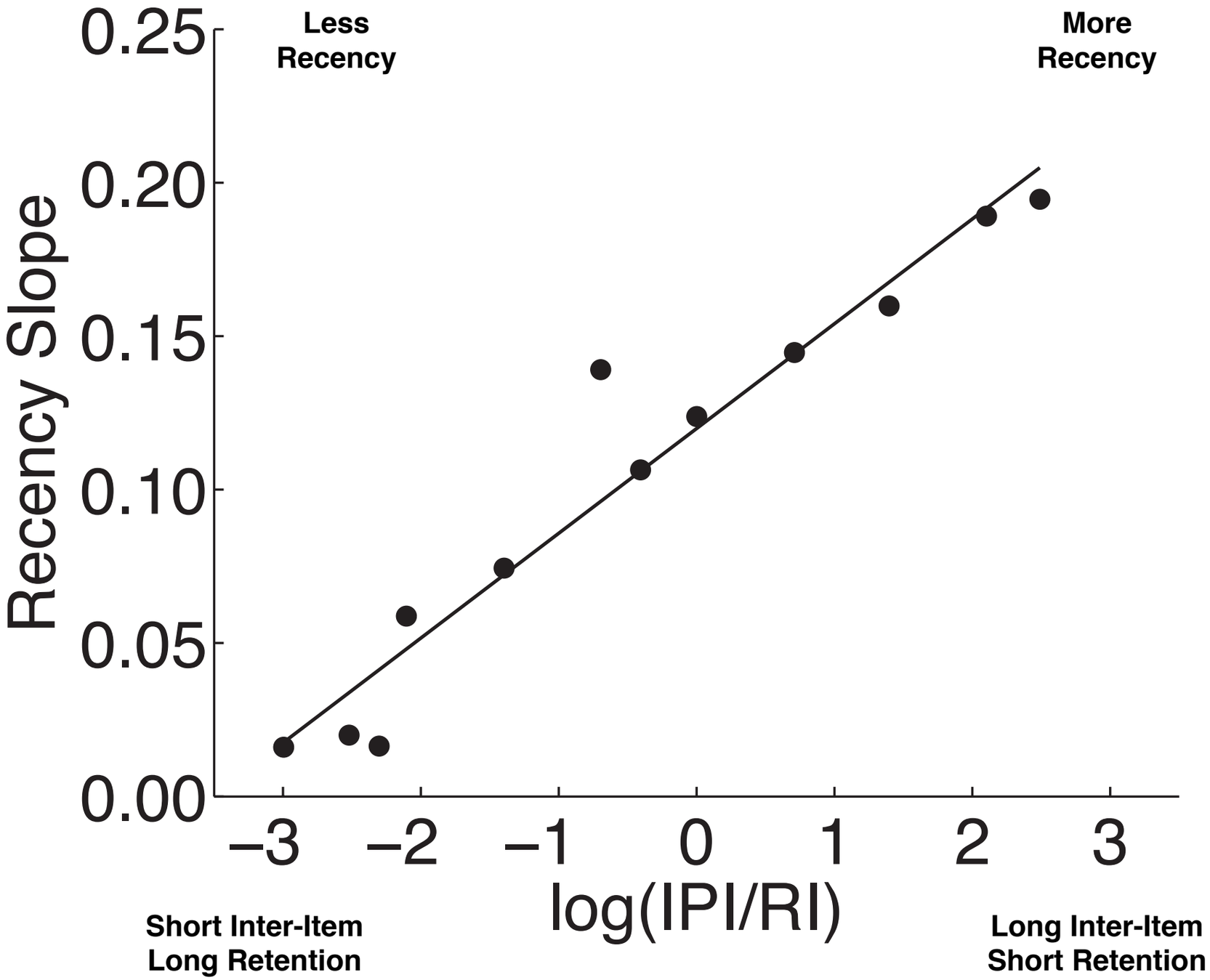
Recap

- Dual store models (SAM)
  - Short term store
  - Long term store
  - Recency, primacy, contiguity
  - Continual distractor free recall

The Ratio Rule



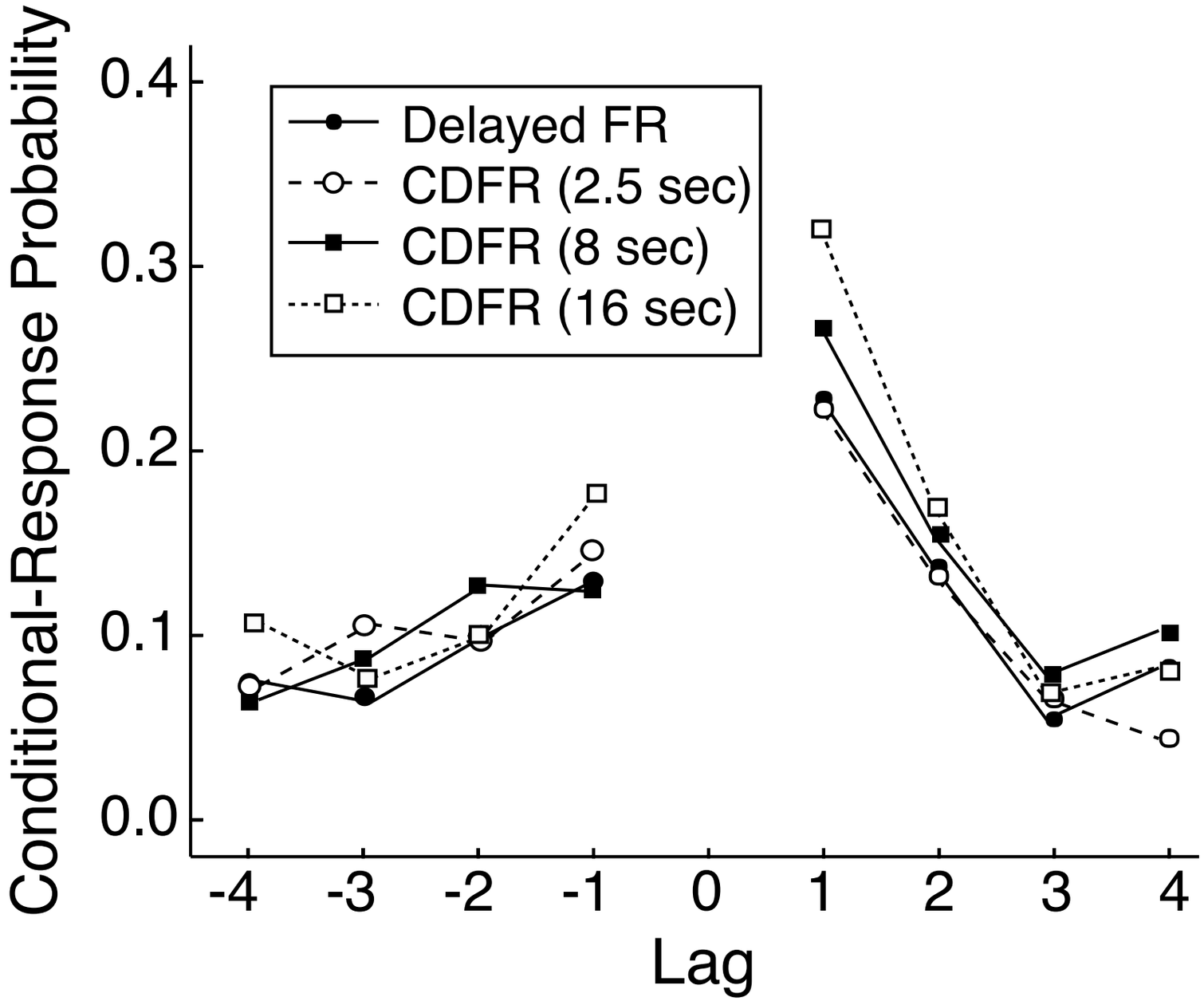
Here, log is “natural log” (base e).

At 1 on the x-axis, the IPI is ~2.7 times longer than the RI.

At -1 on the x-axis, the RI is ~2.7 times longer than the IPI.

At 2 on the x-axis, the IPI is ~7.4 times longer than the RI.

Long-range contiguity



Long-range contiguity

- Studied lists (minutes)
- Dinners you've eaten (days)
- People you've had long conversations with (hours to years)
- Teachers you've had in school (years to decades)

Challenges to SAM

- The long-term recency and long-range contiguity effects present a critical problem for SAM
- If the short term buffer gets filled by the distractor in delayed free recall, why would it not get filled by the same distractor in continual distractor free recall?

Challenges to SAM

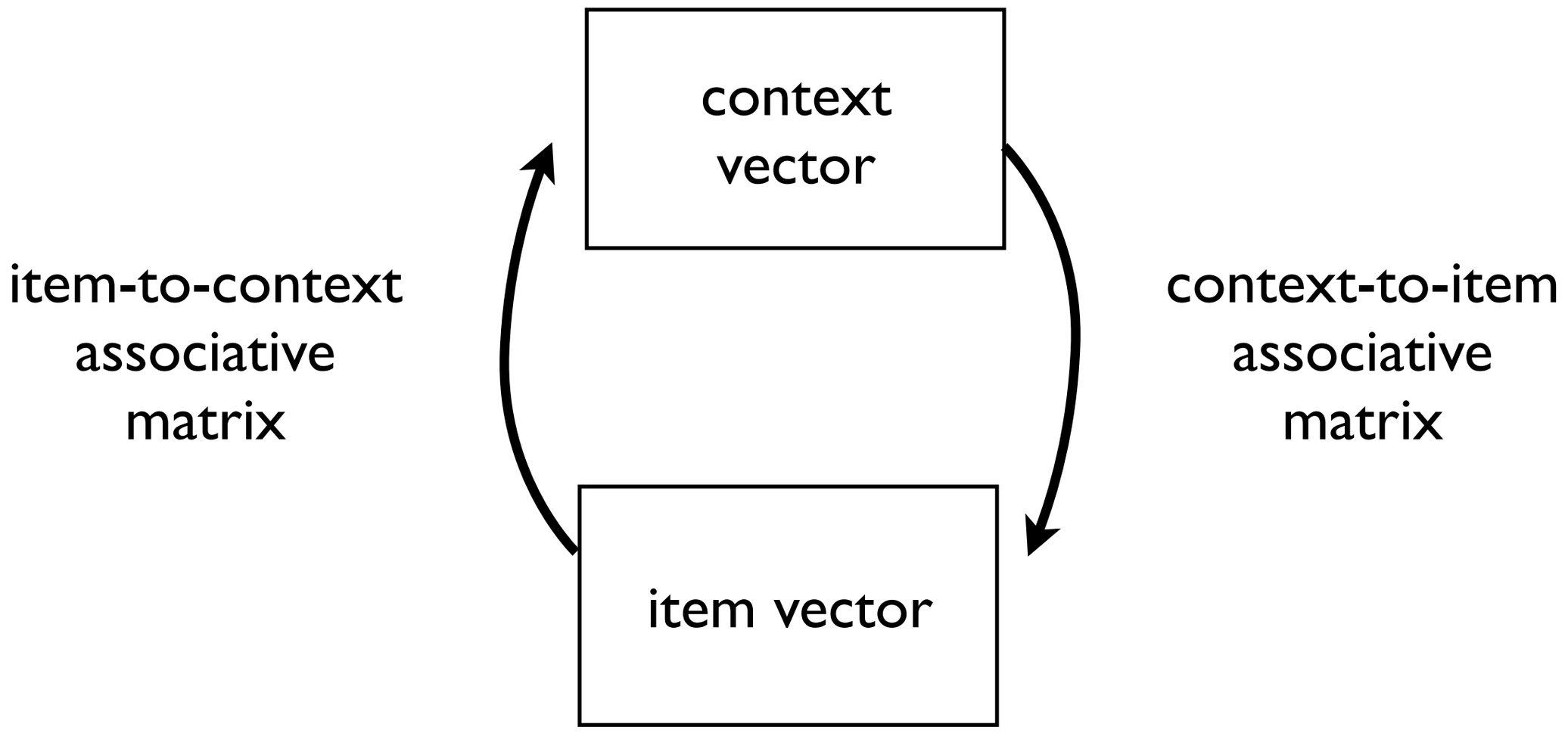
- Another challenge: the Law of Parsimony tells us to select the simpler model, given two alternatives that explain the data equally well

- Do we "need" to assume there are separate short term and long term memory systems to explain free recall data?

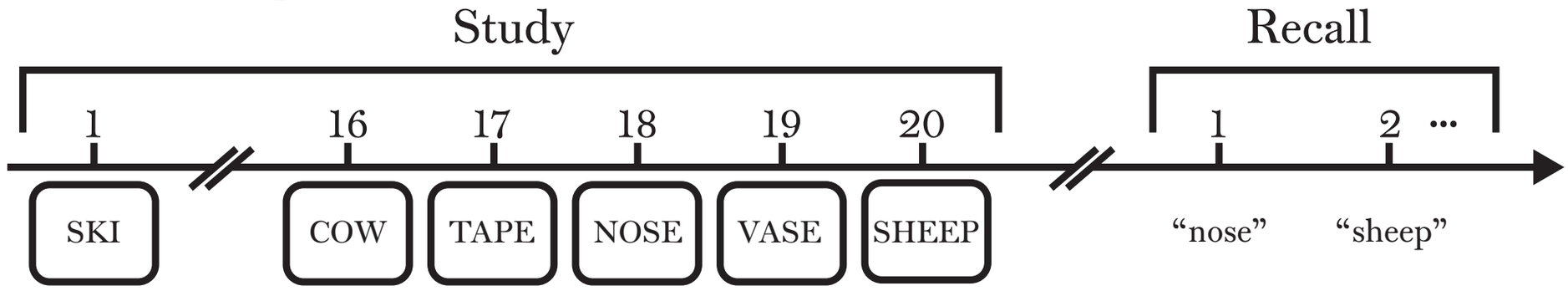
Single store models

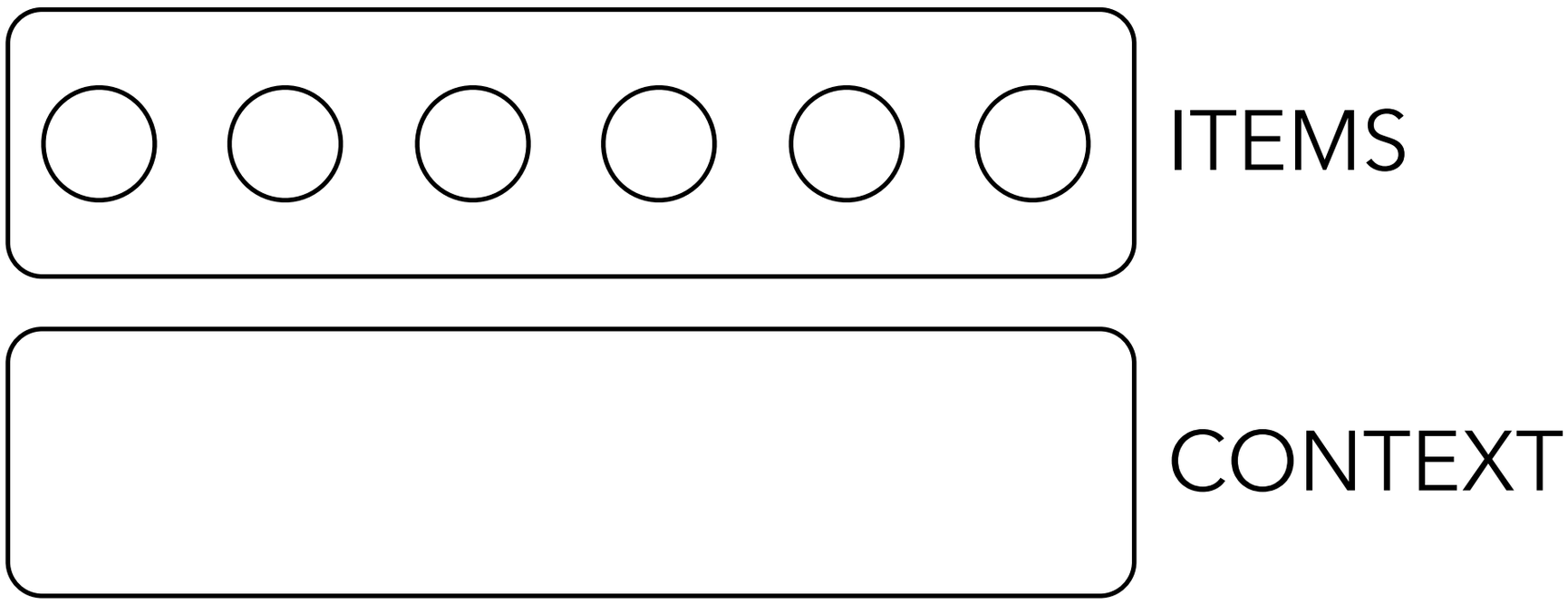
- Single store models (AKA “context-based models”) use **context** as a single mechanism that you use to search through your memories

Single store models



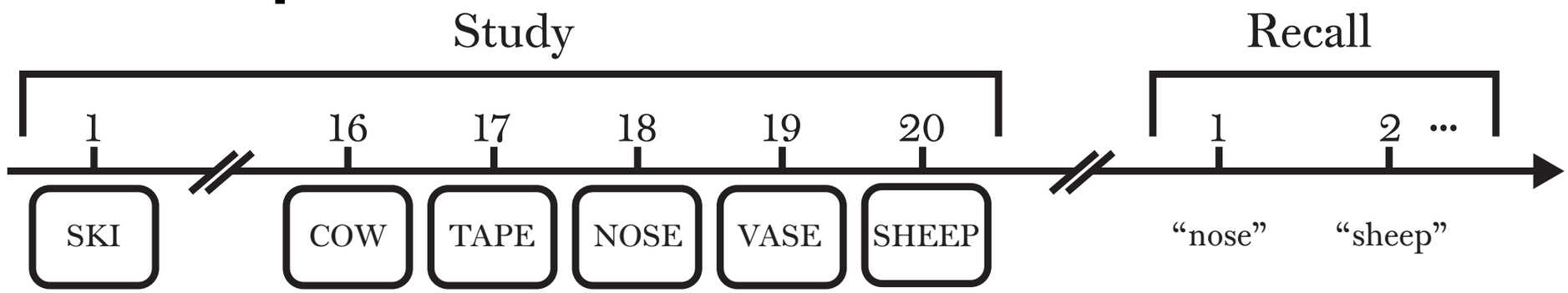
Temporal context model

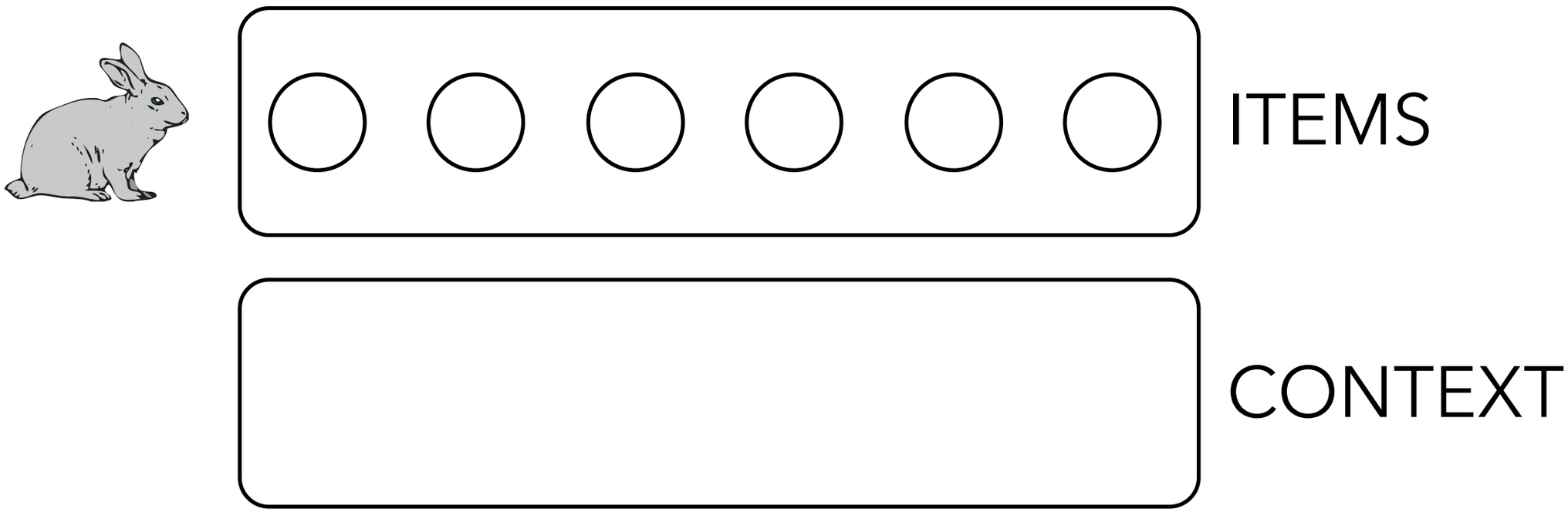




Howard & Kahana, 2002

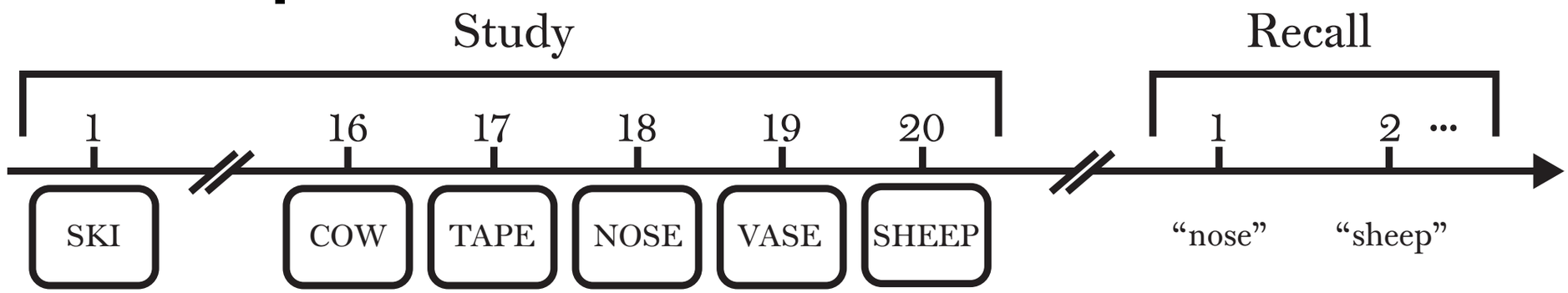
Temporal context model

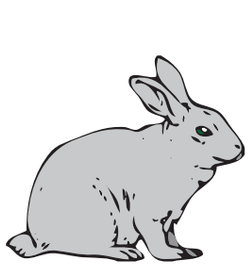


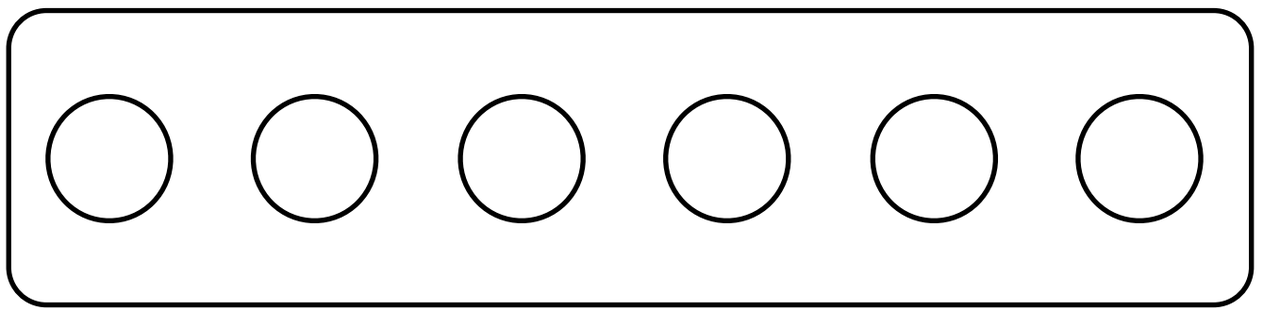


Howard & Kahana, 2002

Temporal context model







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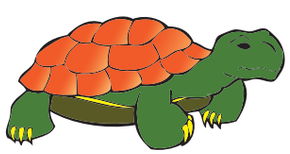
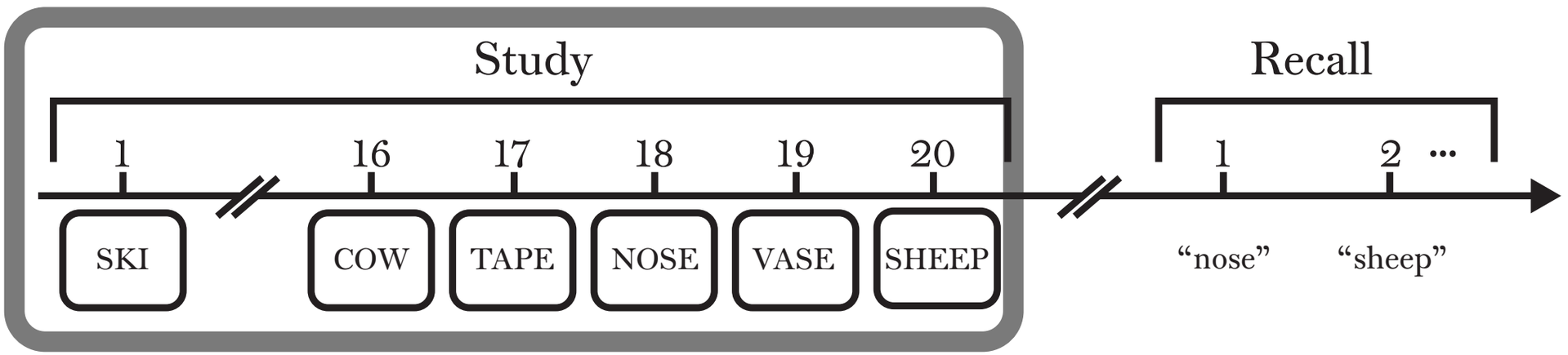


