among representations as such.

3. Therefore, not all thinking is computation.

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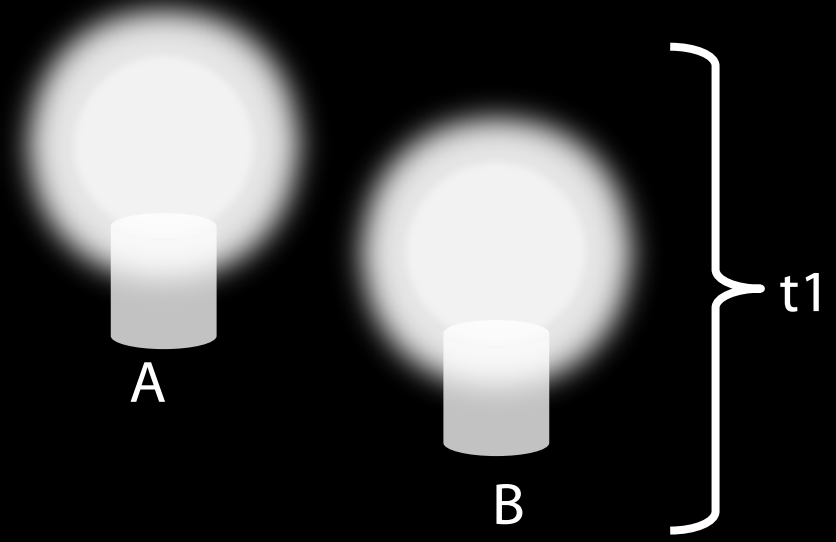

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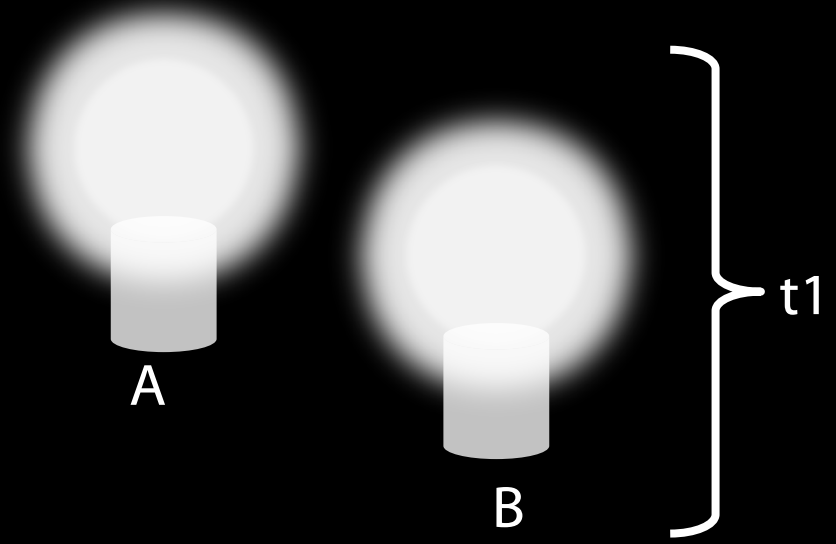

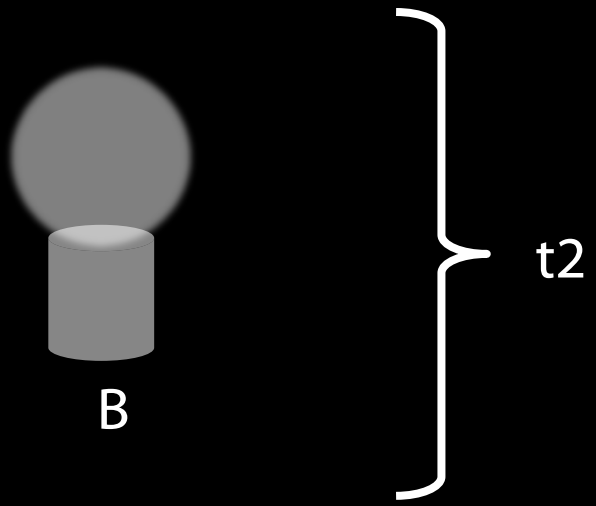

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‘the Computational Theory is probably true at most of only the mind’s modular parts. … a cognitive science that provides some insight into the part of the mind that isn’t modular may well have to be different, root and branch’

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2. Thinking sometimes involves being sensitive to context-dependent relations among representations.

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Consequences for the role
of modules in development

How do modules facilitate development?

(1) Role of modules …

Modules provide 'a basic infrastructure for knowledge and its acquisition'

(Wellman and Gelman 1998: 524)

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(2) How modules fulfil this role …

'The module … automatically provides a *conceptual identification* of its input for central thought … in exactly the right format for inferential processes'

(Leslie 1988: 193–4 my italics).

What are concepts?

The concept OBJECT is …

(a) that in virtue of having which we are able to reason about objects as such;

(b) that in virtue of having which we are able to compute information about objects as such.

How do modules facilitate development?

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associative process → physiological change → sensory experience → thought process


Perceiving & thinking about speech


4 months: categorical perception of phonemes
3-4 years: phoneme judgements


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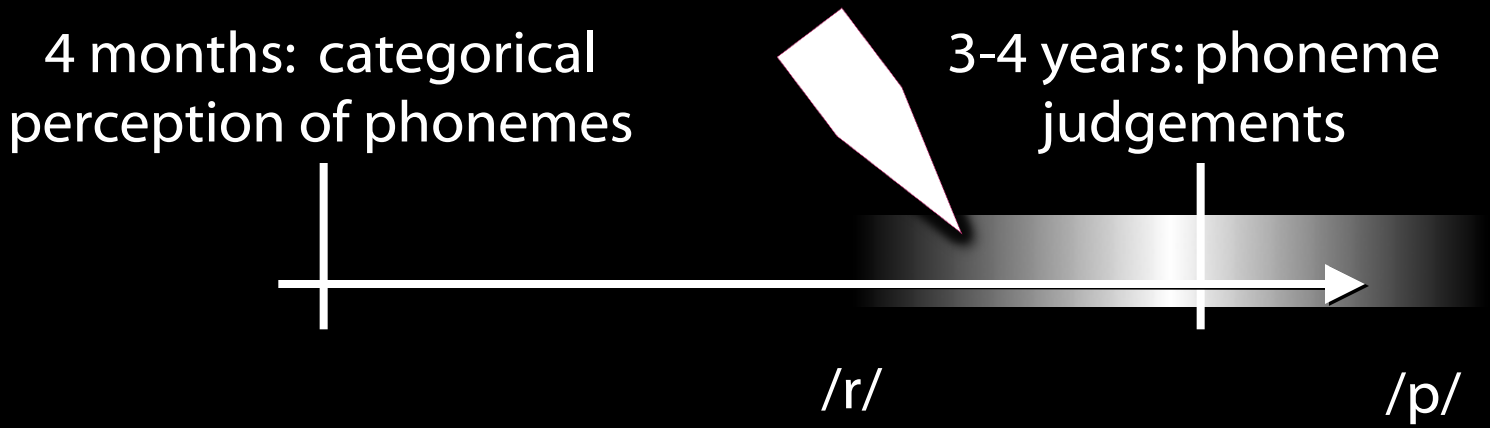
3-4 years: phoneme judgements
/r/
/p/