CONTEXT

Howard & Kahana, 2002


Study
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Recall
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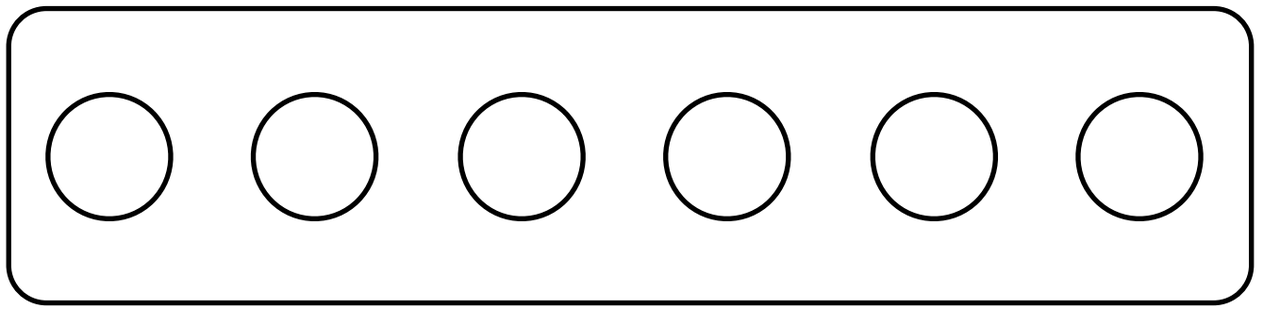
“nose”
“sheep”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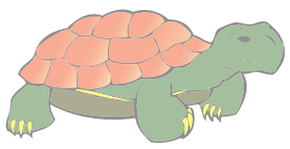


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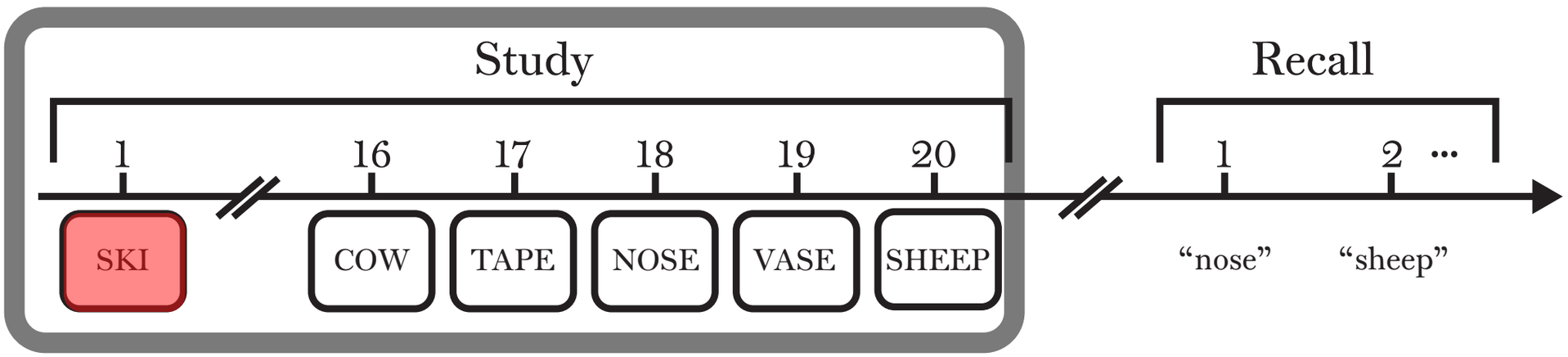

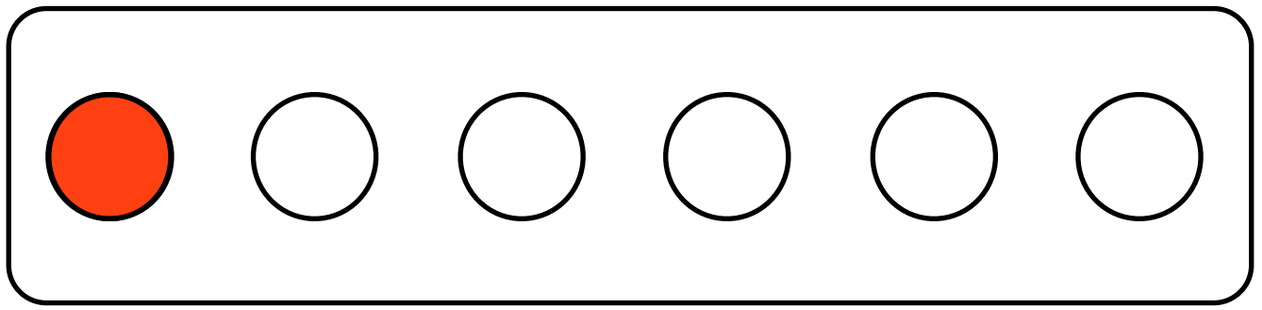

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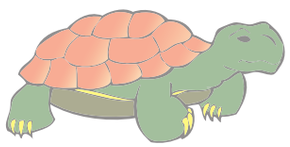

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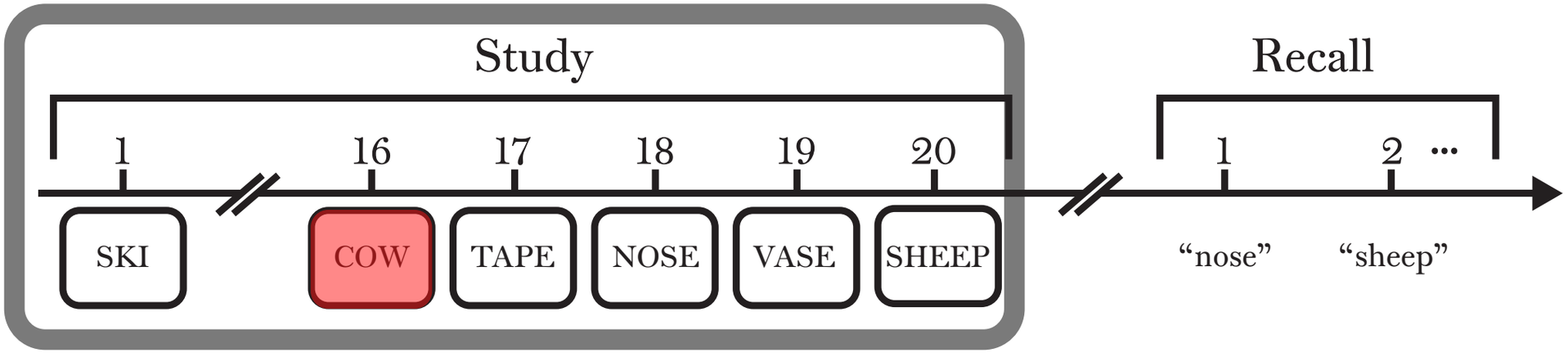
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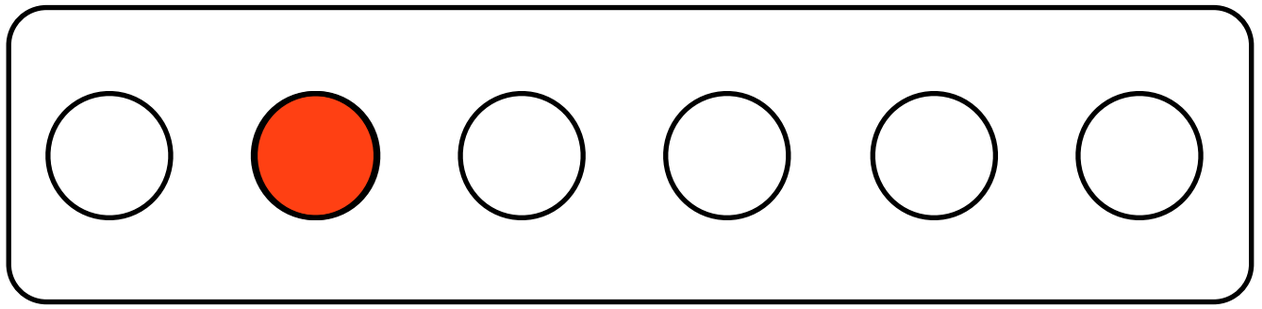
“nose”
“sheep”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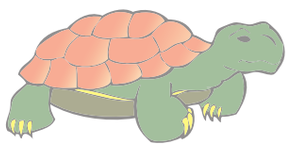


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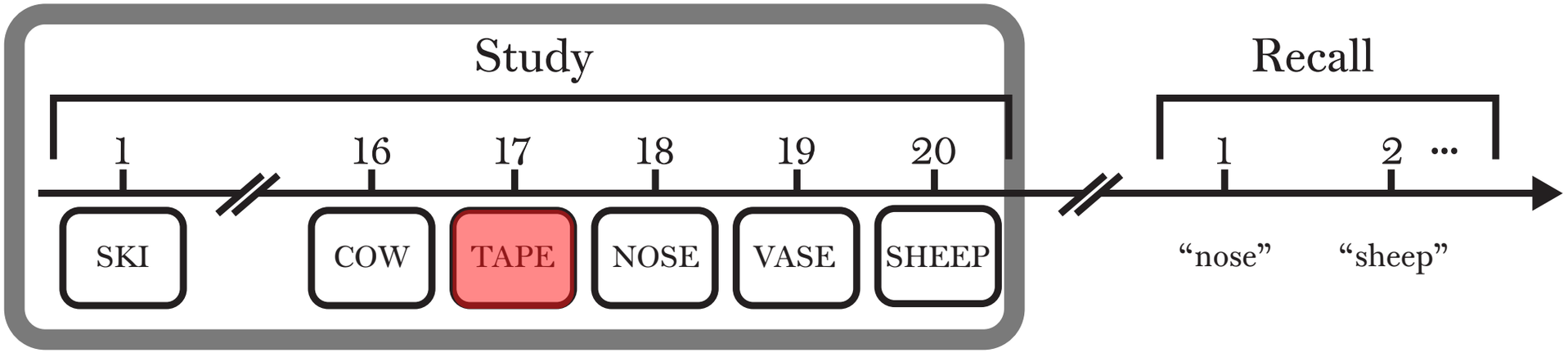

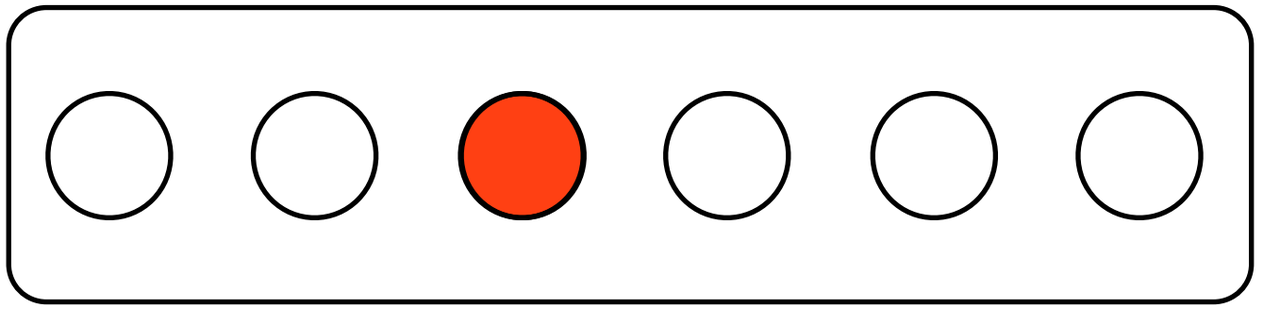

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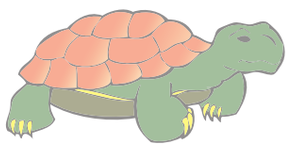

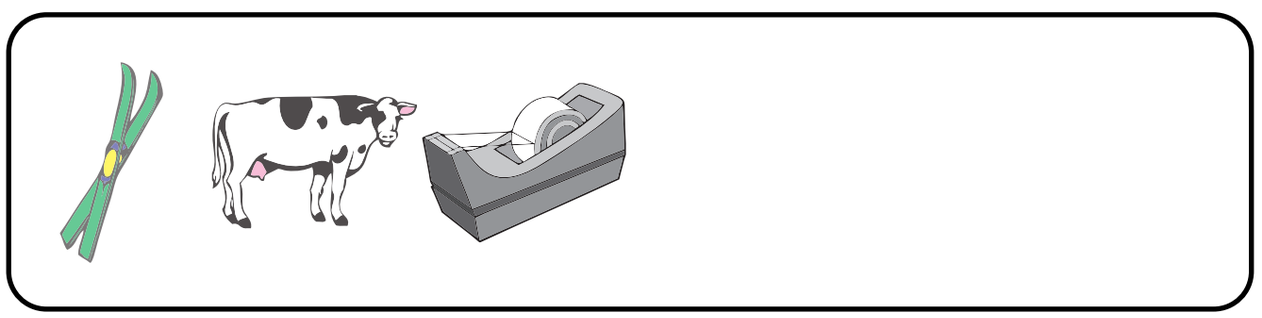

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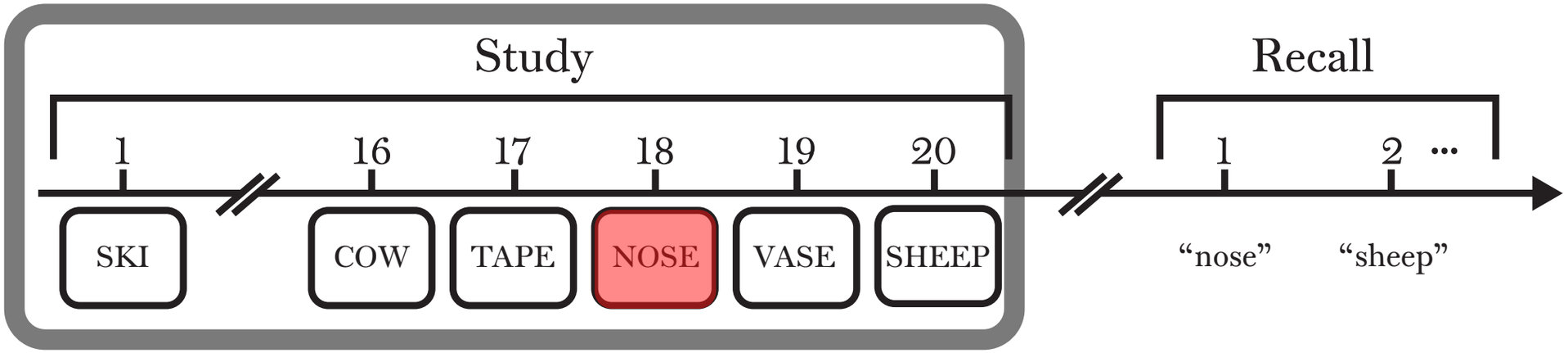
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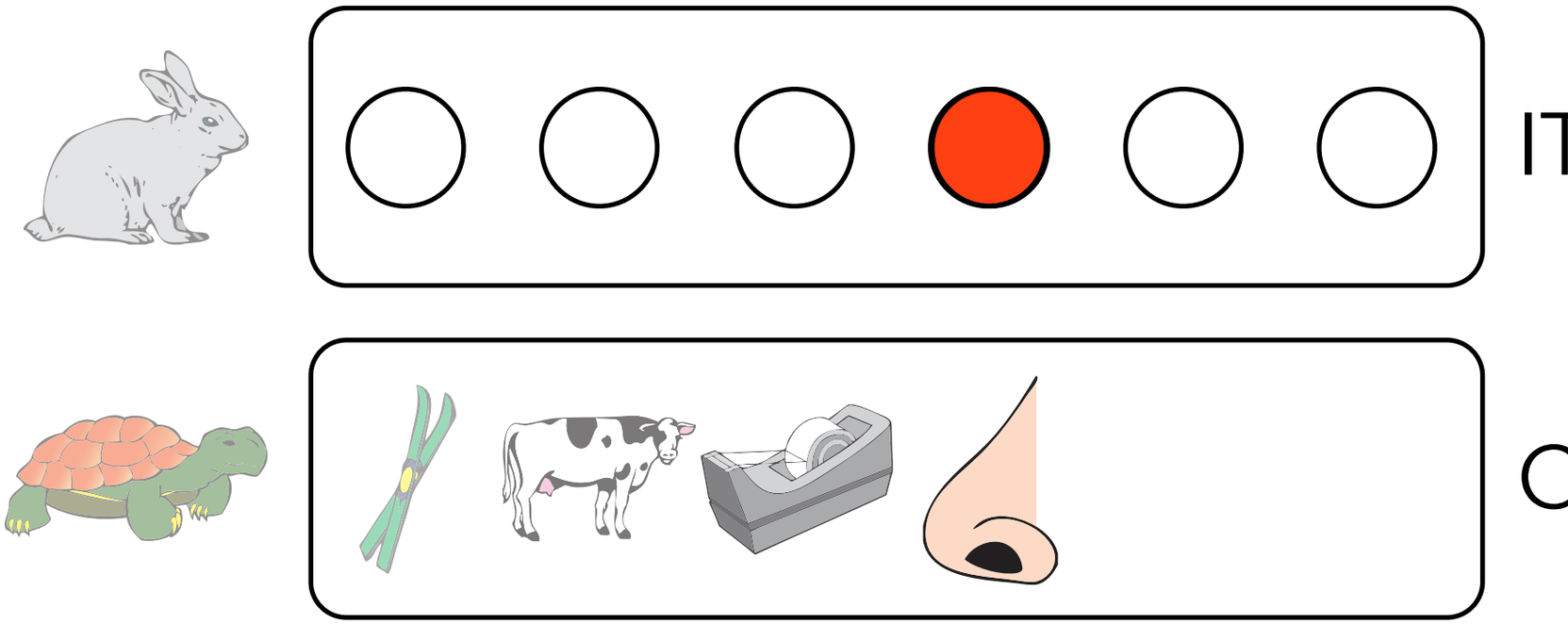
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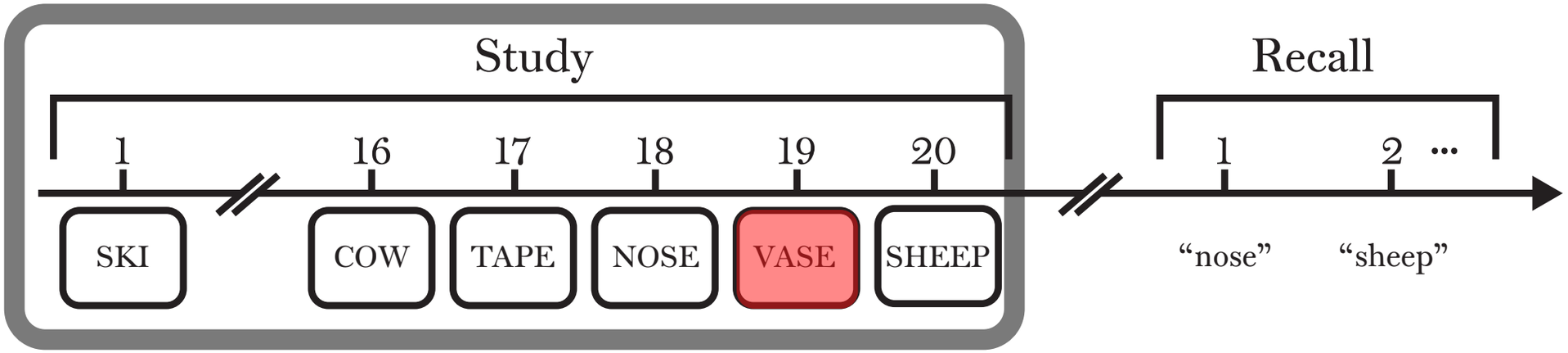
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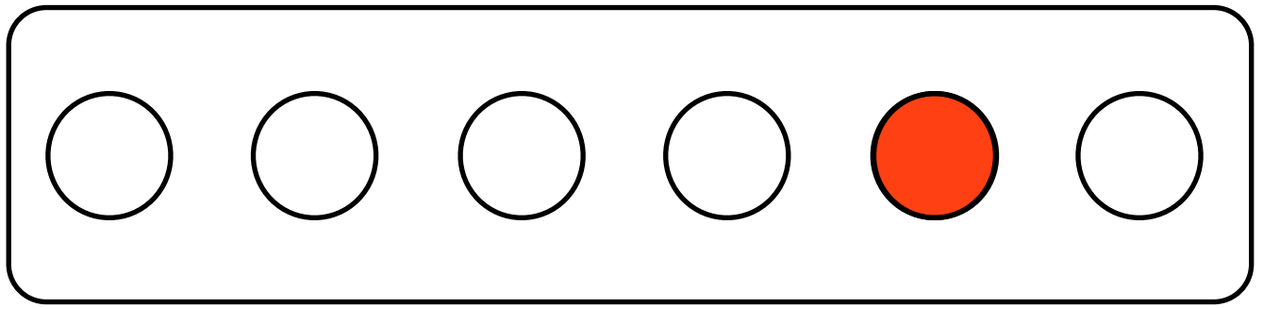
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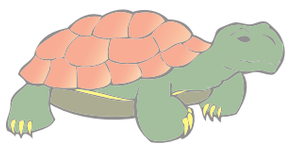

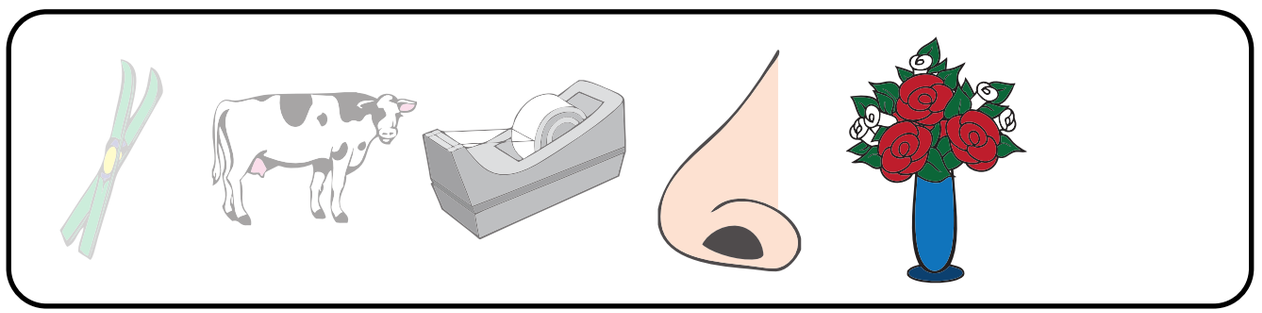
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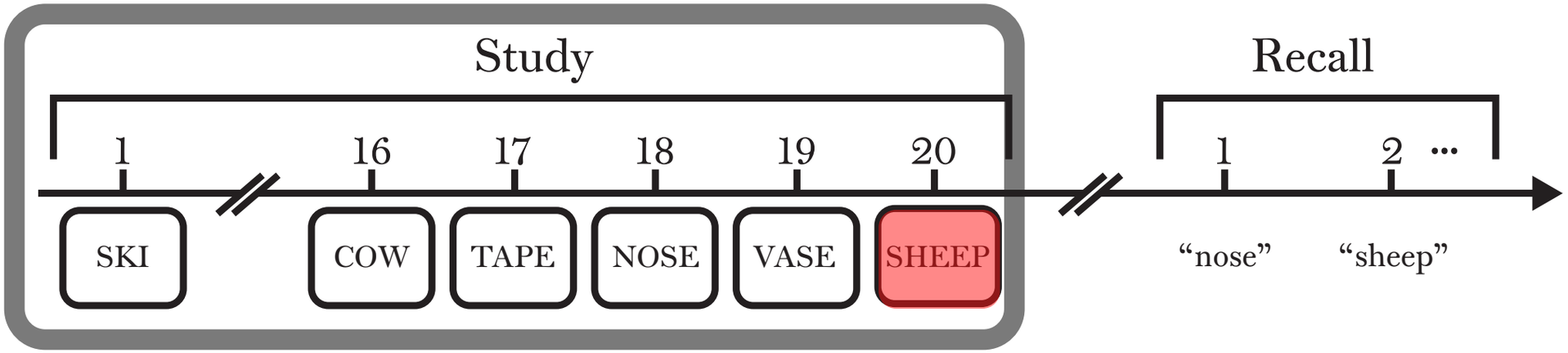
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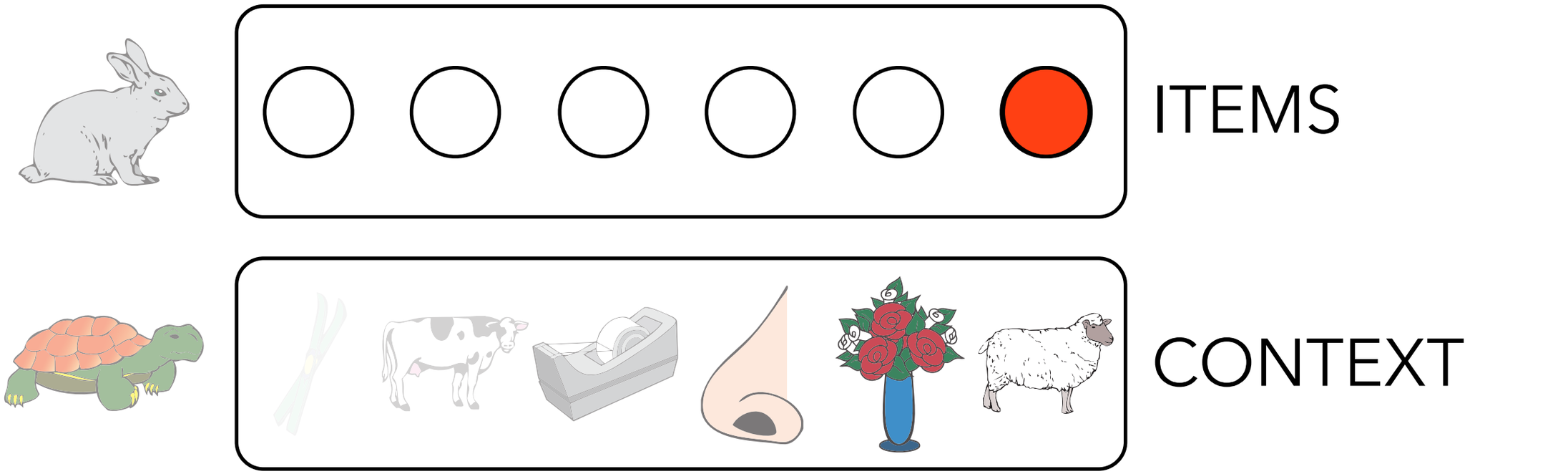
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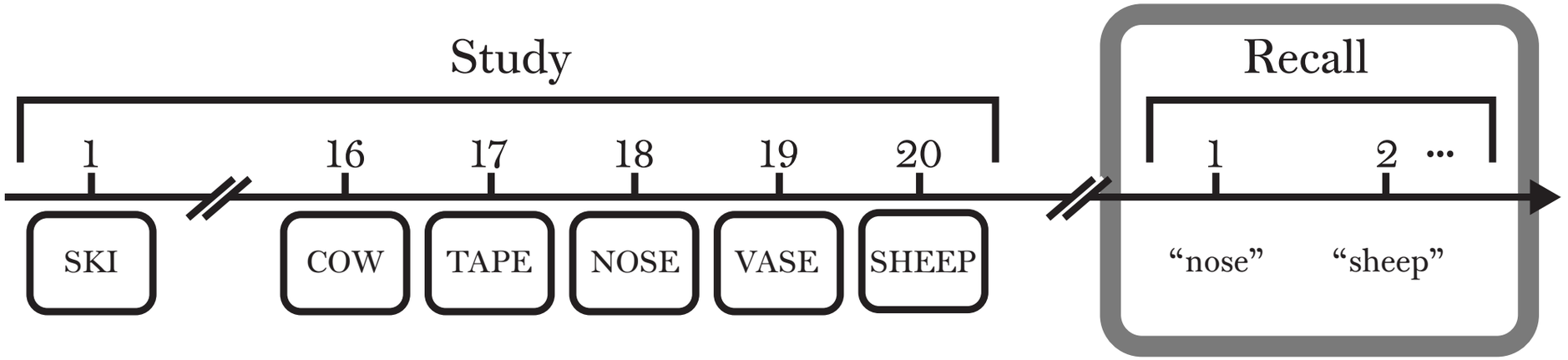
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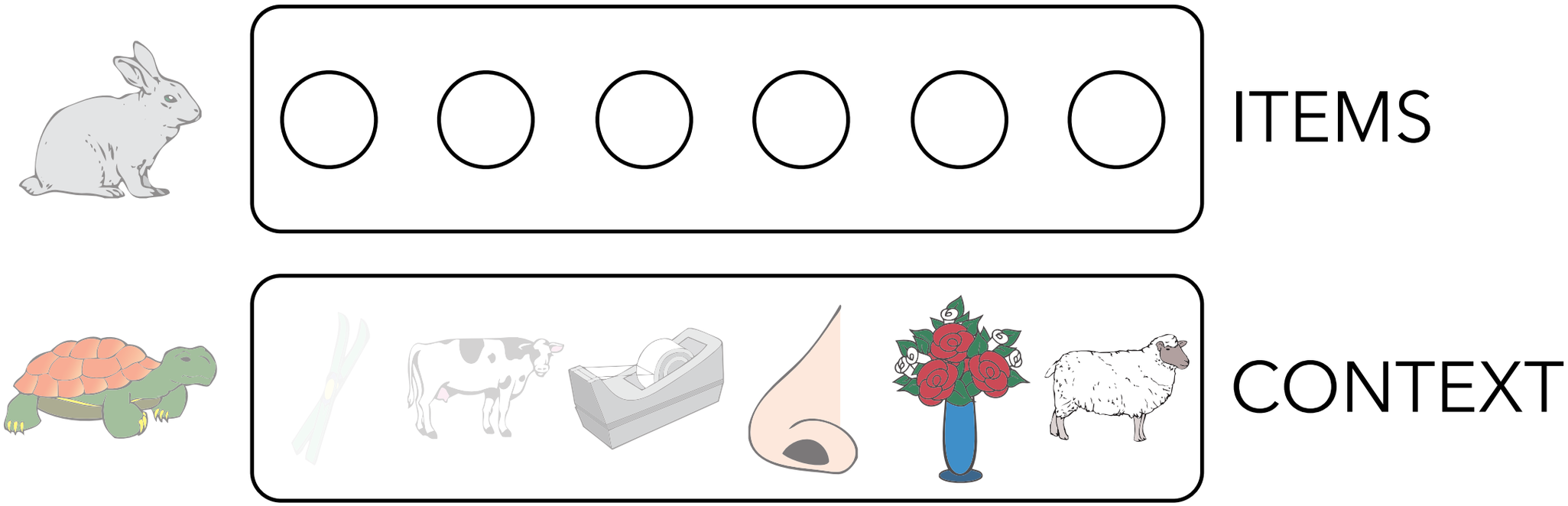
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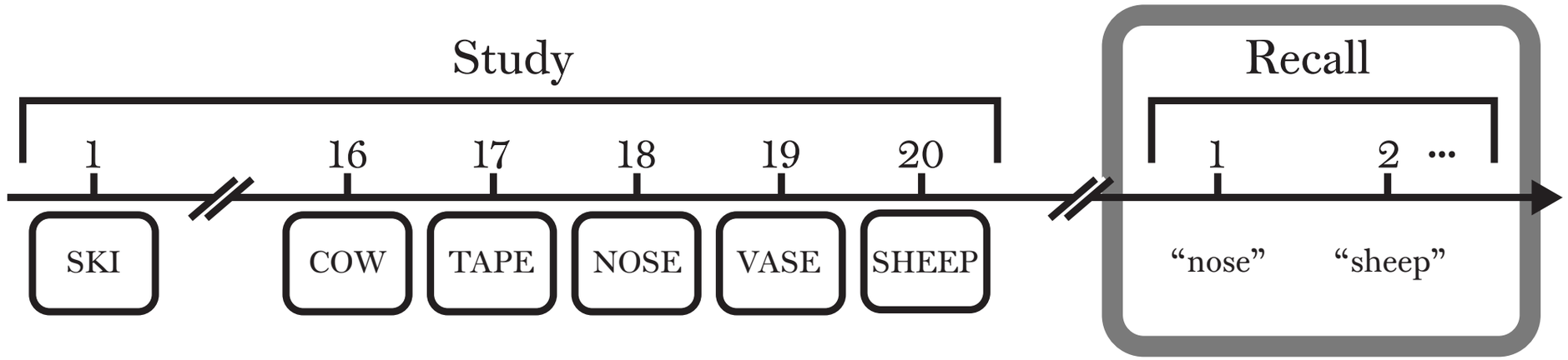
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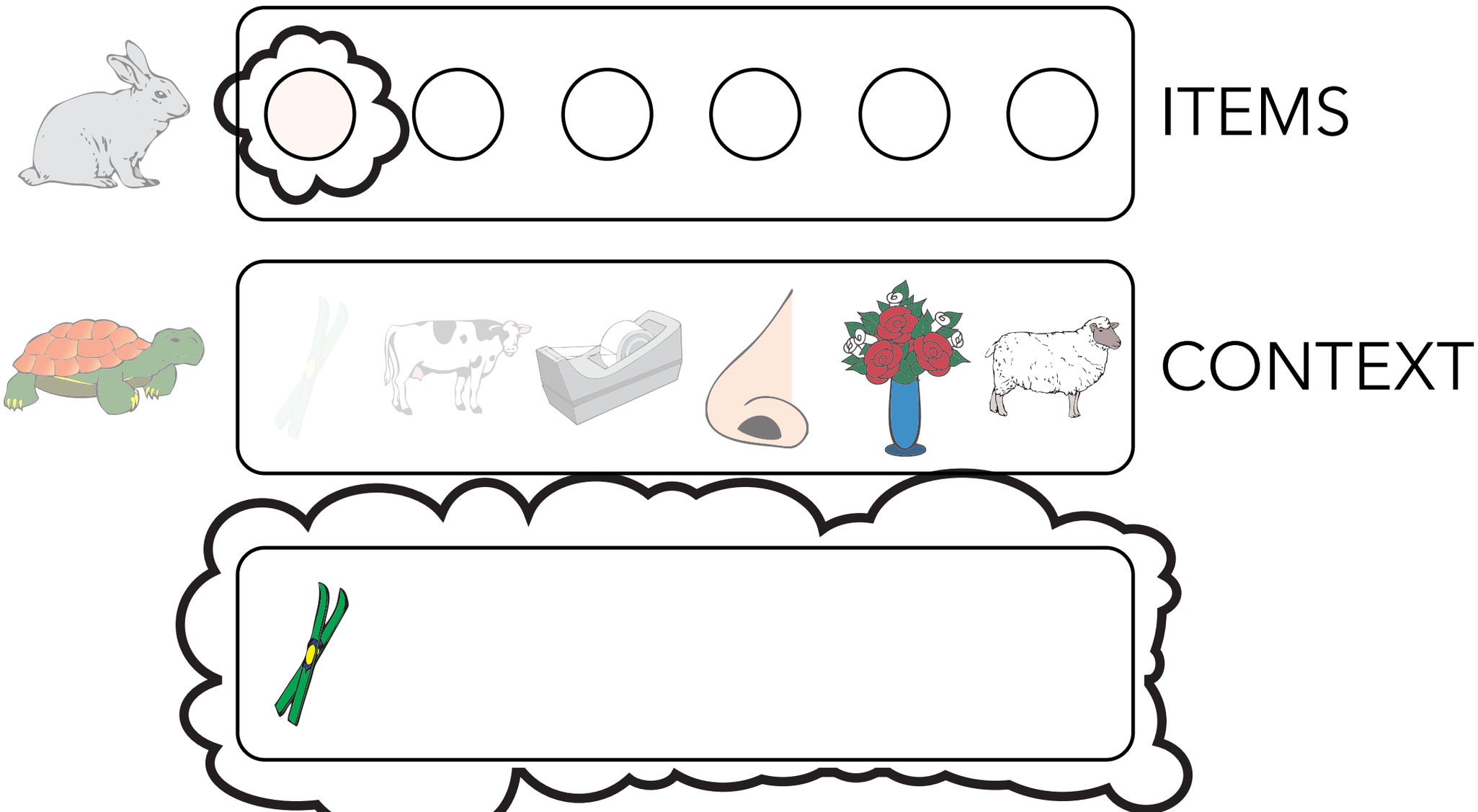
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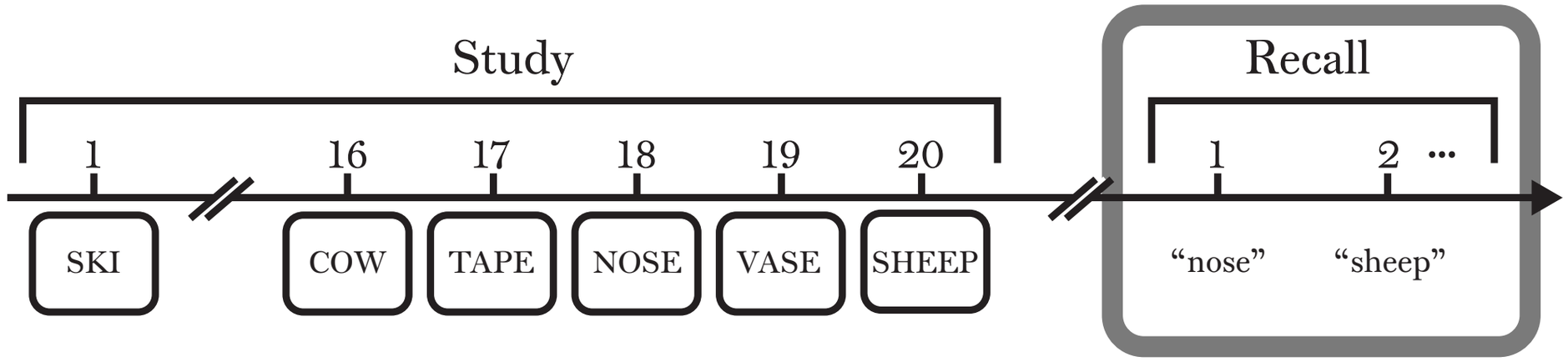
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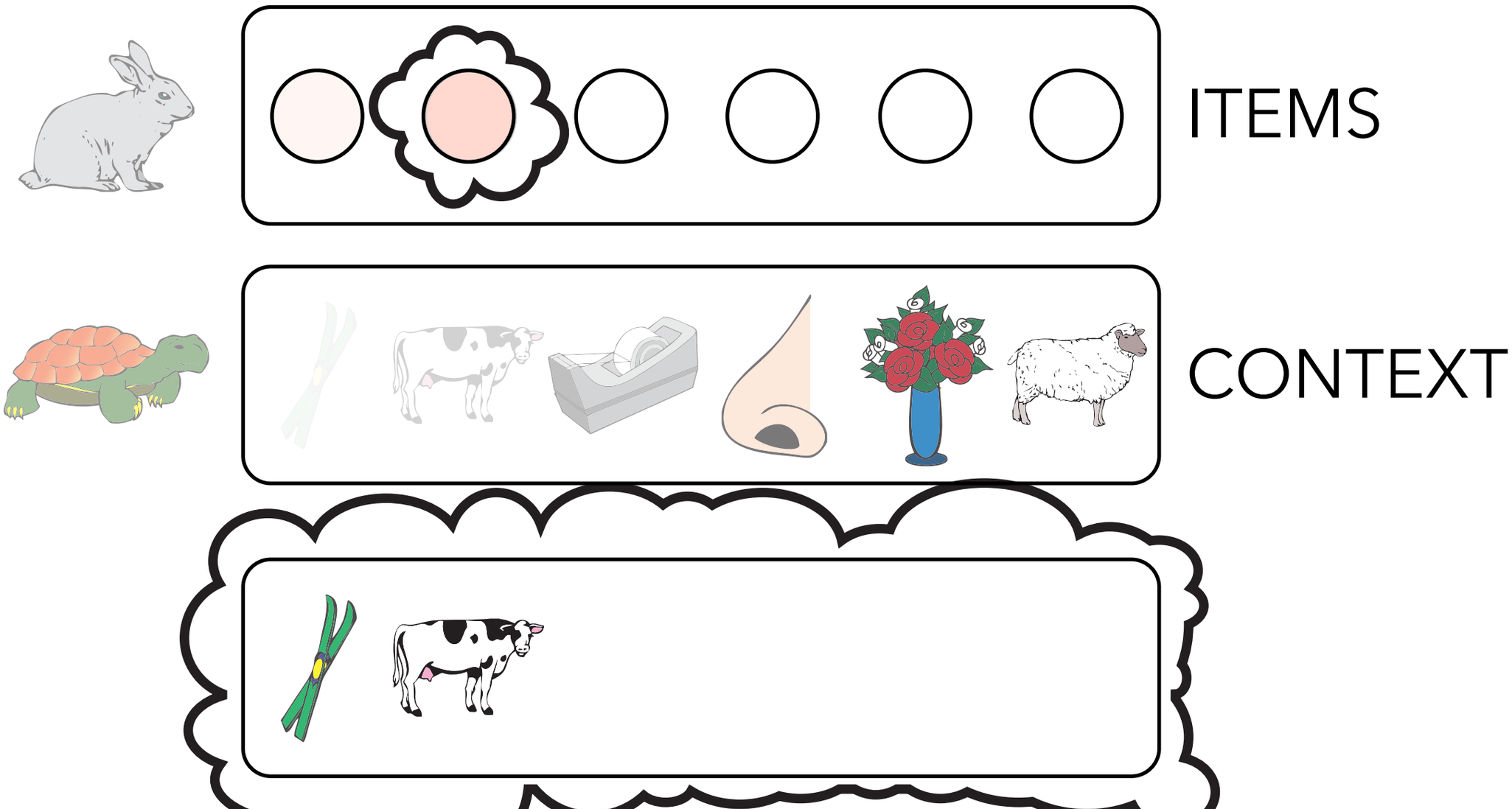
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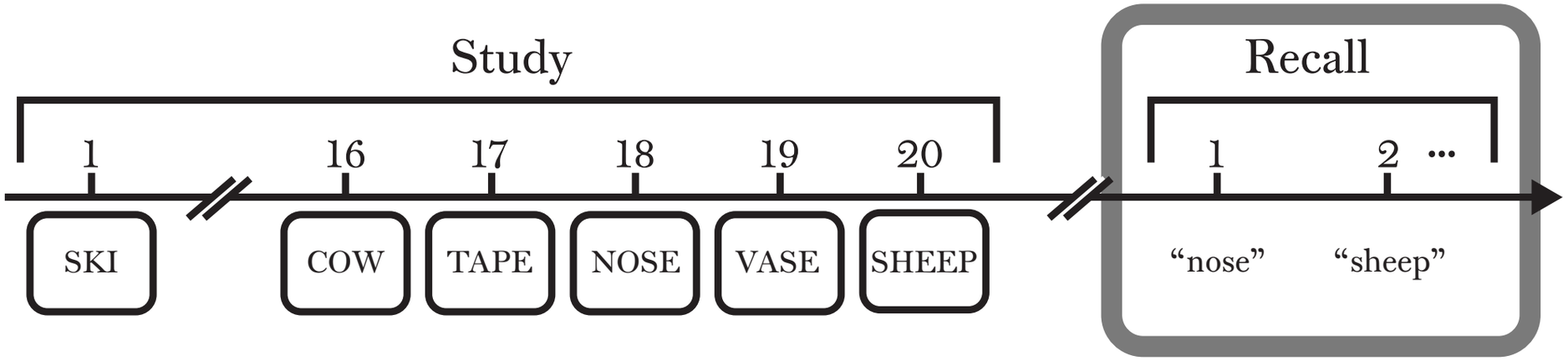
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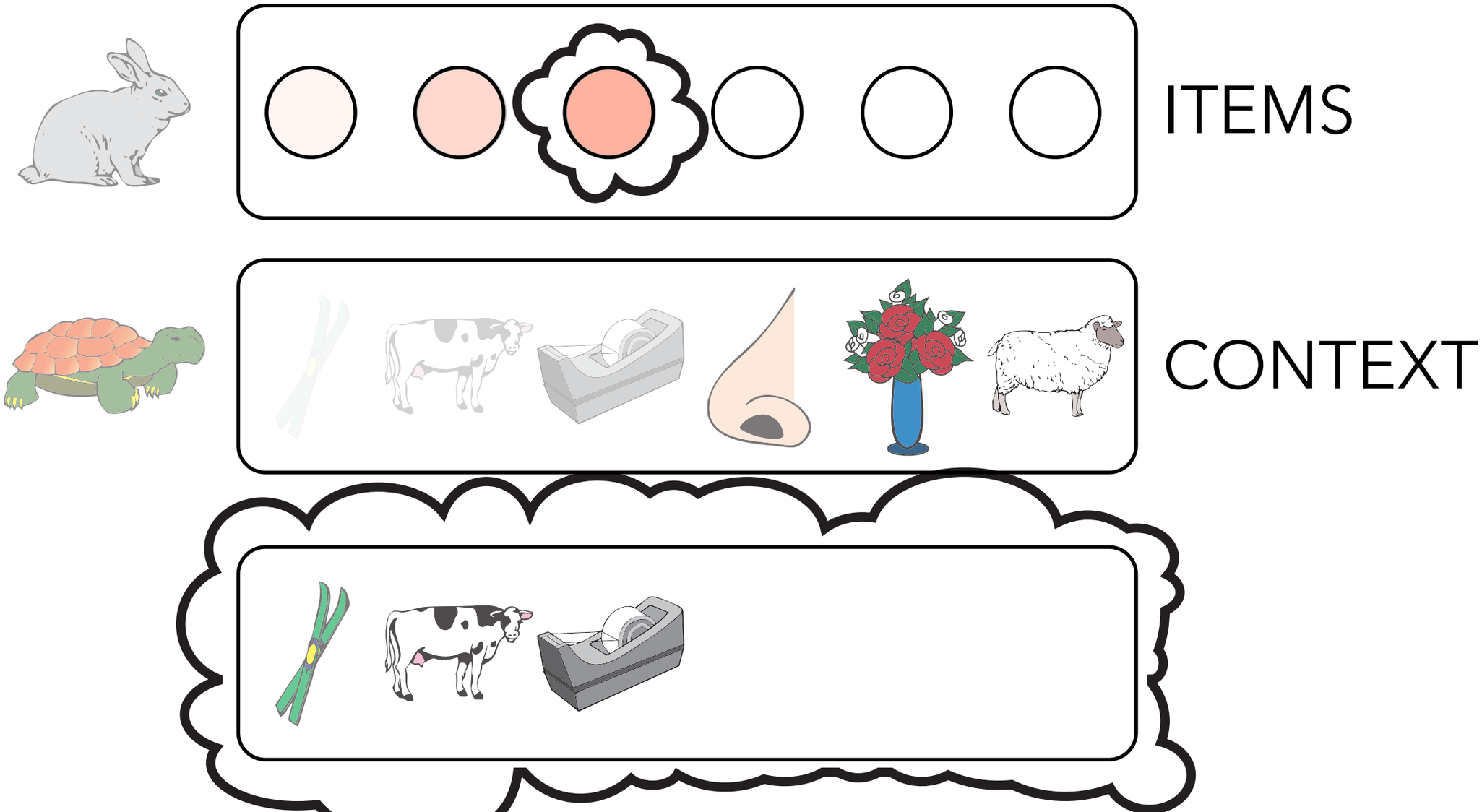
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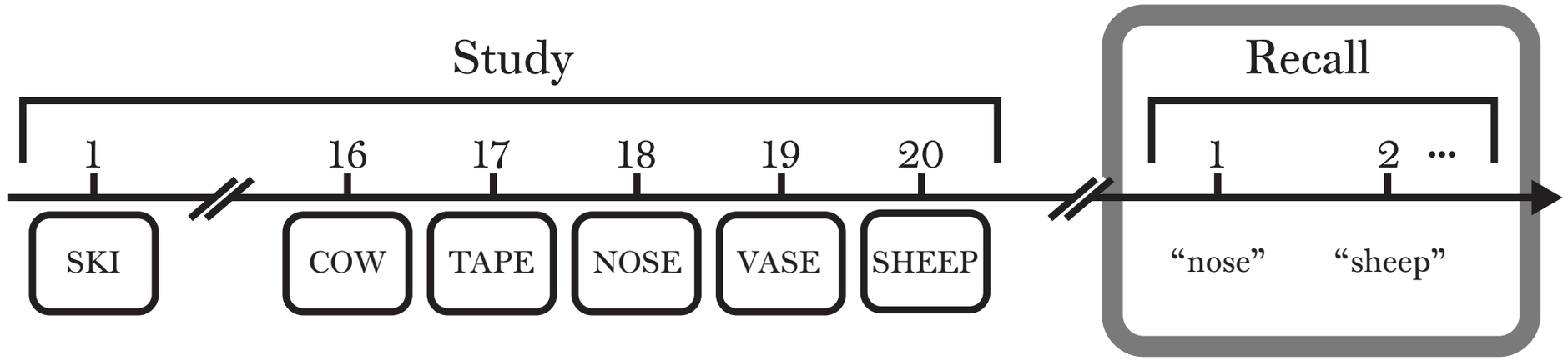
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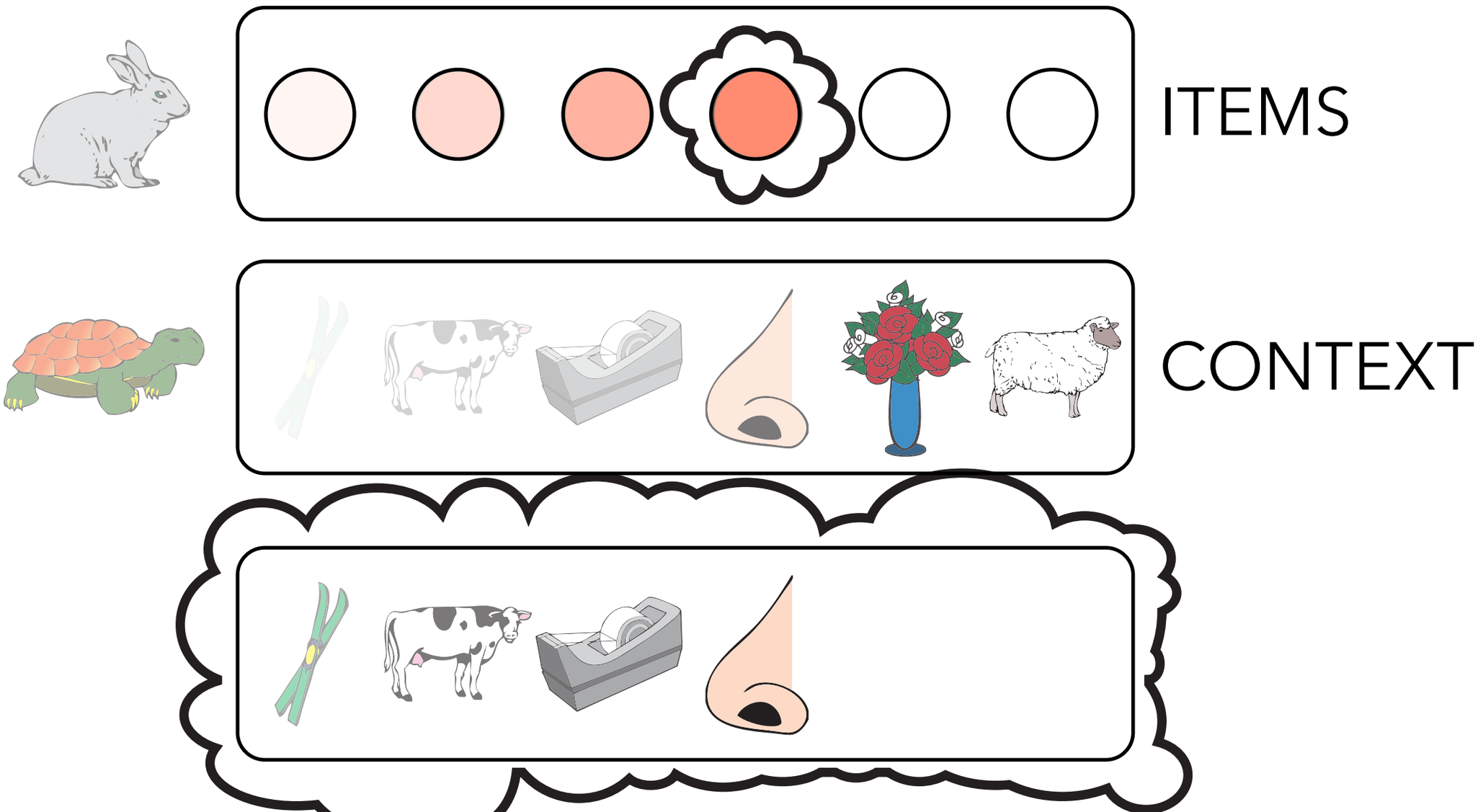