4 months: categorical perception of phonemes
3-4 years: phoneme judgements
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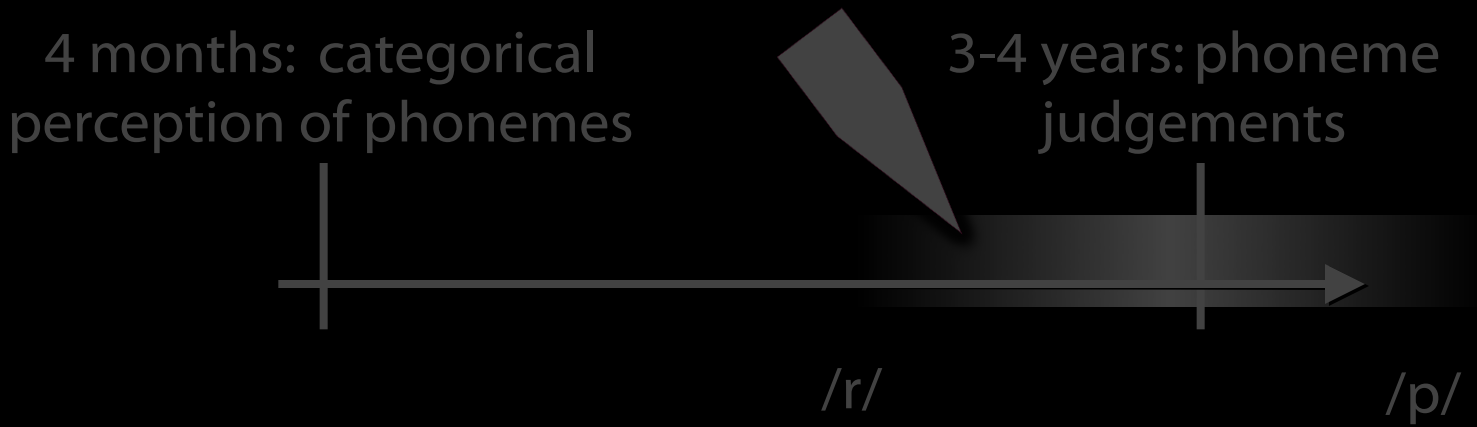
‘we believe that children’s performance depends on cognitive capacities that are continuous over human development’

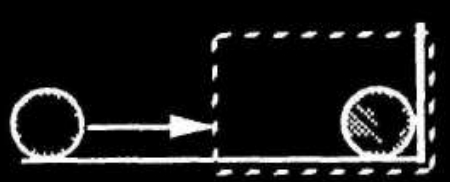
(Spelke 2001: 336)