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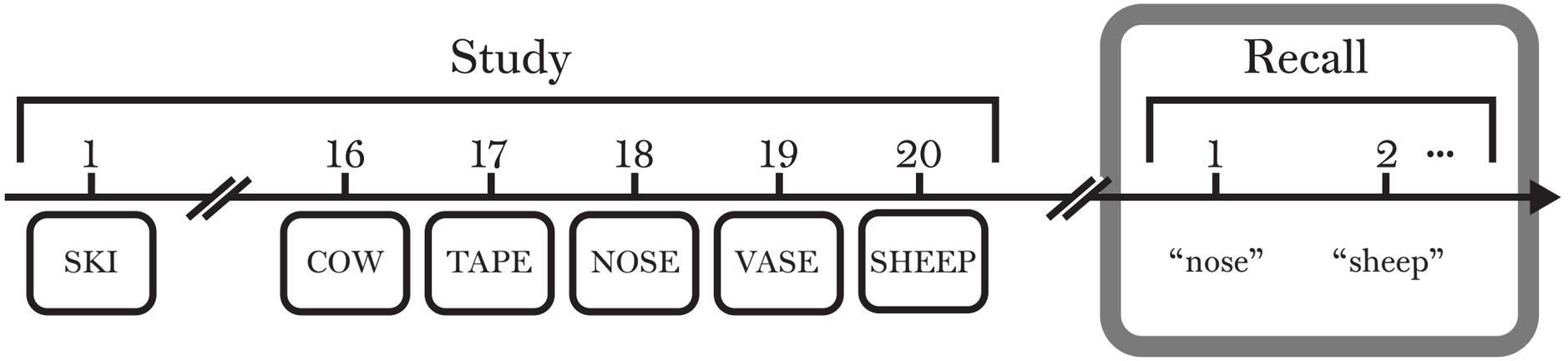
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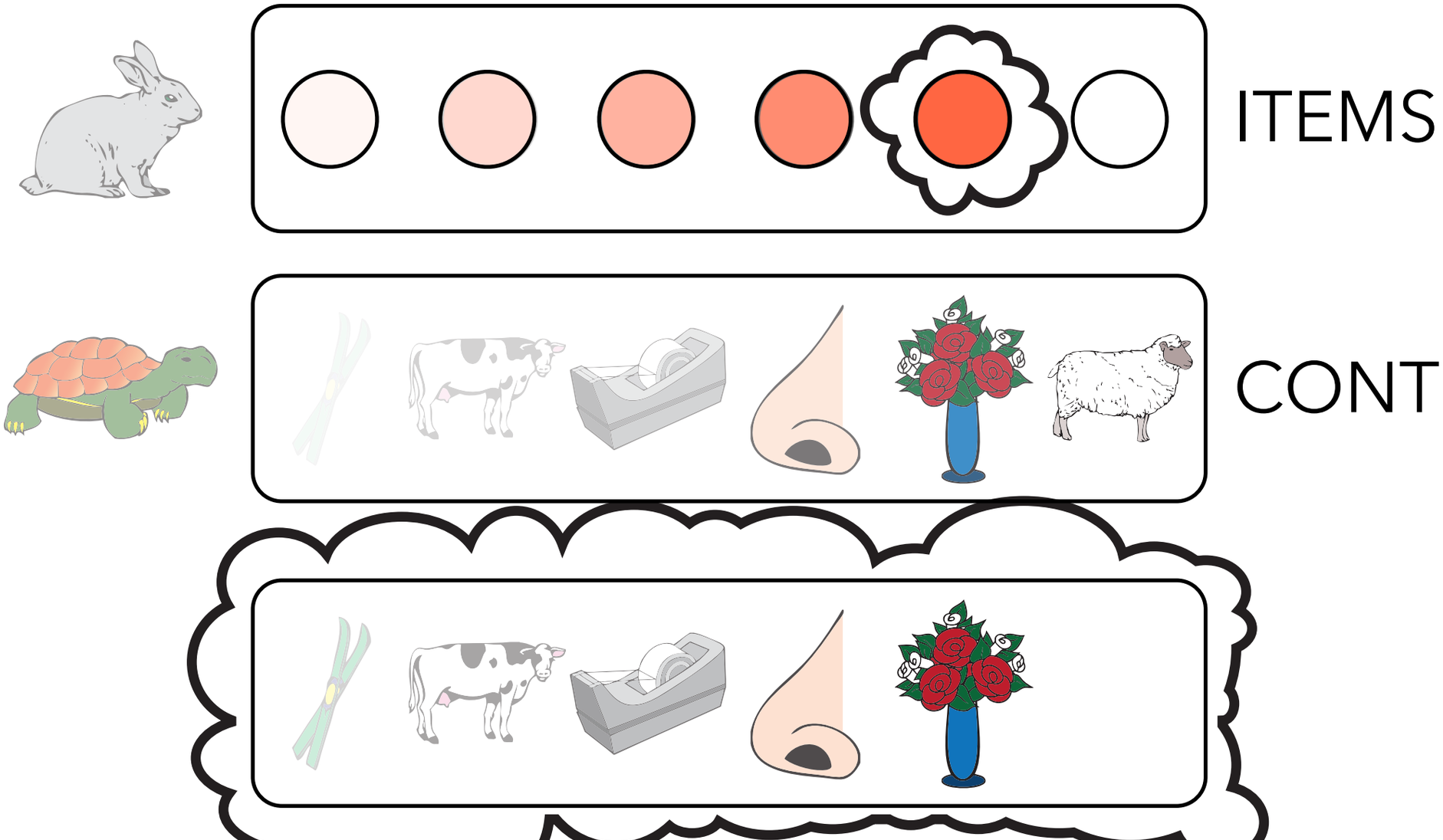
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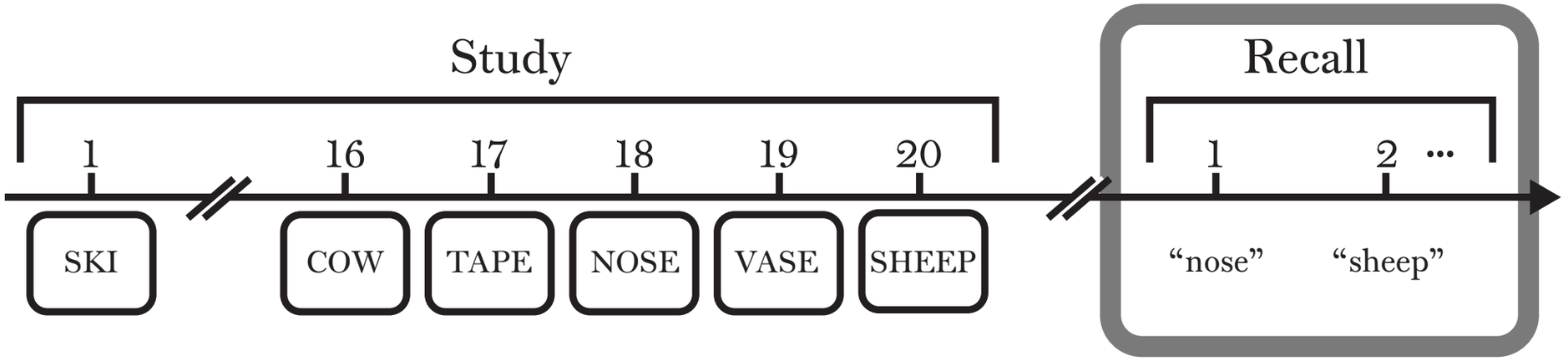
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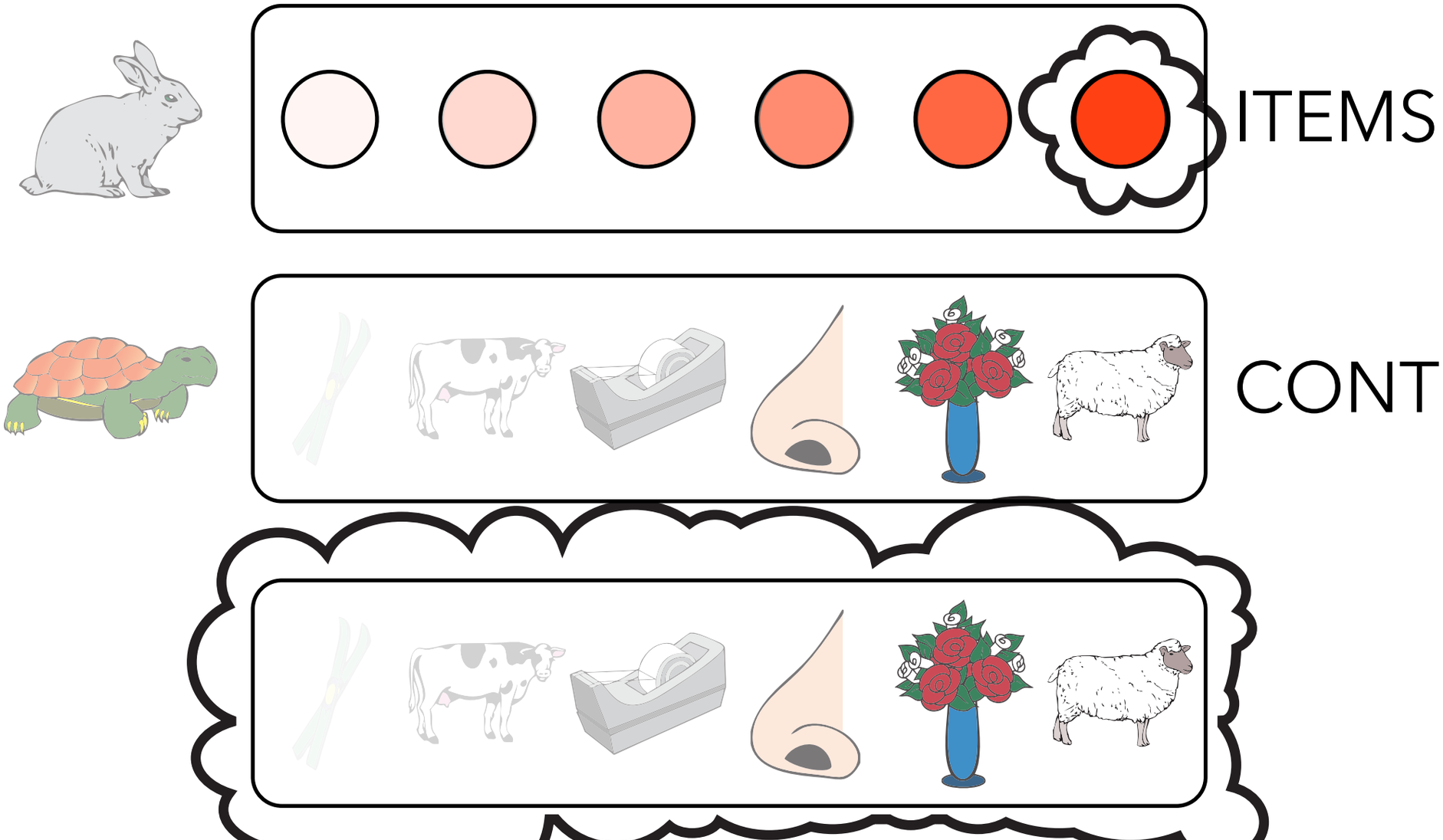
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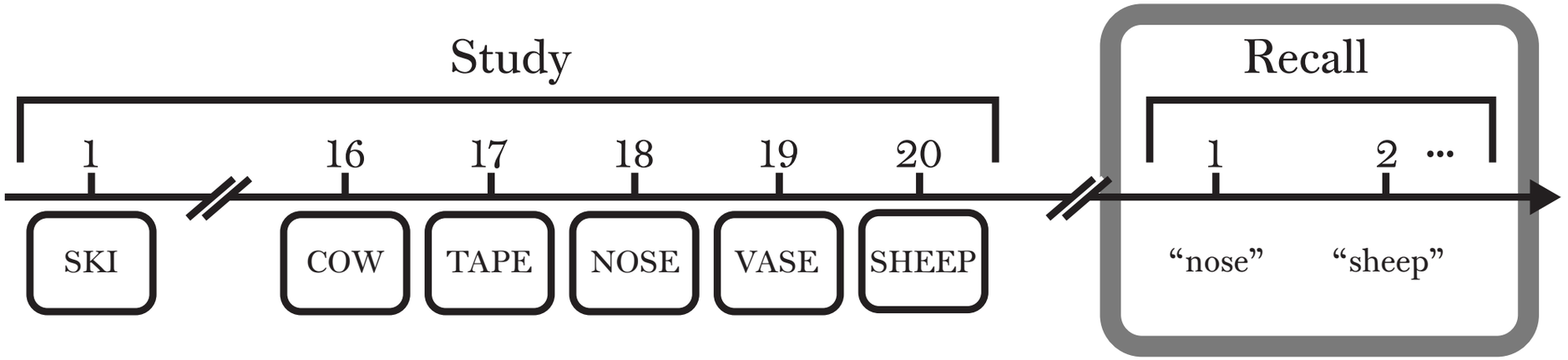
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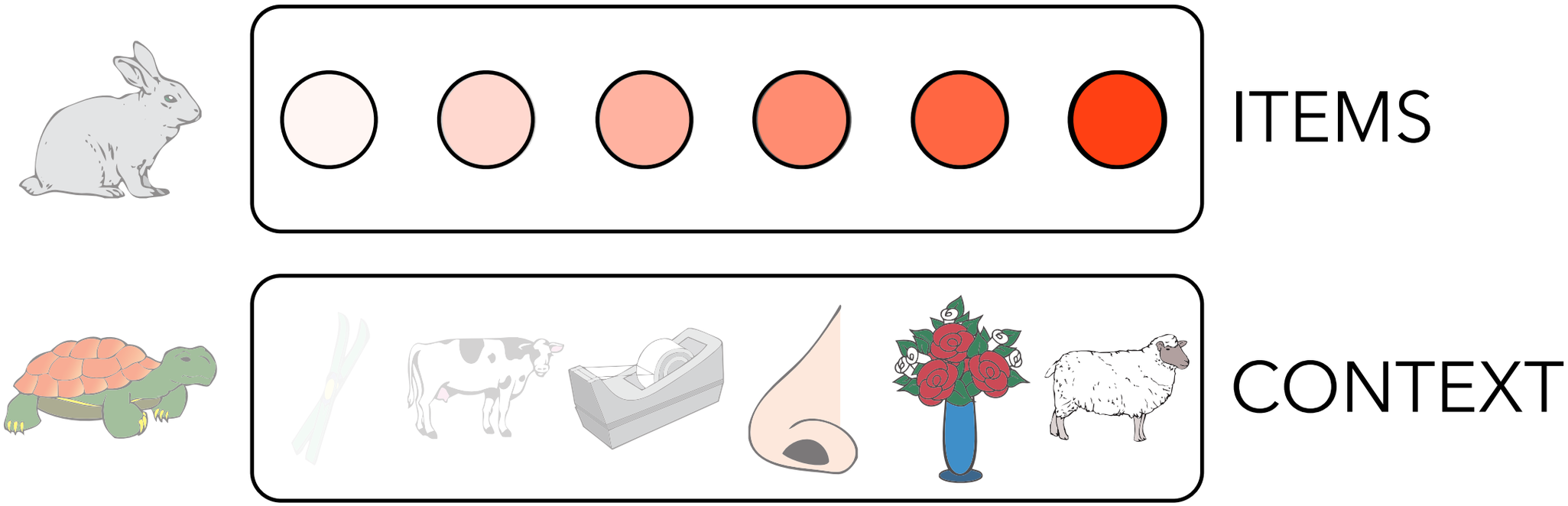
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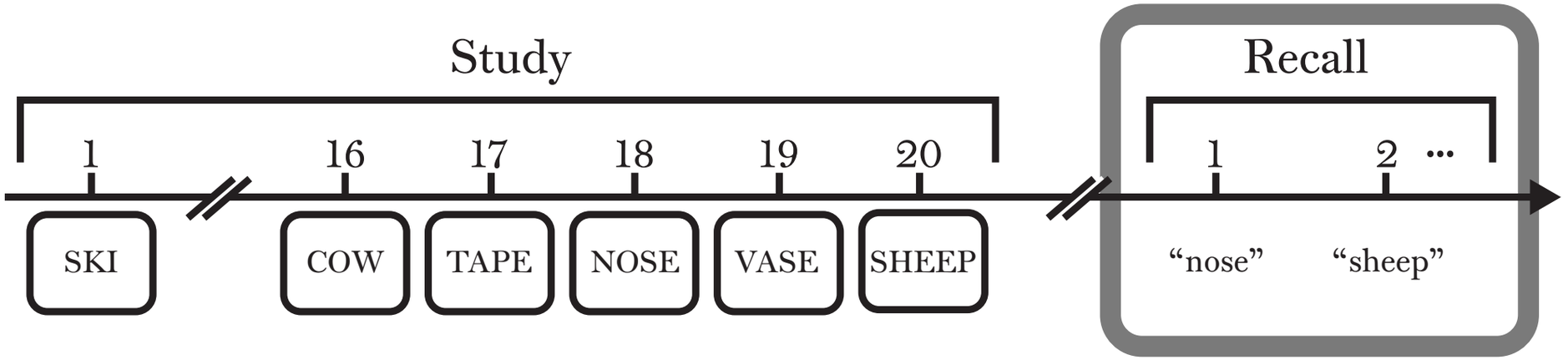
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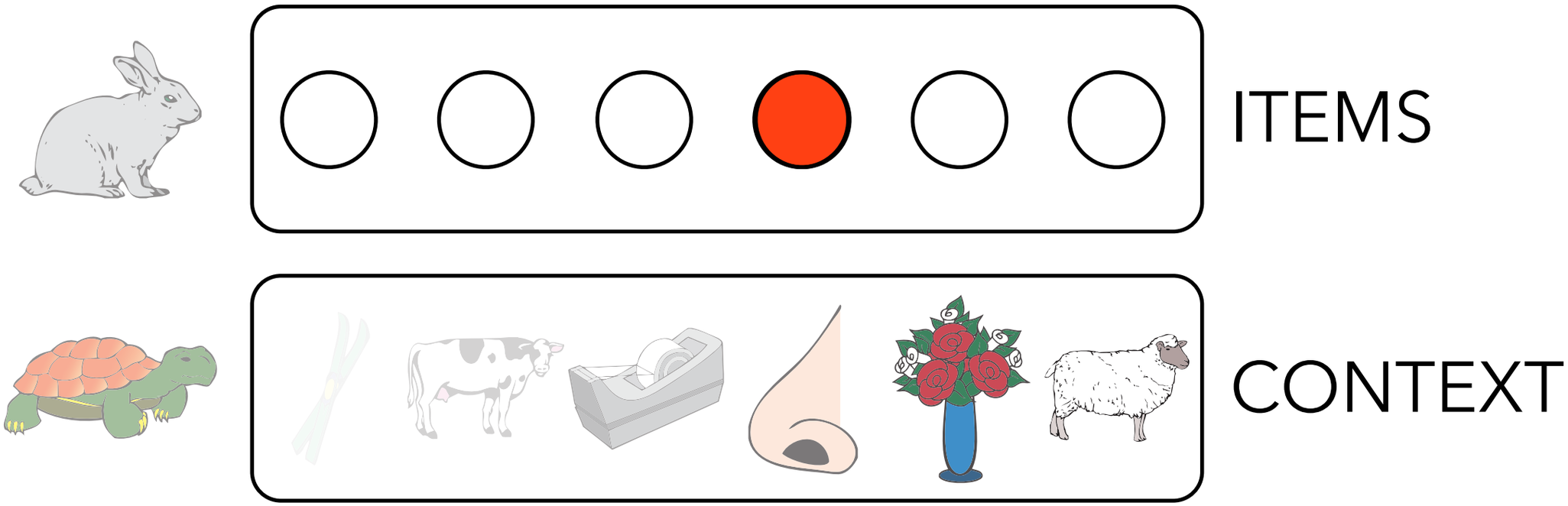
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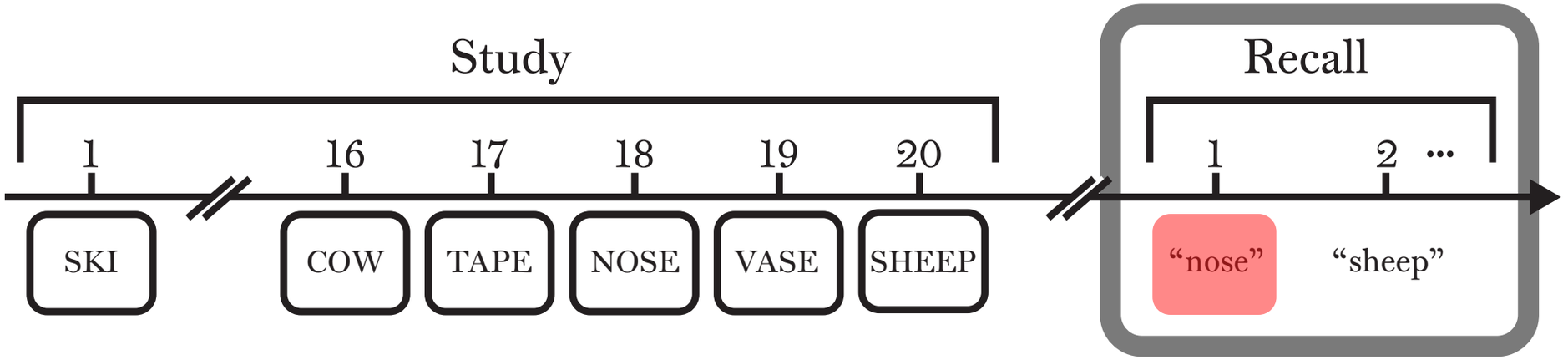
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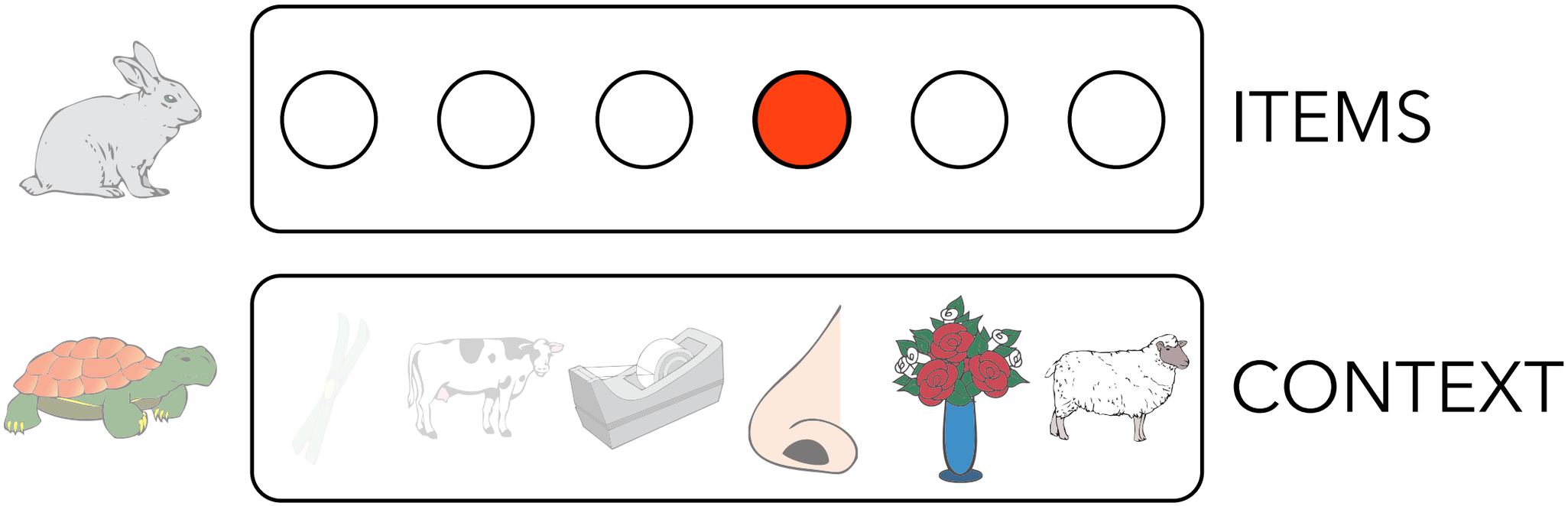
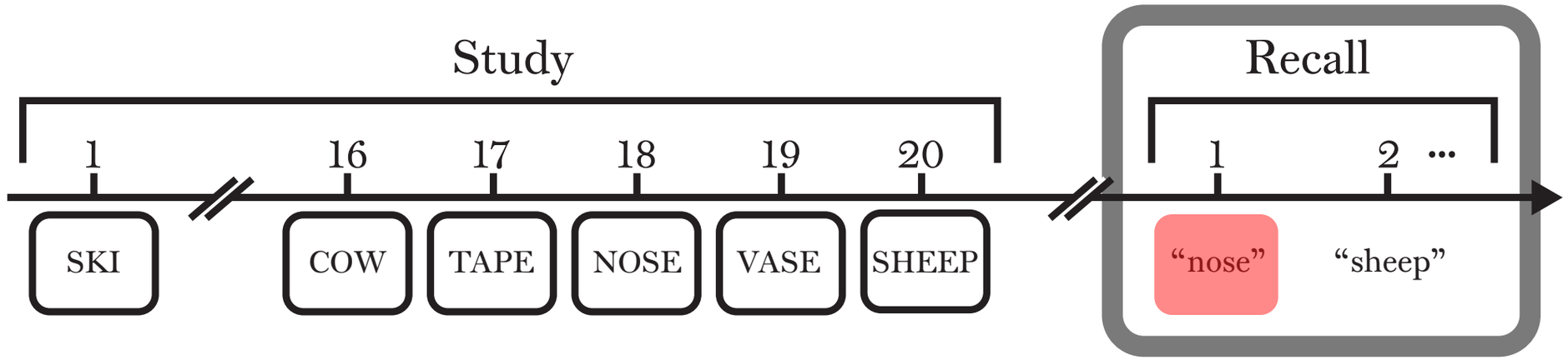
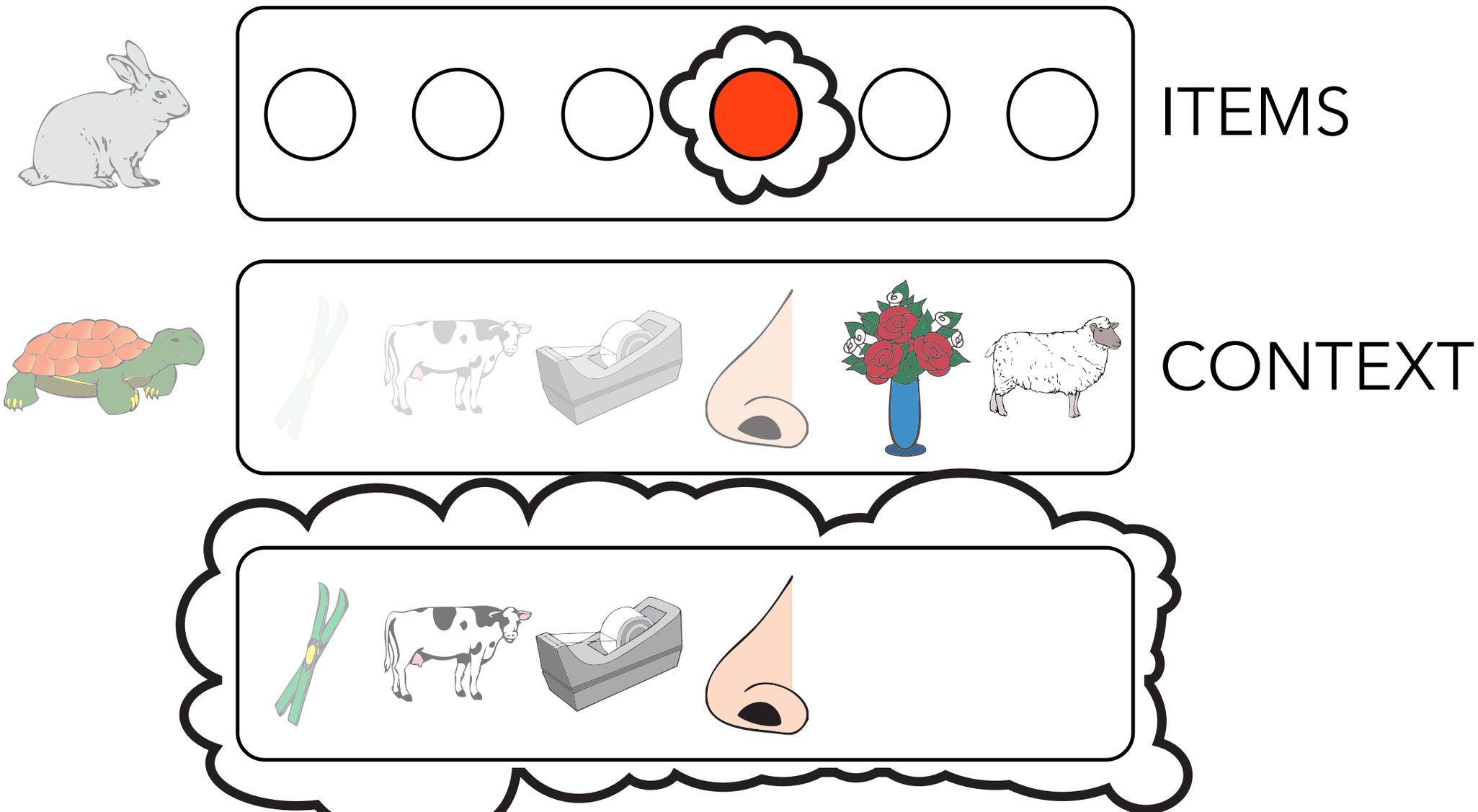
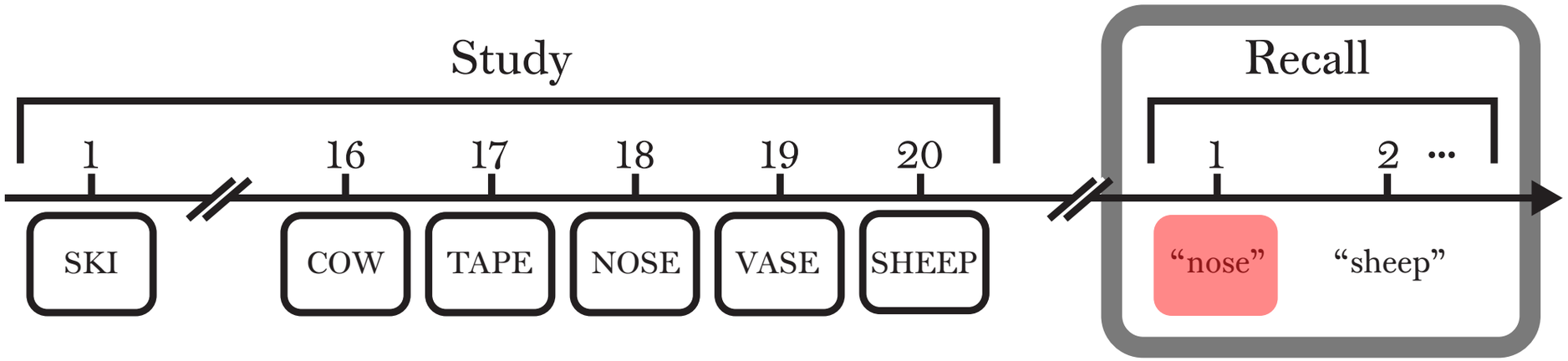
...
“nose”
“sheep”


ITEMS
CONTEXT


Study
1
16
17
18
19
20
SKI
COW
TAPE
NOSE
VASE
SHEEP
Recall
1
2
...
“nose”
“sheep”


ITEMS
CONTEXT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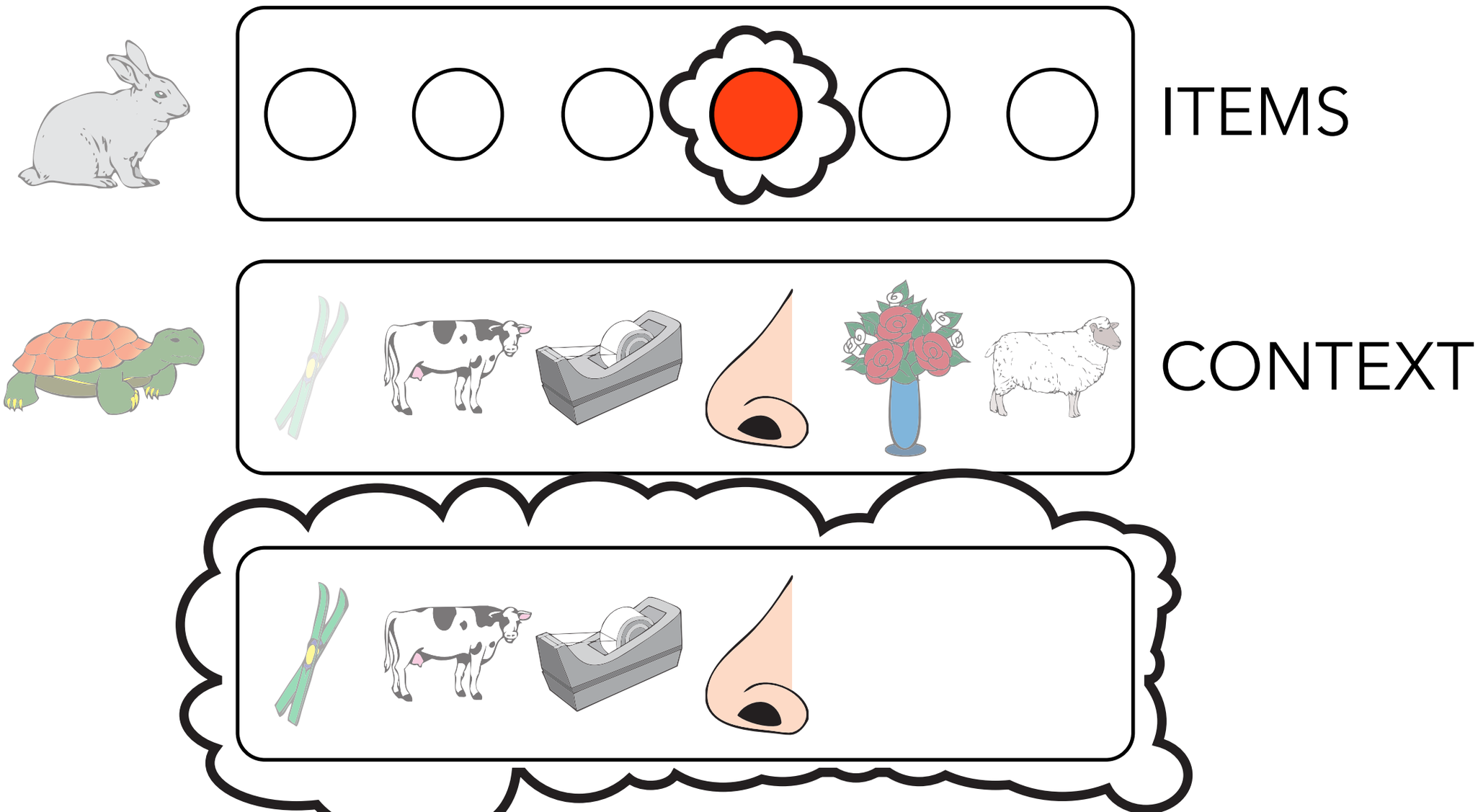

ITEMS
CONTEXT

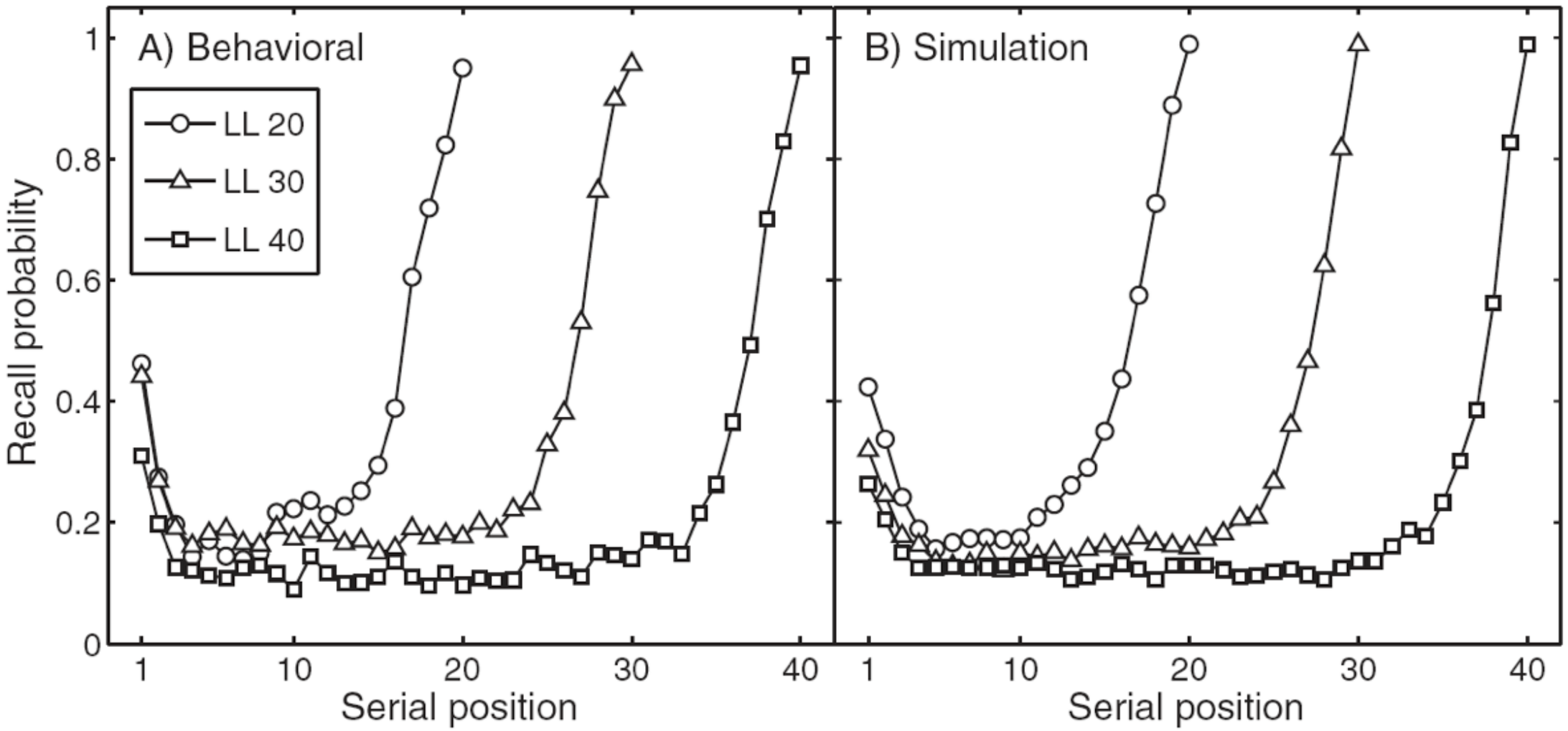
TCM mechanisms

- TCM assumes that each occurrence of an item is (bidirectionally) associated with the context *at the time the item is presented*

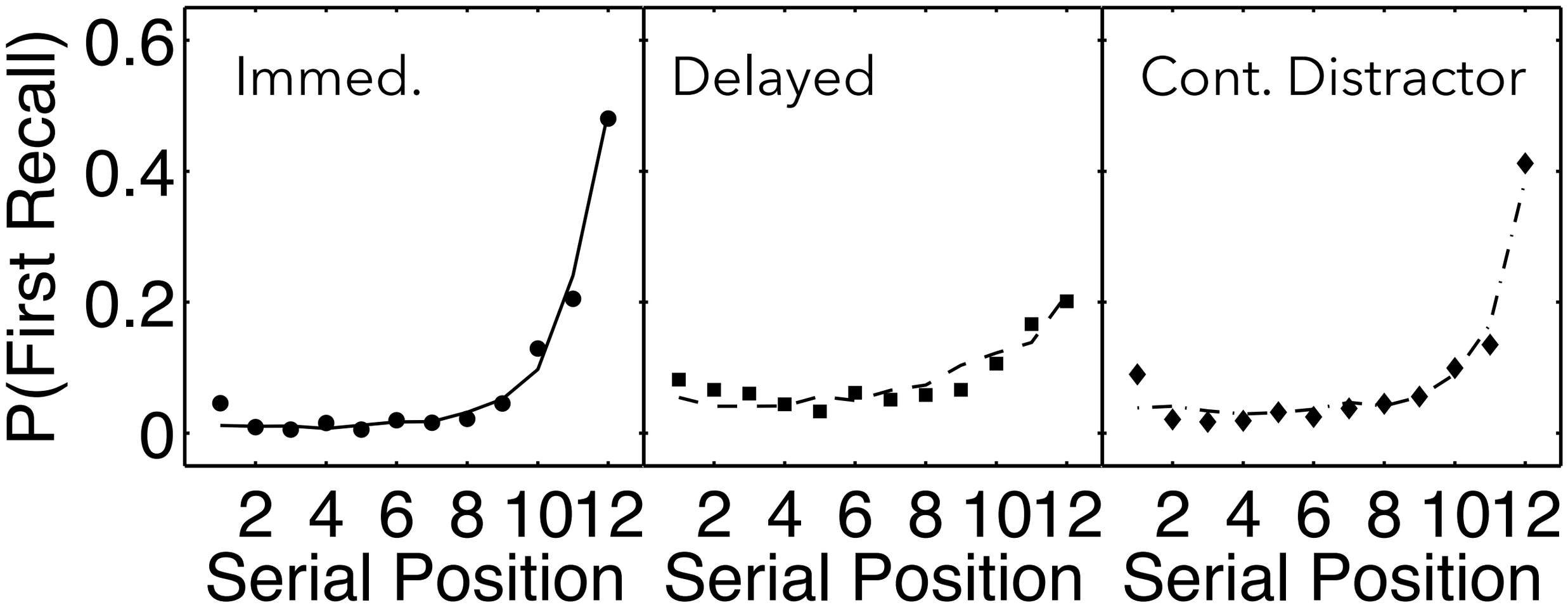
- Information association with an item is retrieved and added to context. Thus, context represents a **recency-weighted average of prior thoughts**.