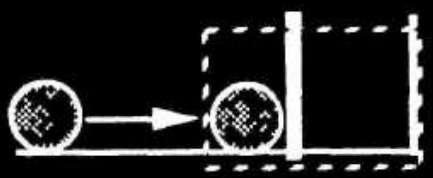


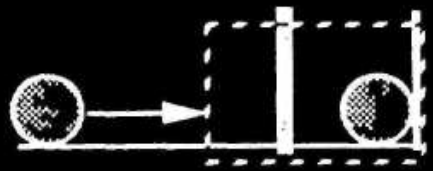
habituation

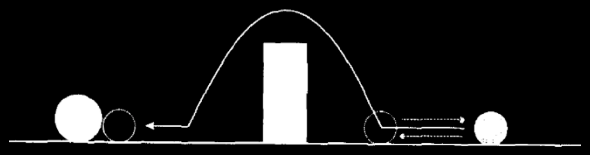
consistent

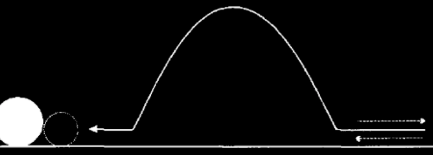
inconsistent

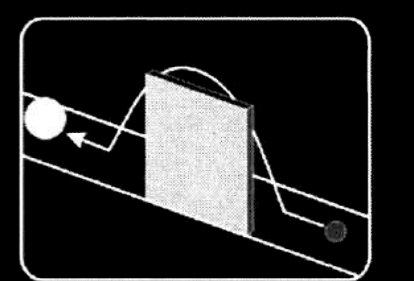


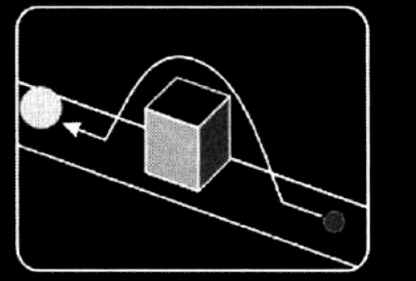


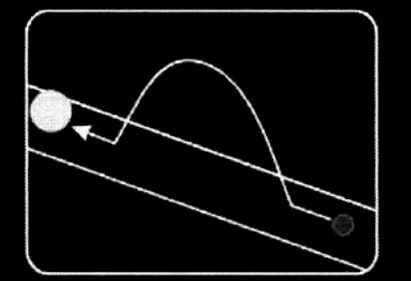










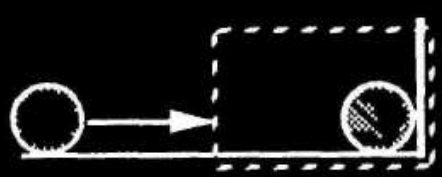


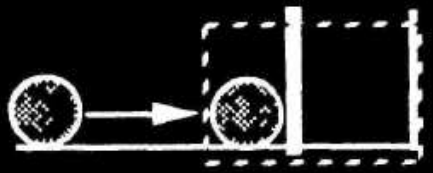
Sources Spelke 1991, Gergely, Csibra & Biro 1995, Csibra 2003 p. 125 fig. 6, Mark Steyvers' web page for PSYCH 140C

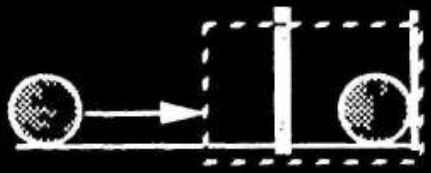
habituation

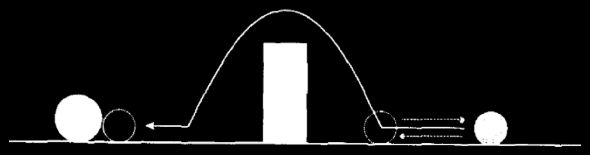
consistent

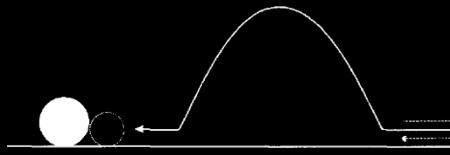
inconsistent

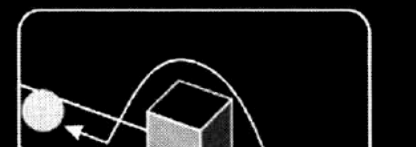


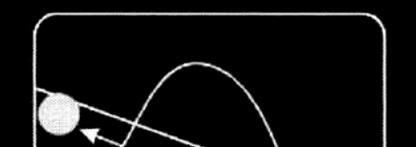


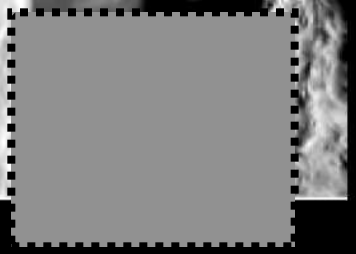












Sources Spelke 1991, Gergely, Csibra & Biro 1995, Csibra 2003 p. 125 fig. 6, Mark Steyvers' web page for PSYCH 140C

Conclusion

Conclusions

1. If modules exist, there is more to modularity than a cluster of features.
2. Modular cognition differs from thinking in being a different kind of process; specifically, in being a special kind of computational process.
3. The 'concepts' and 'knowledge' involved in modular cognition differ in kind from those involved in general reasoning.
4. The relation between modular cognition and general reasoning is indirect.
5. Categorical perception of speech provides a model of non-representational communication between modules and thought

Nativism about knowledge
Not all knowledge is acquired by learning

Poverty of Stimulus Argument

(1) Experience alone wouldn't enable us to know truths about X.

(2) But we do know truths about X.

Therefore:

(3) Some knowledge about X must be innate.

The Problem of Truth
Knowledge involves true beliefs and it's hard to see how beliefs could be true unless acquired through learning.