$$c_t = \rho c_{t-1} + (1 - \rho) f_t$$

Evaluating TCM…

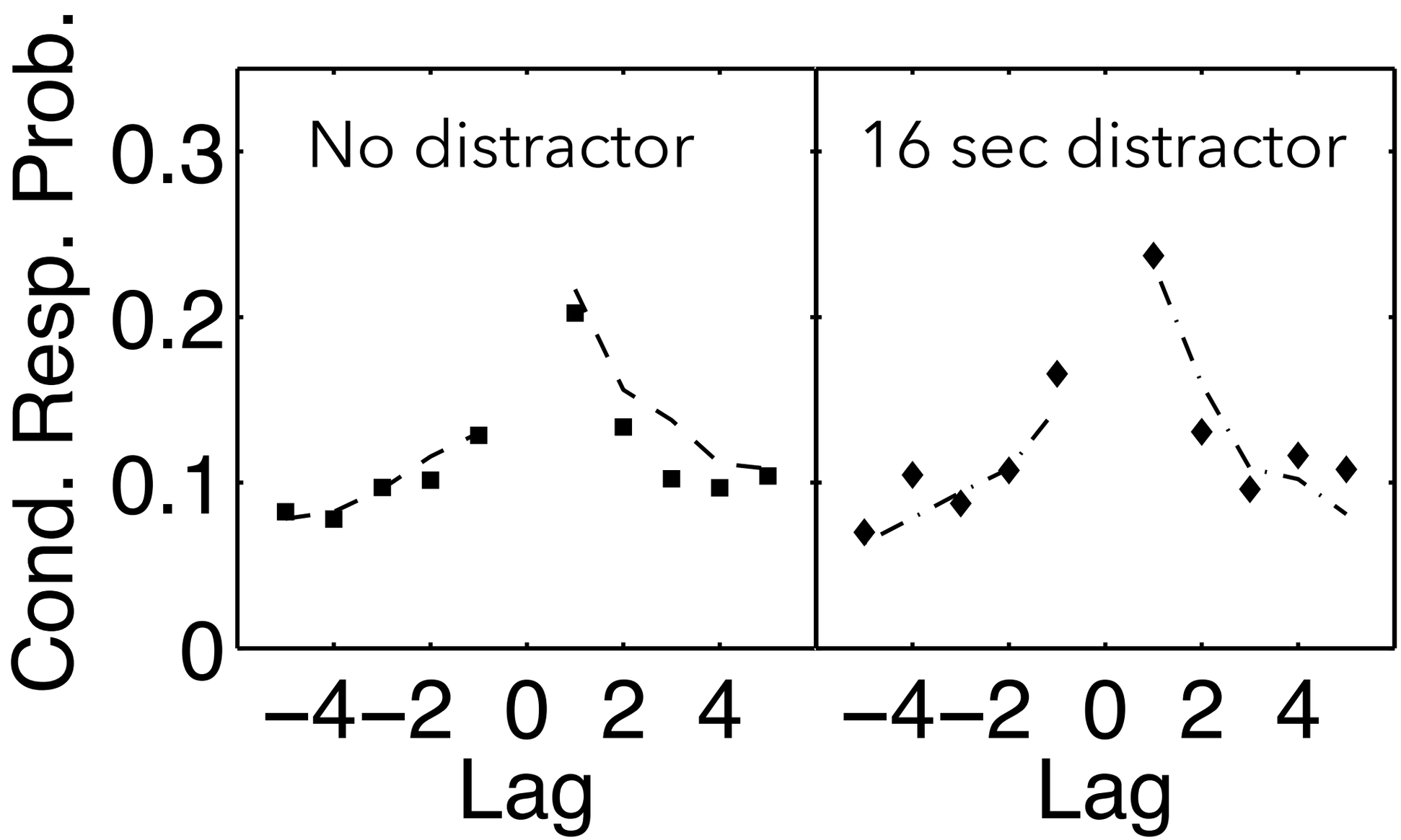

A) Behavioral
B) Simulation
LL 20
LL 30
LL 40
Recall probability
Serial position
Serial position
0
0.2
0.4
0.6
0.8
1
1
10
20
30
40

Long-term Recency



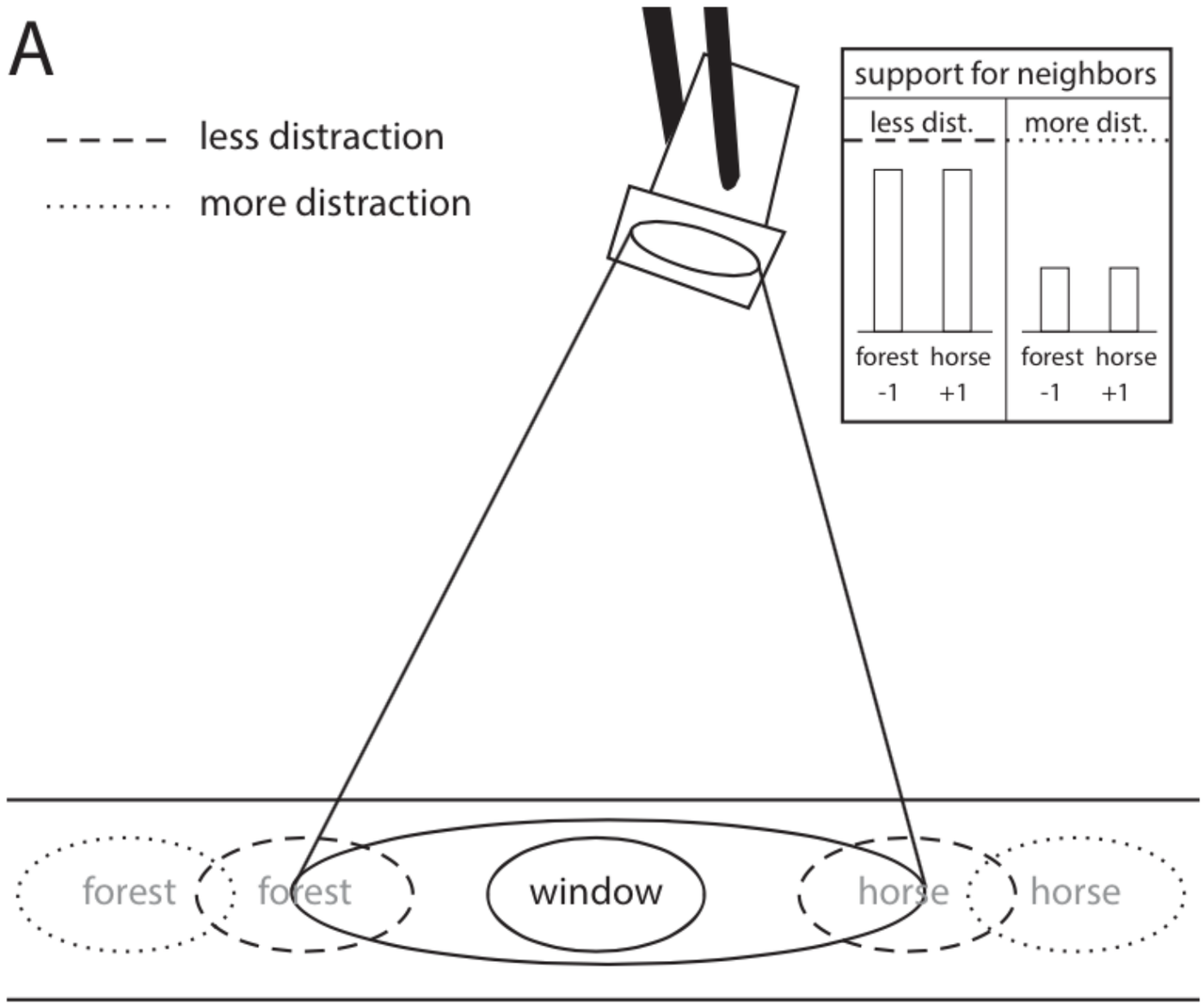
Sederberg et al. (2007)

Long-range associations

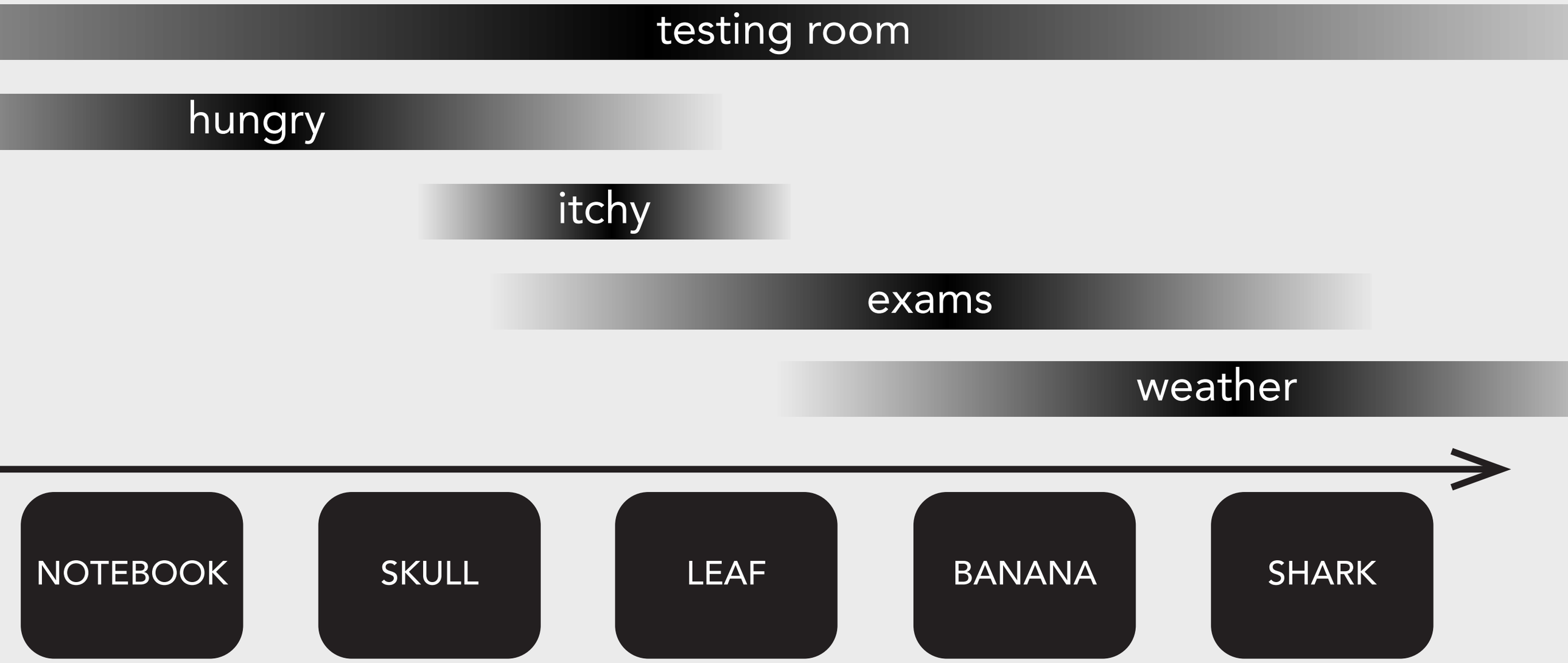


Sederberg et al. (2007)

TCM and long-range associations

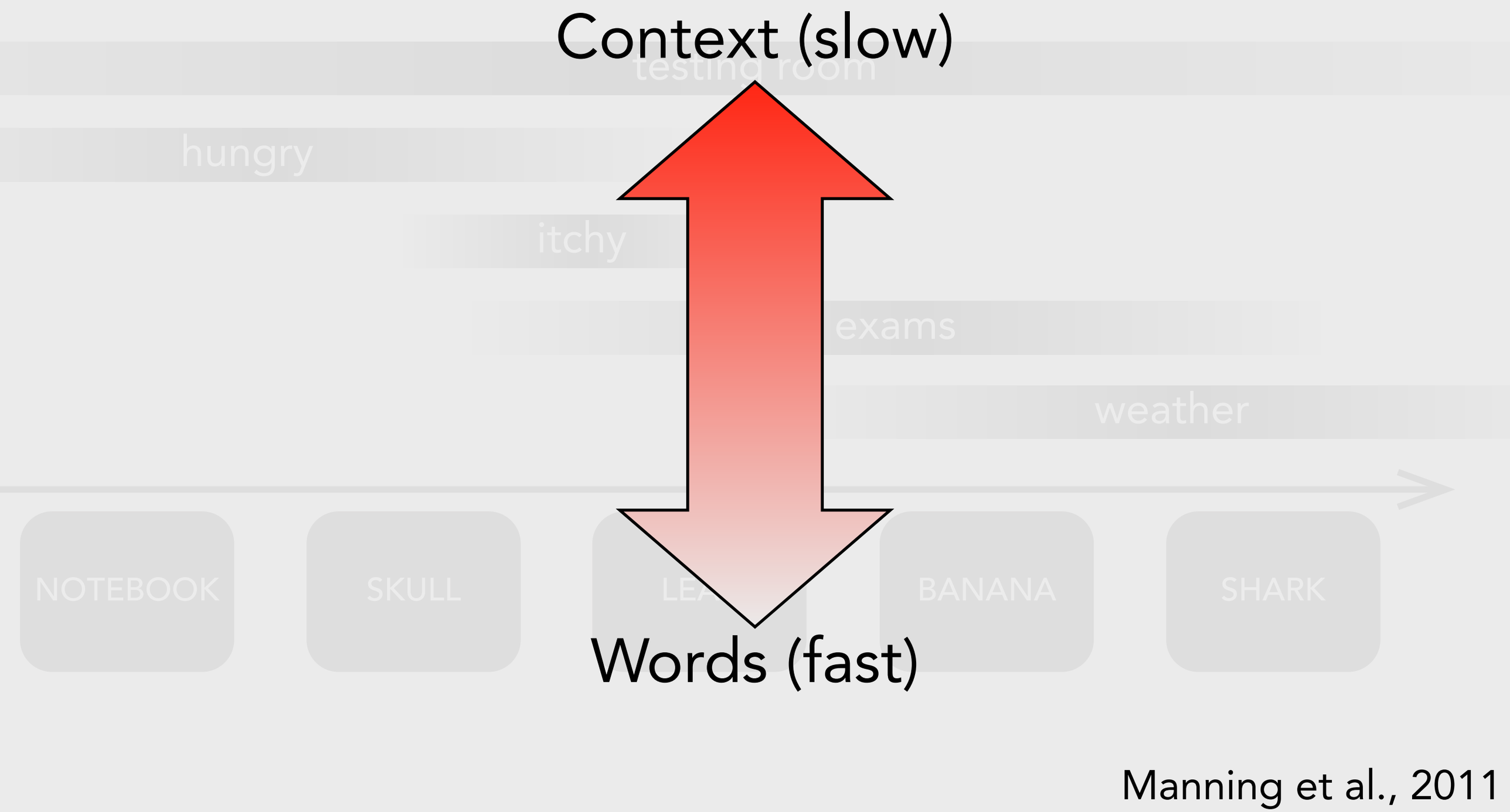


Teasing out the neural representation of context



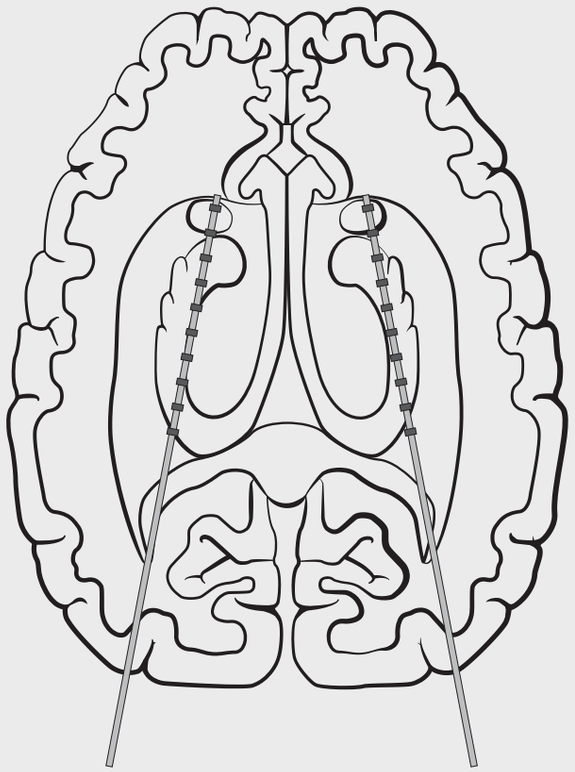
Manning et al., 2011

Teasing out the neural representation of context

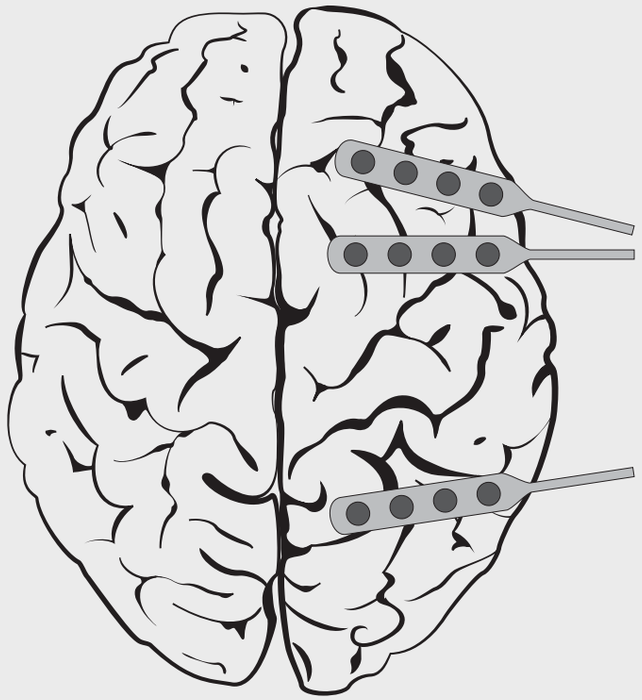


Manning et al., 2011

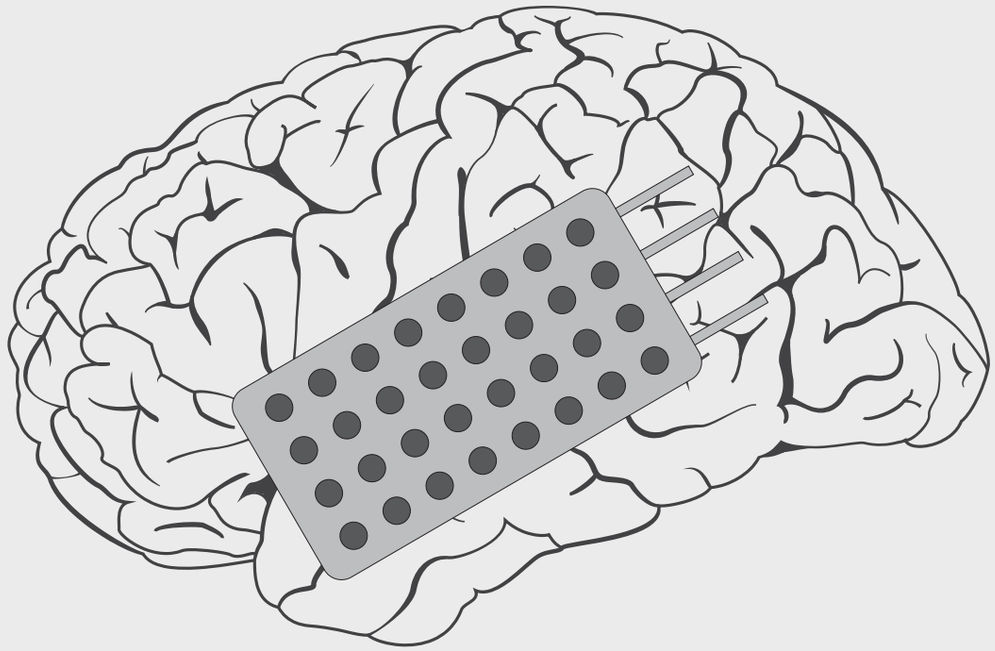
Human intracranial recordings



Depth electrodes



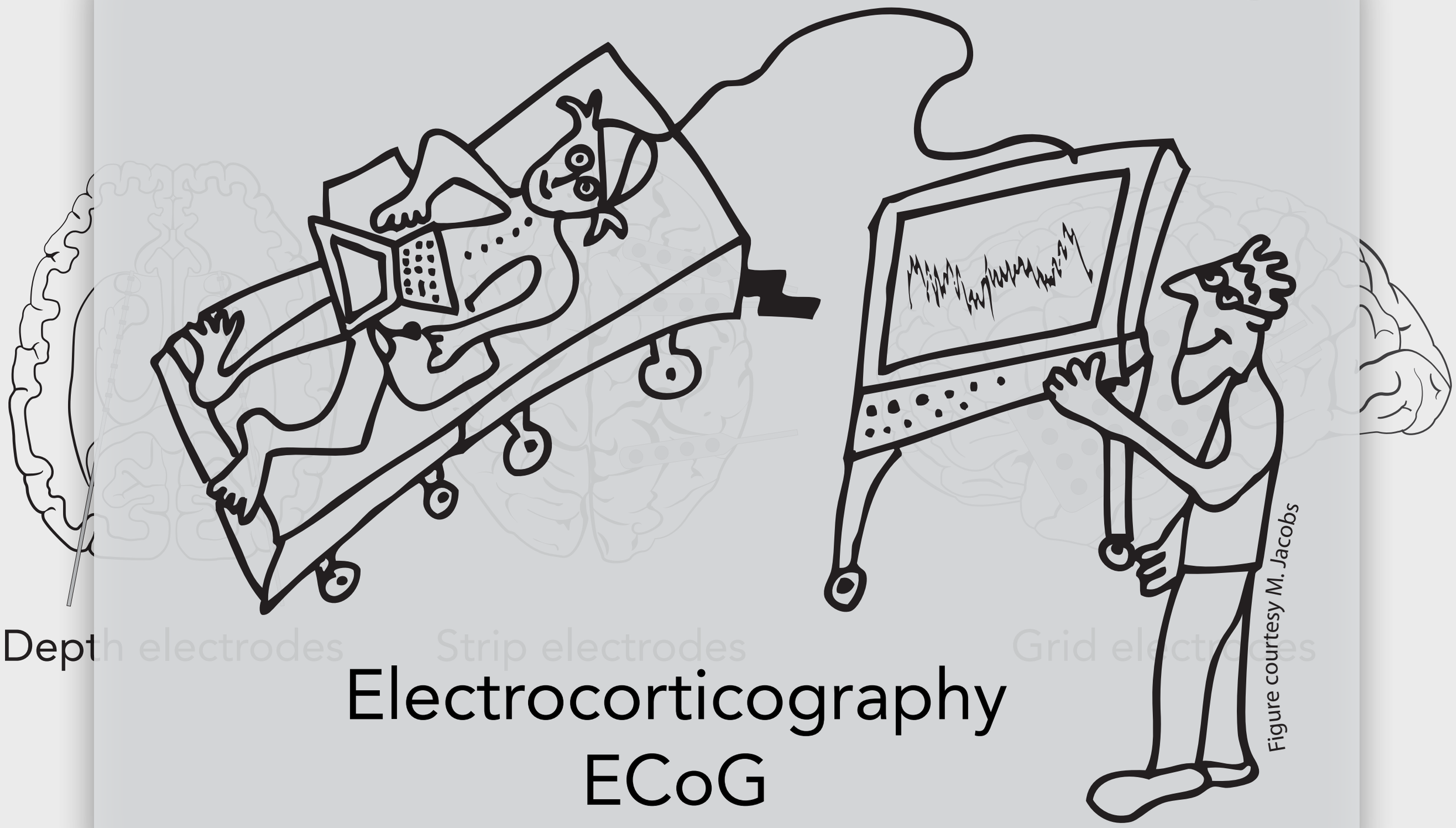
Strip electrodes



Grid electrodes

Manning et al., 2011

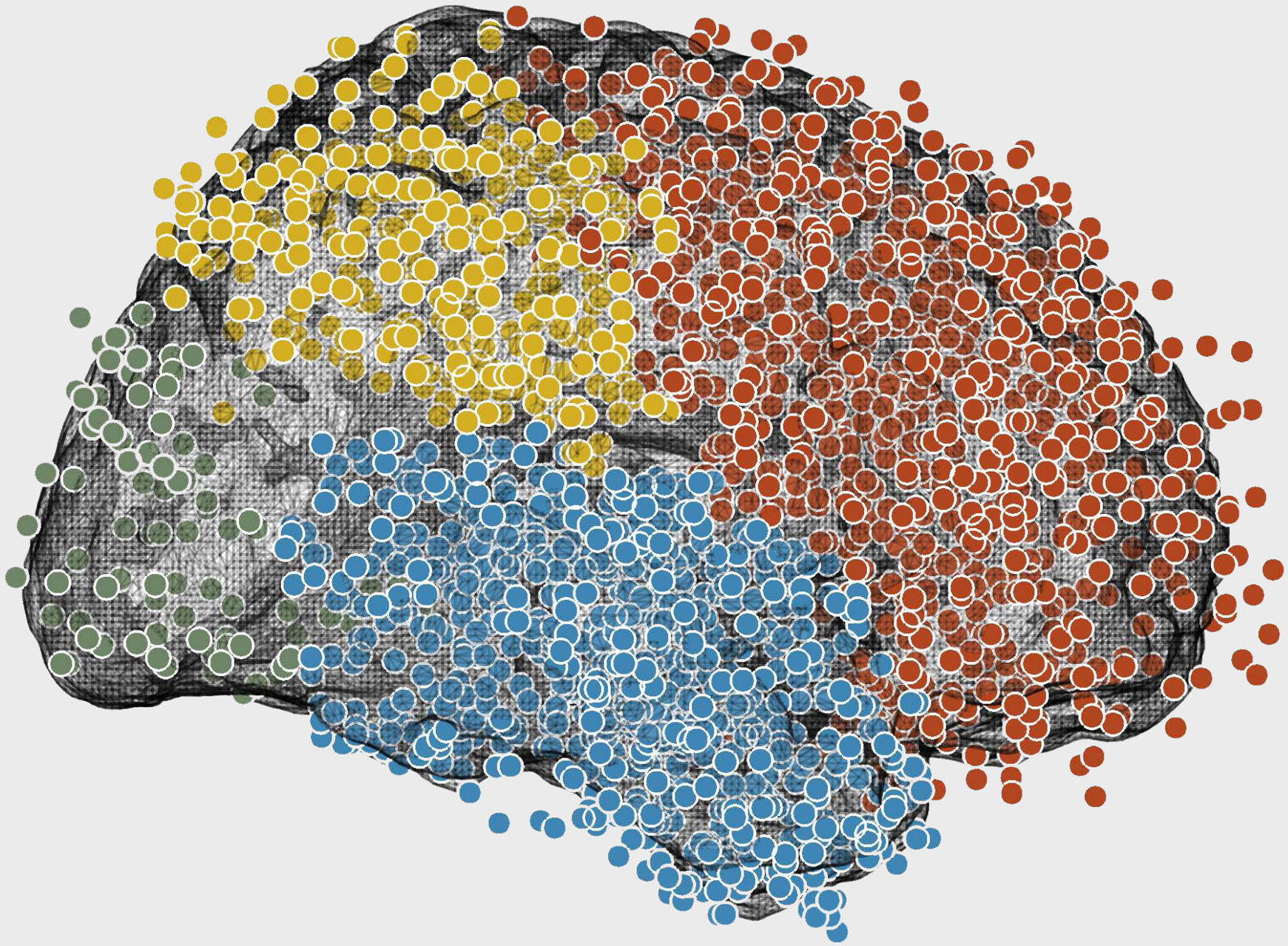
Human intracranial recordings



Electrocorticography
ECoG

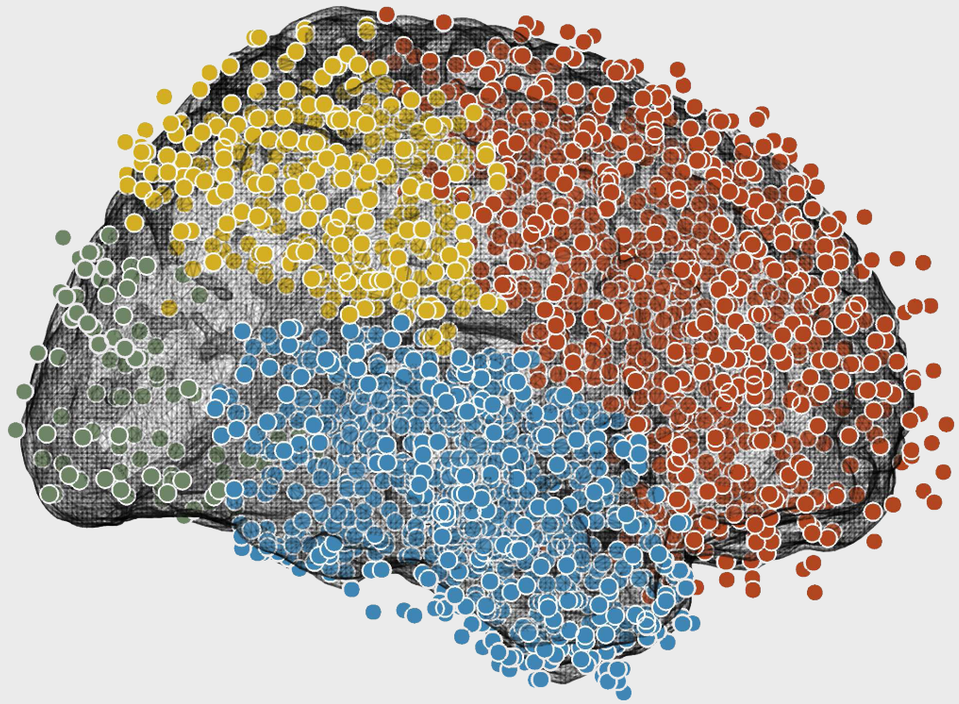
Manning et al., 2011

Human intracranial recordings

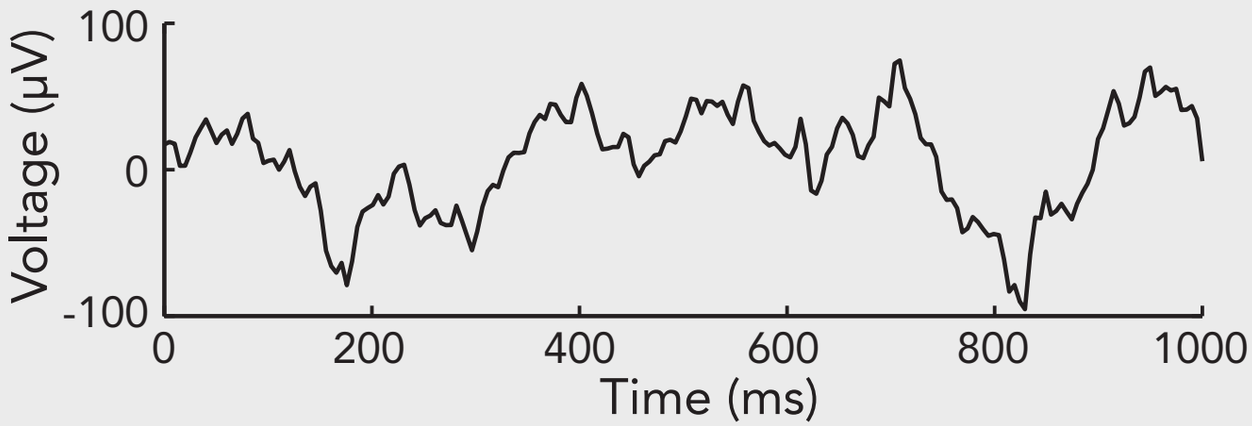


Manning et al., 2011

Human intracranial recordings

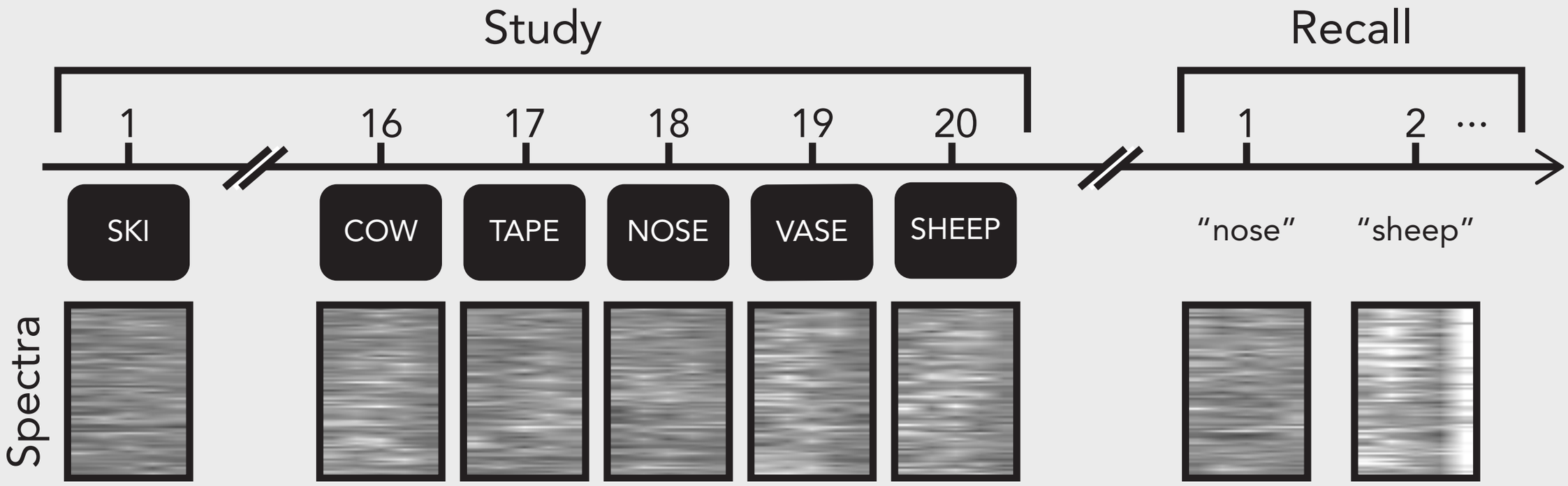


Local field potential



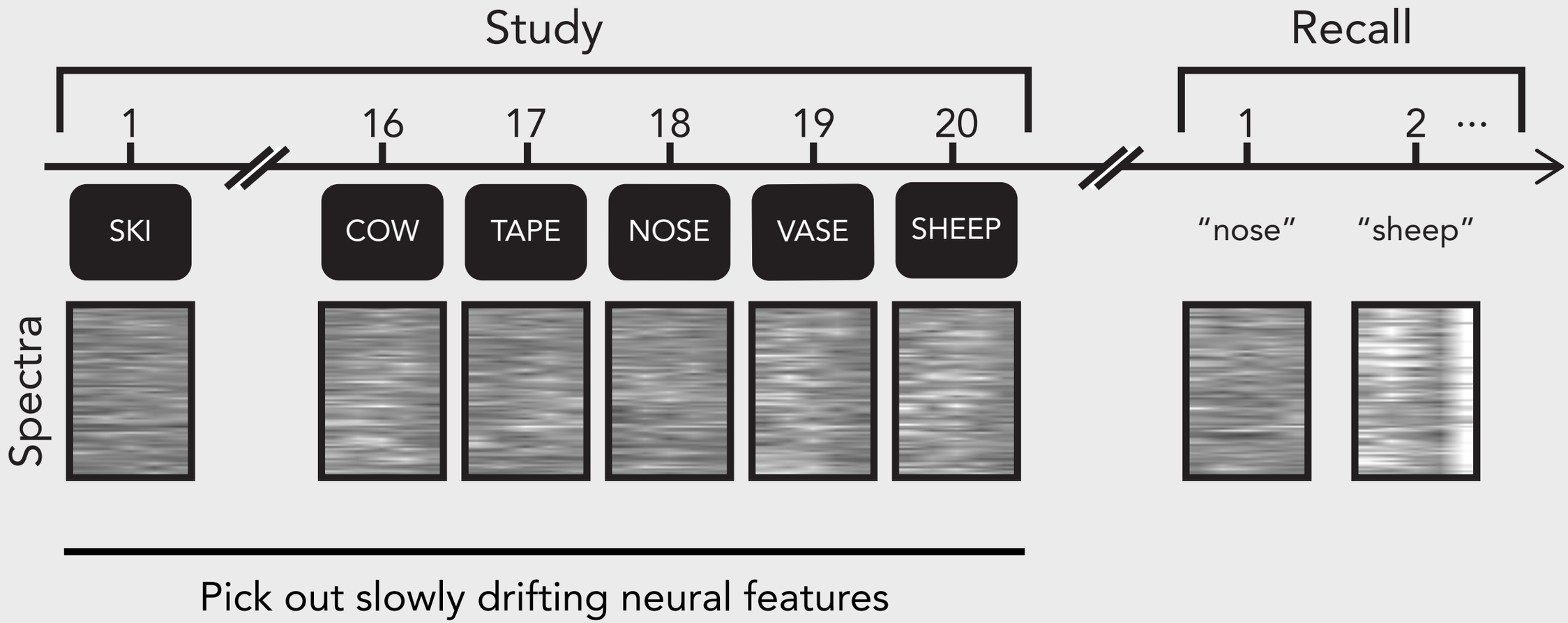
Manning et al., 2011

Human intracranial recordings



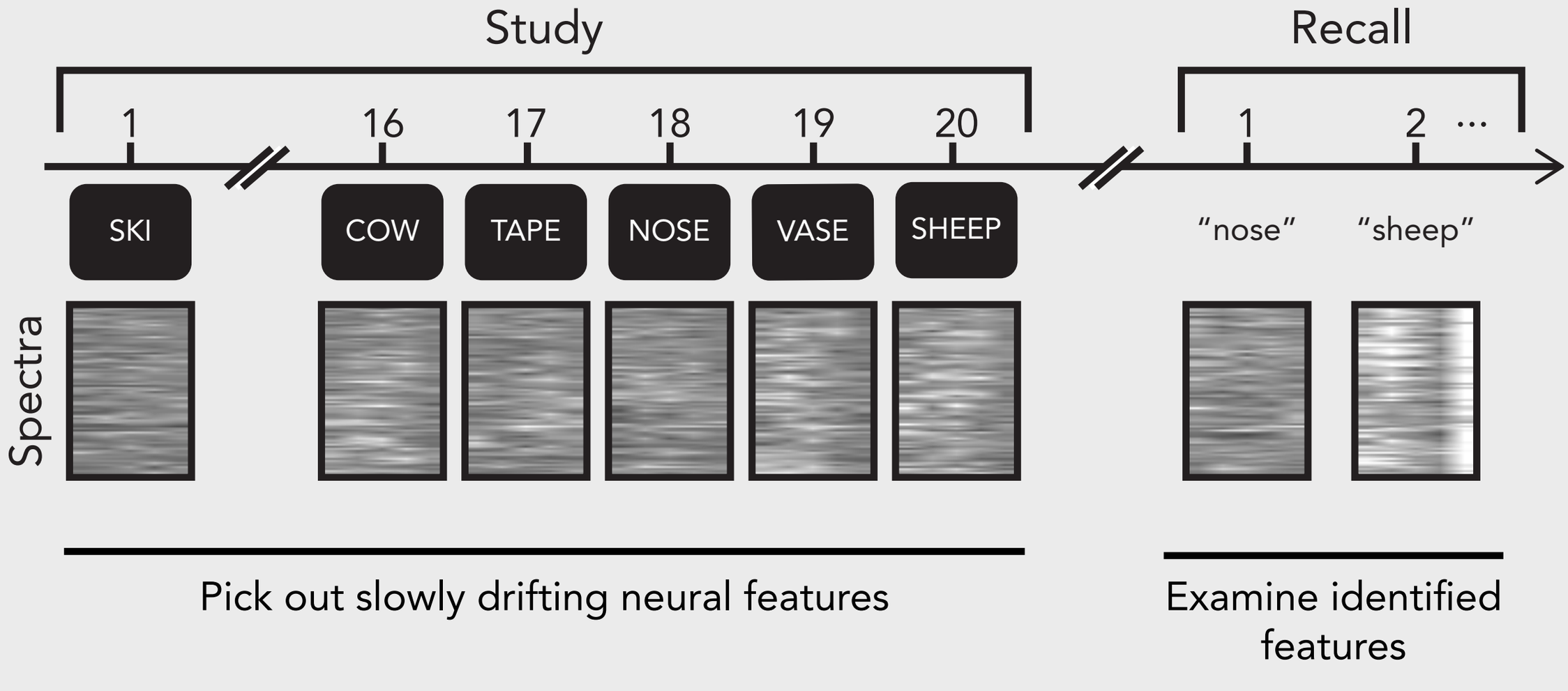
Manning et al., 2011

Isolating neural representations of contextual cues



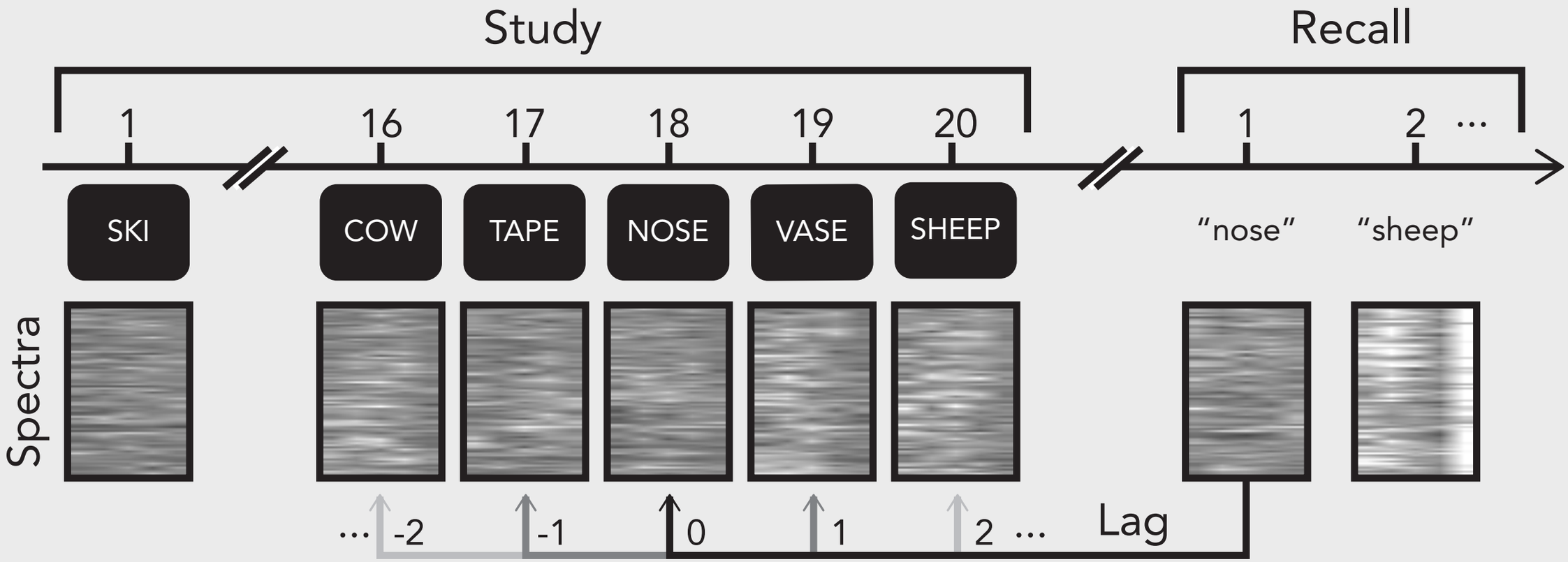
Manning et al., 2011

Isolating neural representations of contextual cues



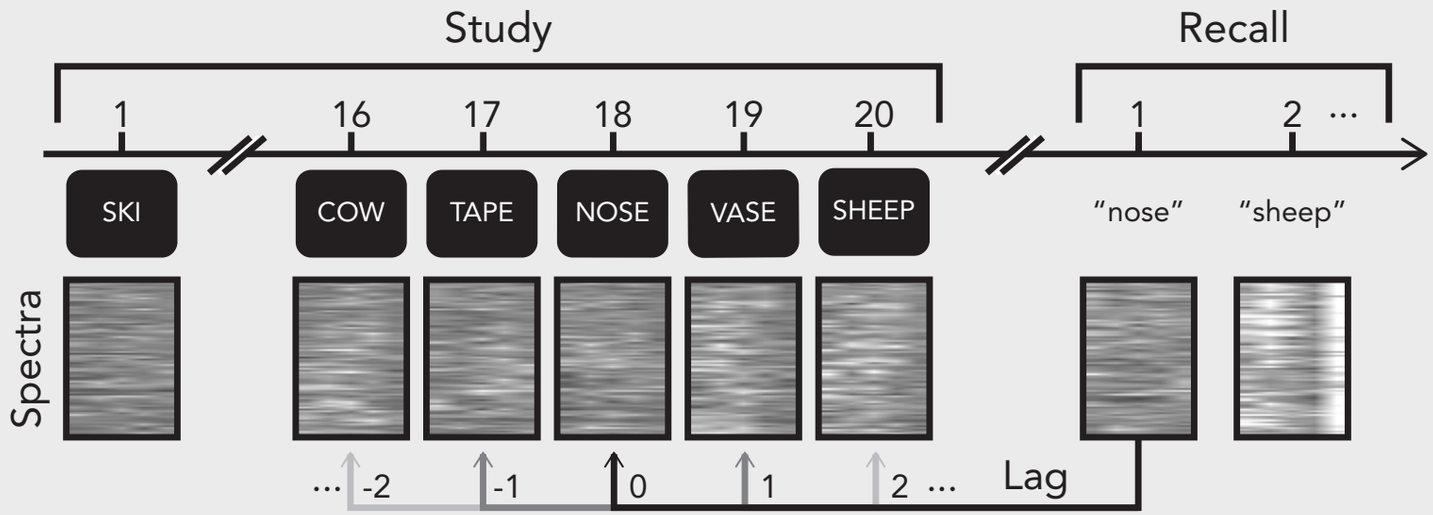
Manning et al., 2011

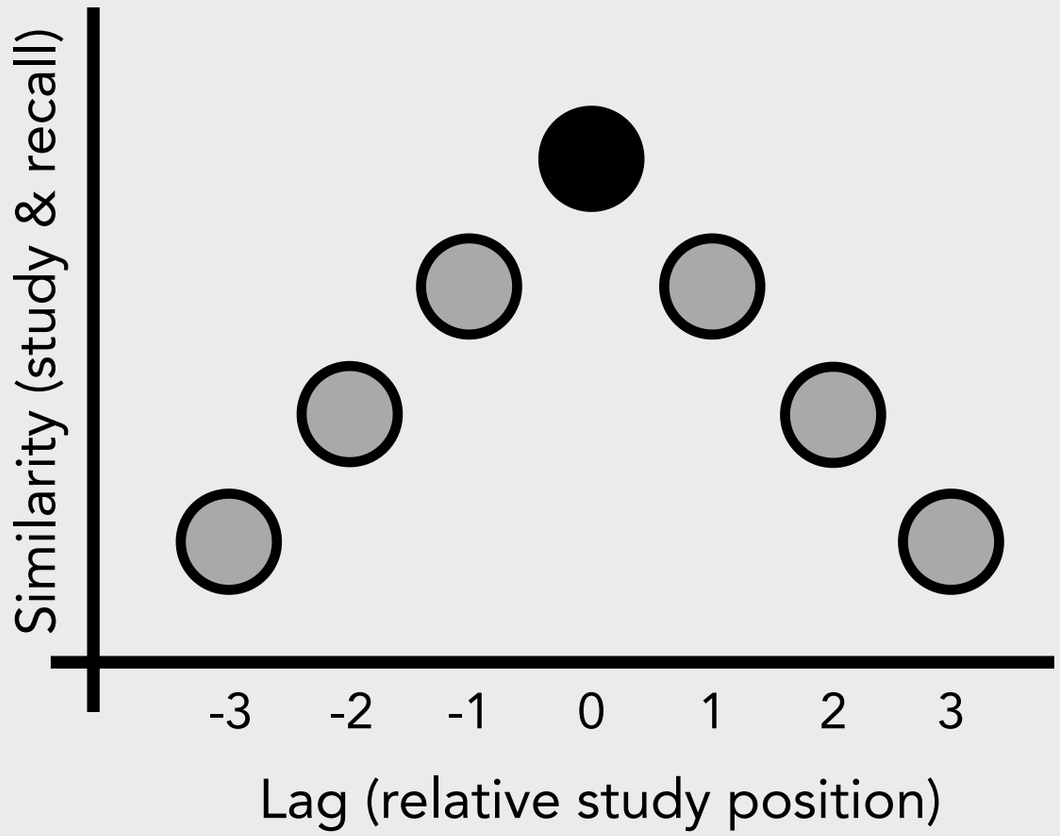
Isolating neural representations of contextual cues



Manning et al., 2011

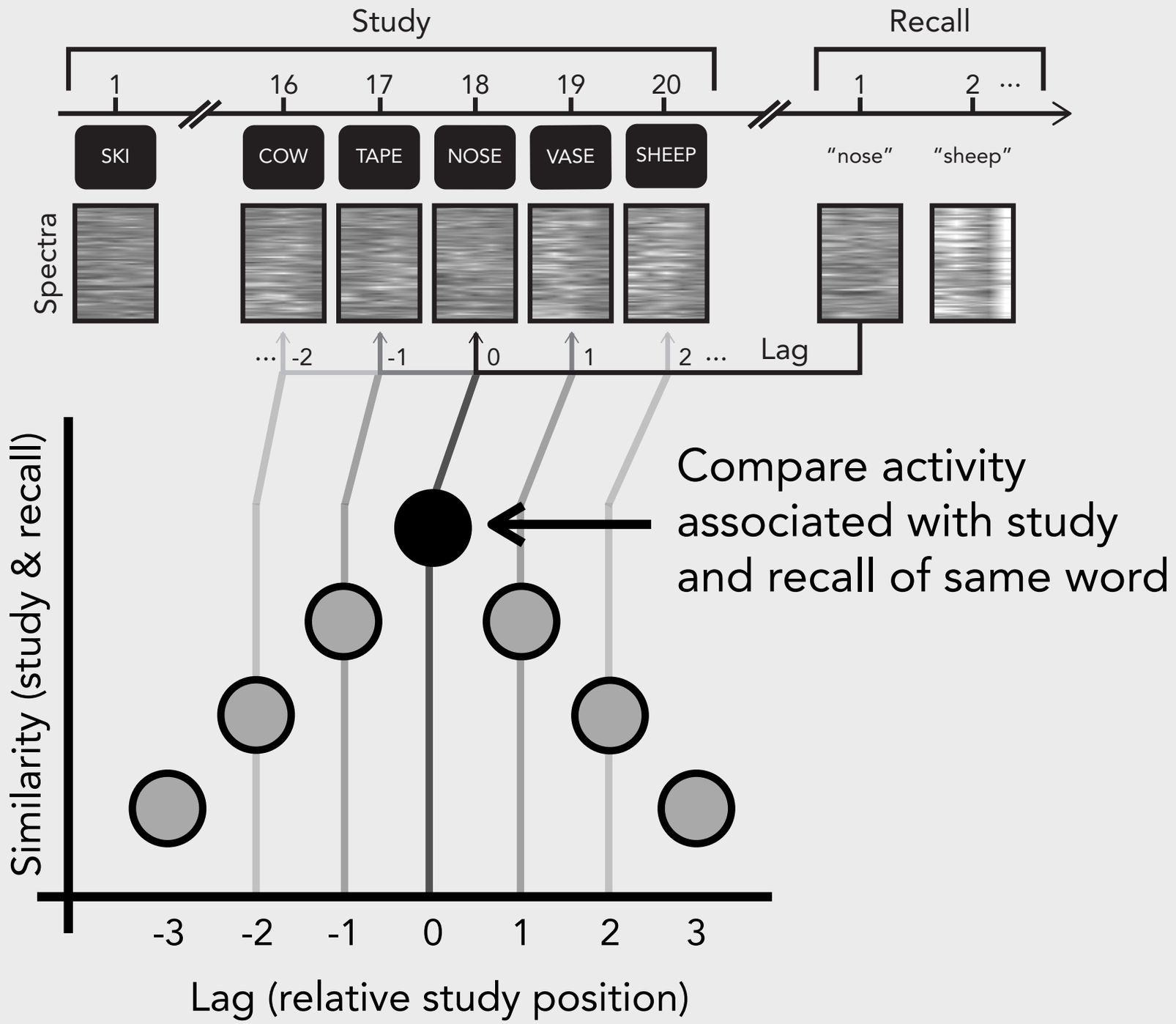
Isolating neural representations of contextual cues





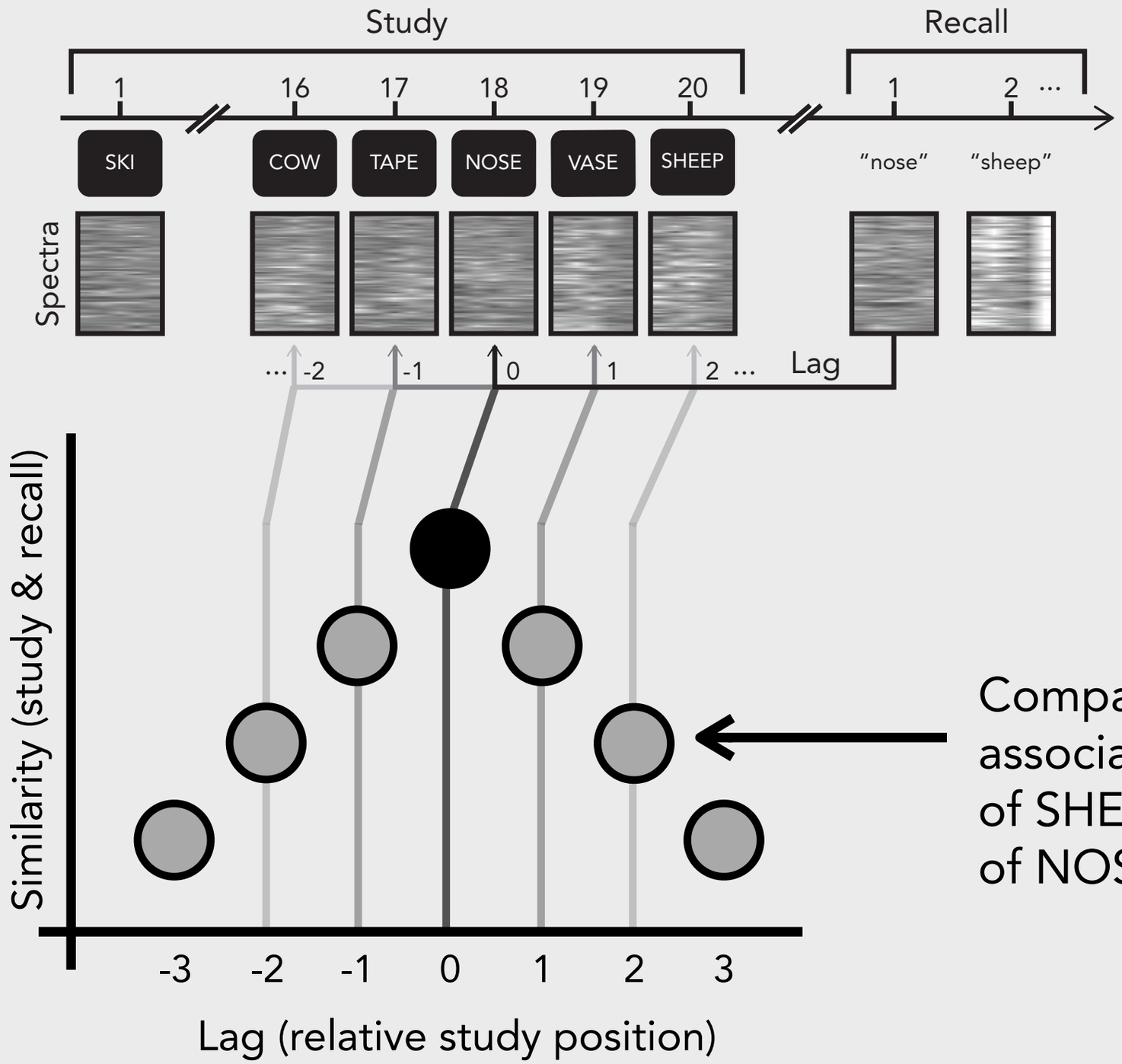
Manning et al., 2011

Isolating neural representations of contextual cues



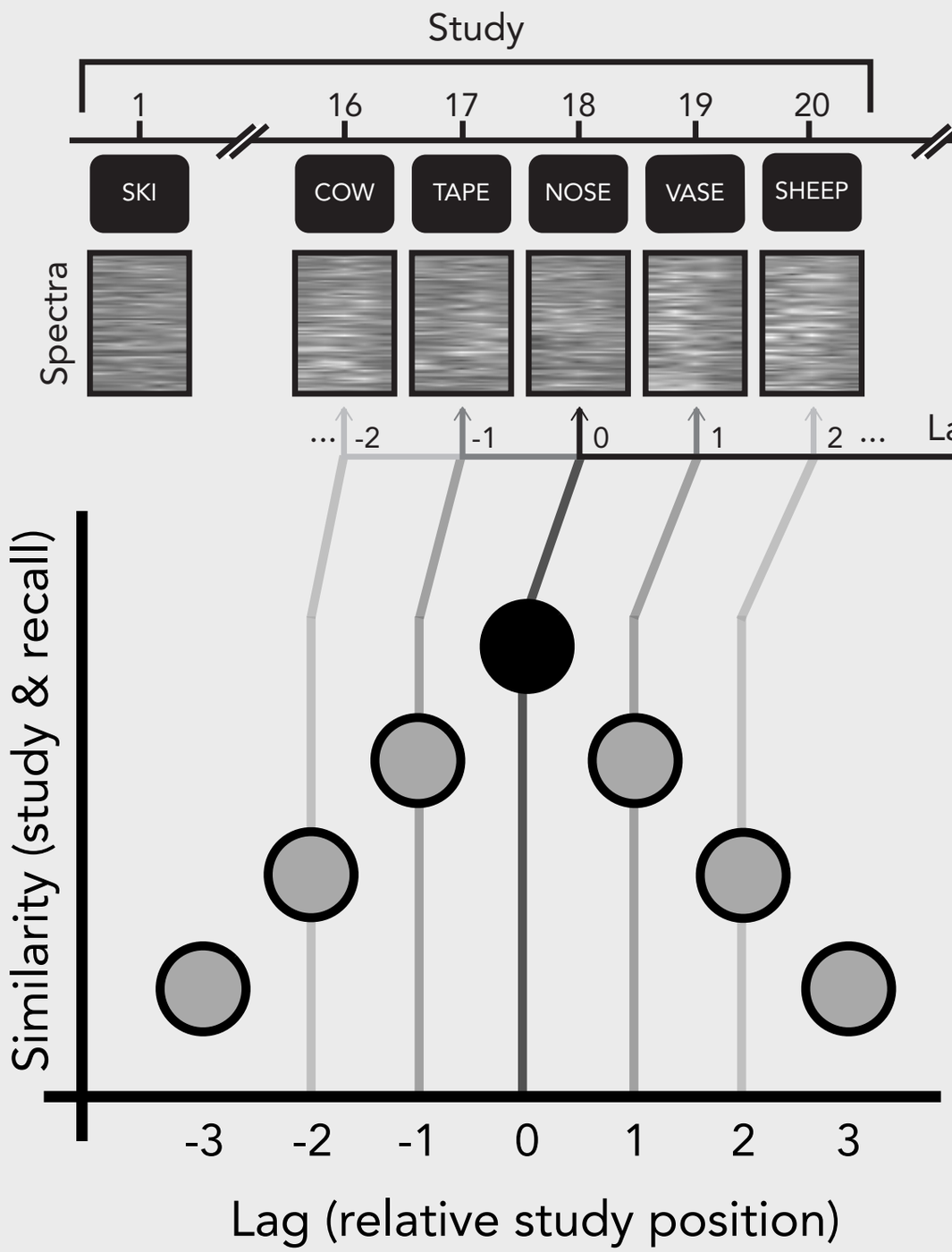
Manning et al., 2011

Isolating neural representations of contextual cues



Manning et al., 2011

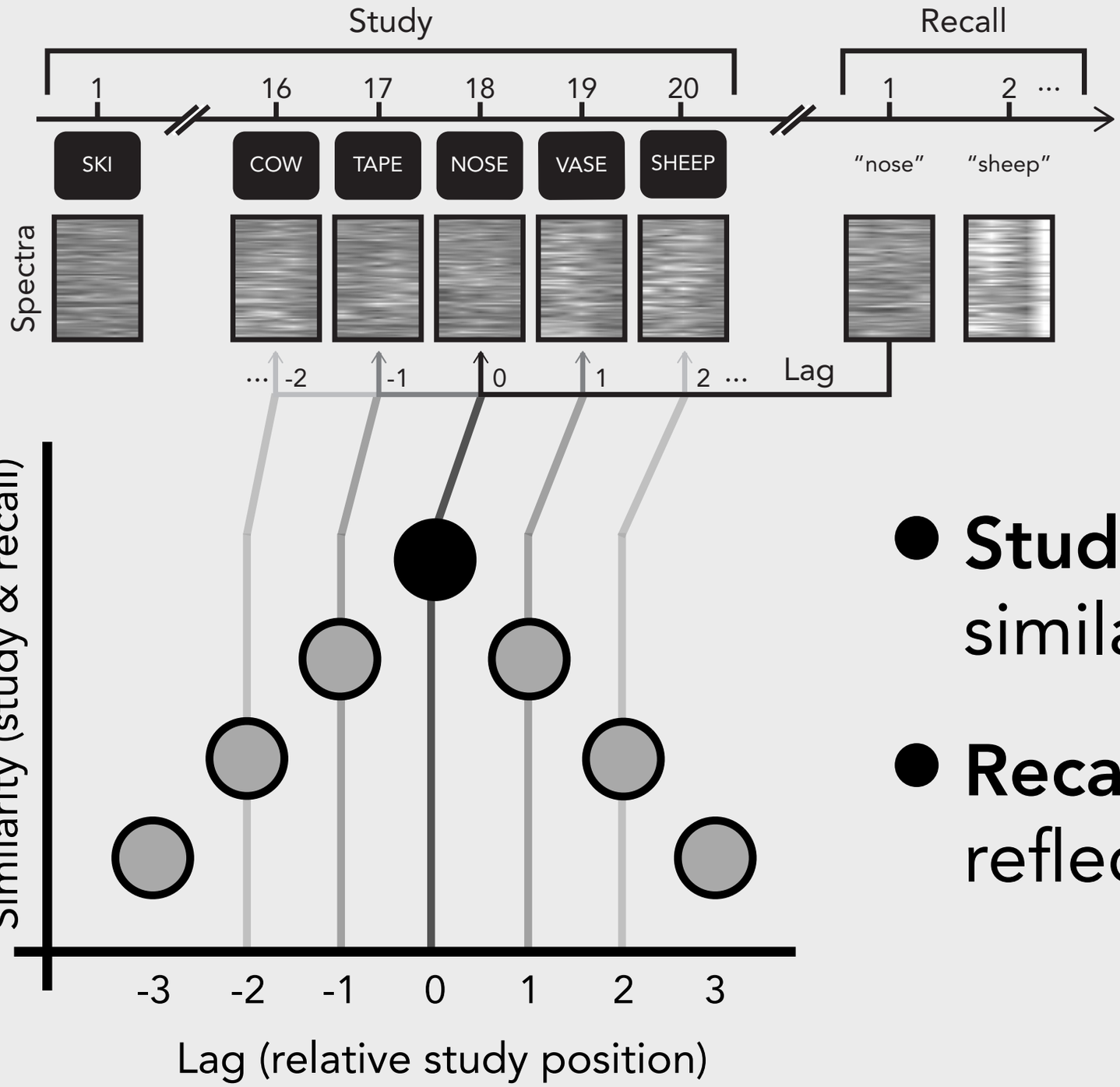
The upside-down ‘V’ indicates reinstatement of slow drift (context)

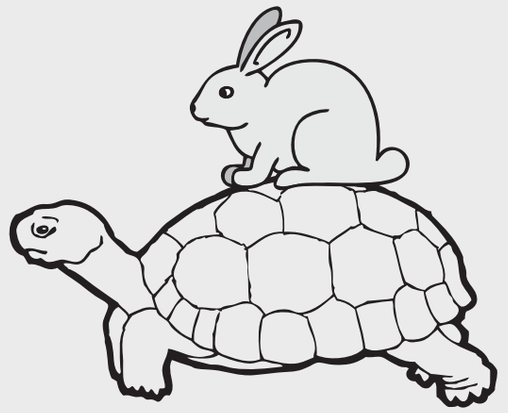


- **Study:** nearby items have similar representations
- **Recall:** similarity to study reflects reinstatement

Manning et al., 2011

The upside-down ‘V’ indicates reinstatement of slow drift (context)





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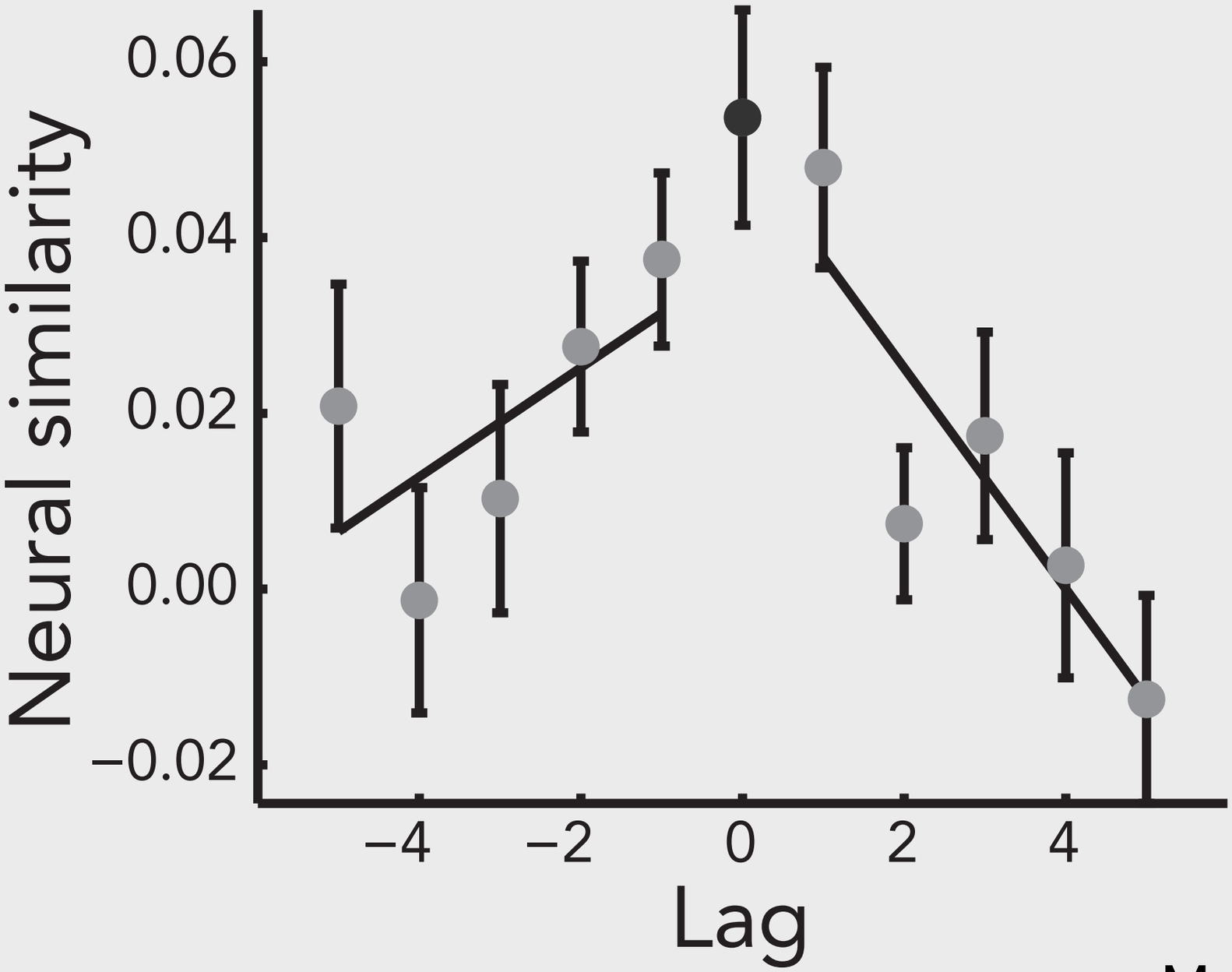
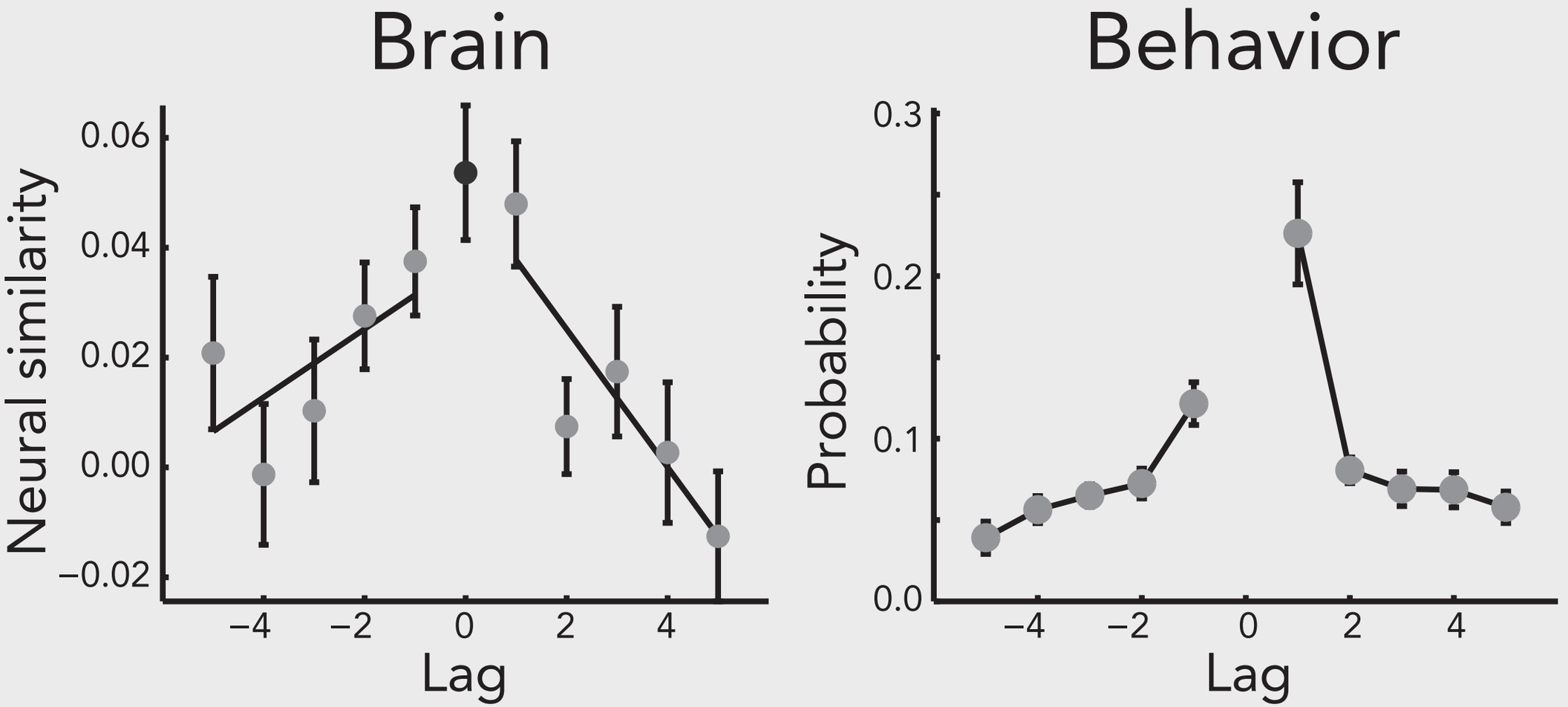
Manning et al., 2011

The neural underpinnings of temporal clustering



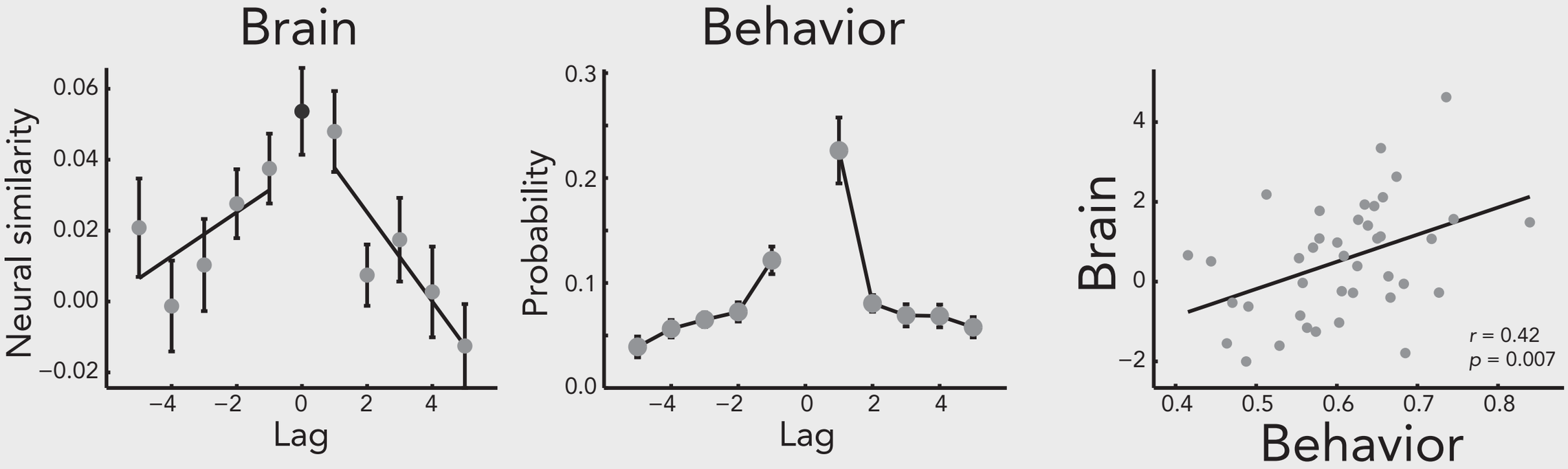
Manning et al., 2011

The neural underpinnings of temporal clustering



Manning et al., 2011

The neural underpinnings of temporal clustering



Manning et al., 2011