Metacognitively Guided Retrieval and Report (META-RAR): Quality Control Processes in Recall

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General Research question

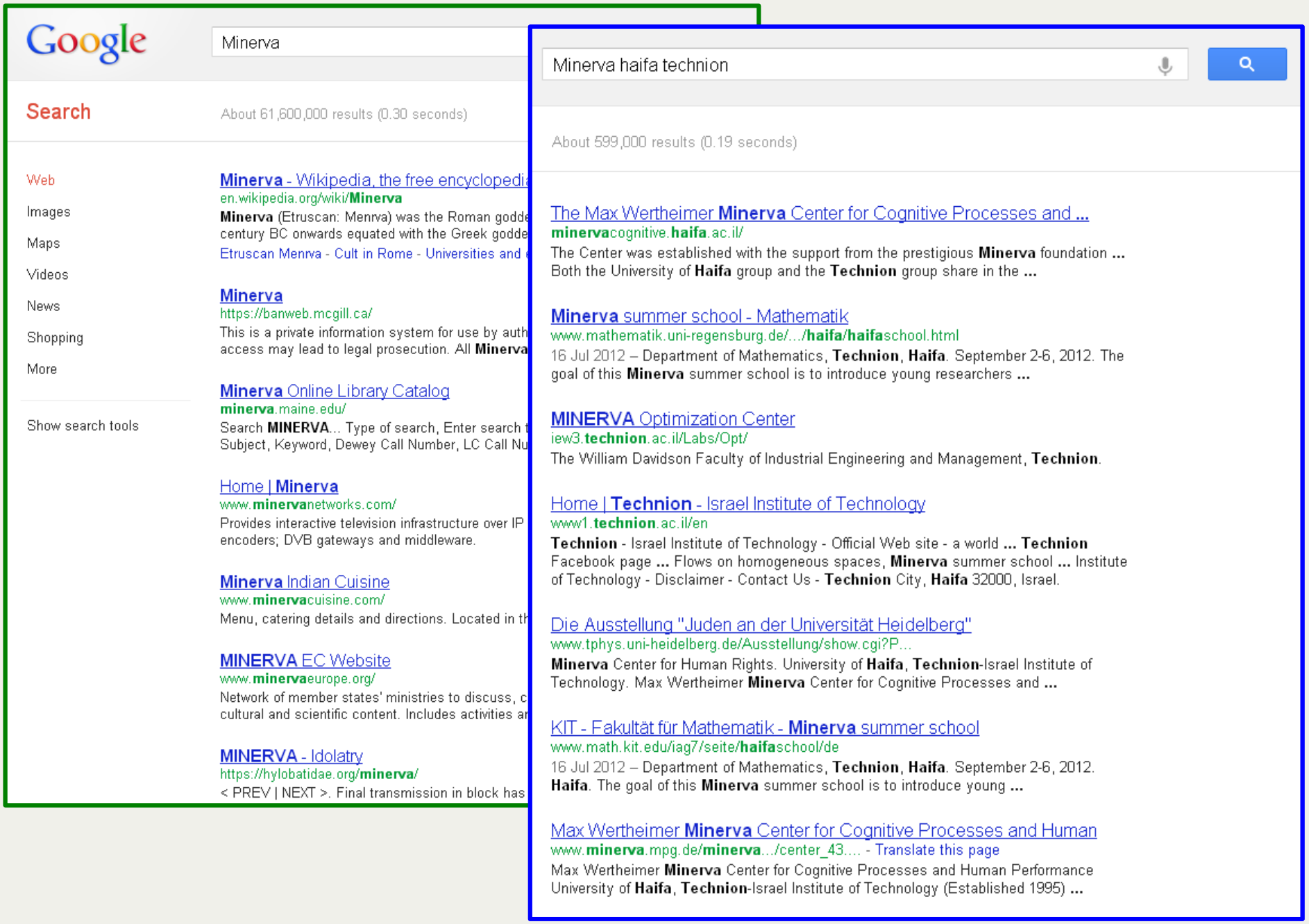
What are the processes used to control voluntary remembering?

Rational

Manufacturing metaphor (Jacoby et al., 2005):
Quality control in manufacturing involves:

- post-production monitoring and control processes that identify and screen out defects. ***[back-end]***
- improved production techniques, so that fewer defects are produced in the first place. ***[front-end]***

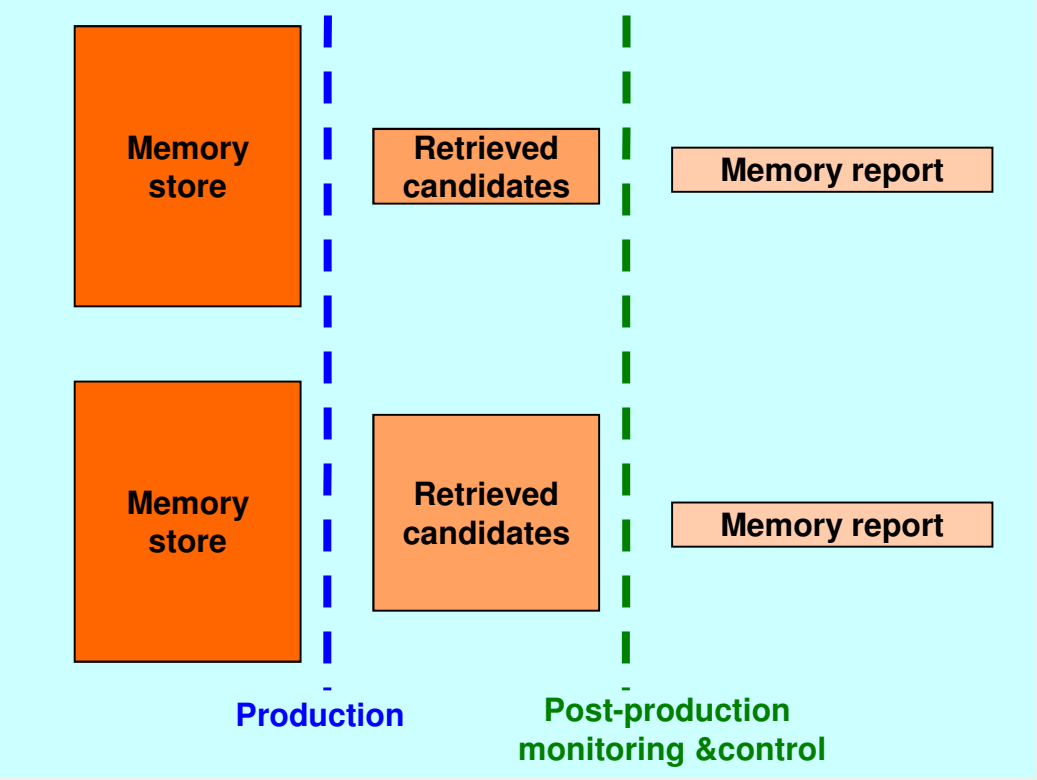
Search engine metaphor:



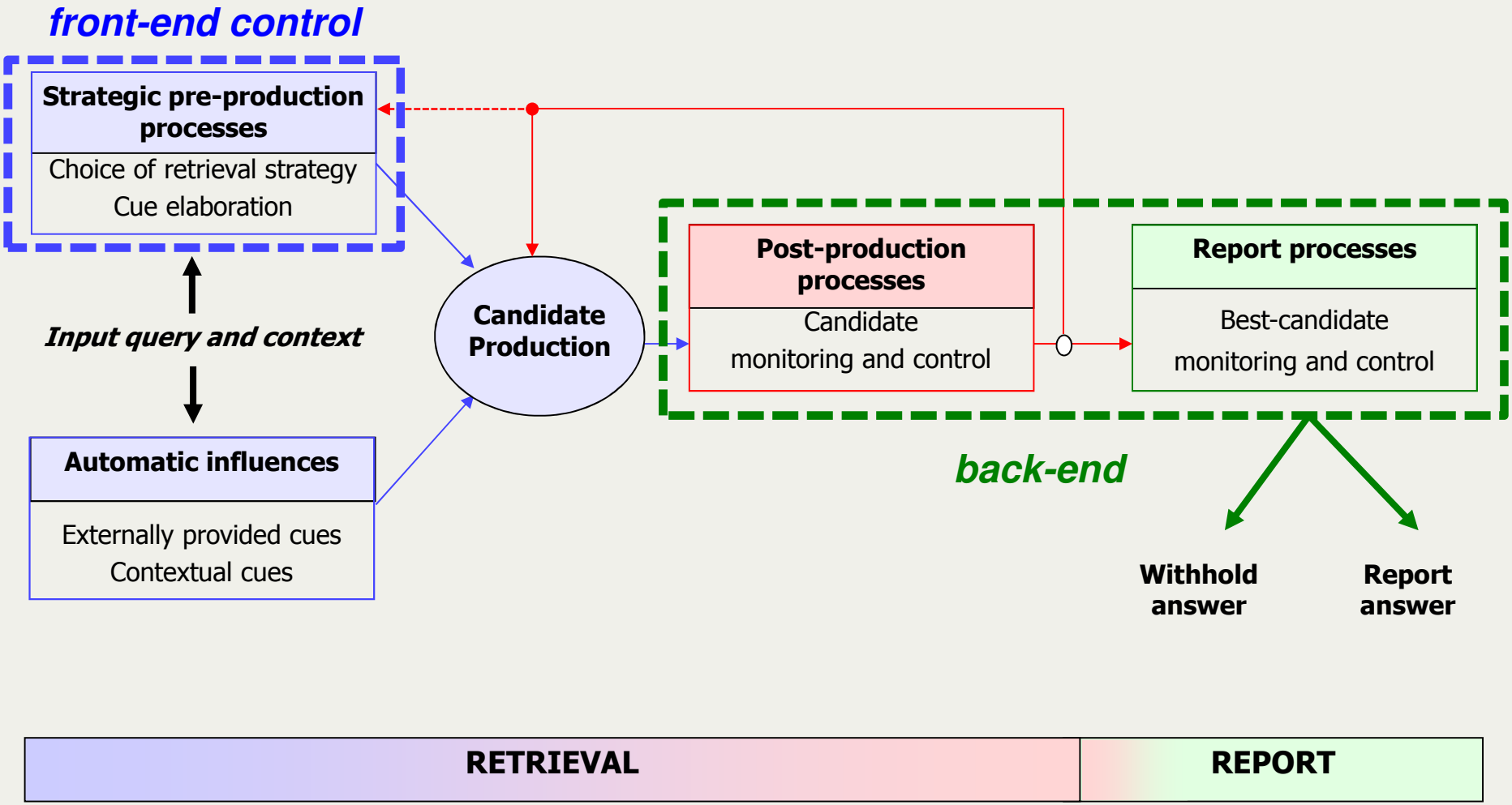
Rational

The same may be true in memory:

- post-production monitoring and control processes that identify and screen out false memories. ***[back-end]***
- improved production, so that fewer false memories are produced in the first place. ***[front-end]***



META-RAR:
Metacognitively Guided Retrieval and Report



(Halamish, Goldsmith & Jacoby, In preparation; Koriat, Goldsmith, & Halamish, 2008;
Based on Koriat & Goldsmith, 1996)

RAR-QAP methodology

Cue Word	Produced Candidates	Confidence	Report Decision
TABLE	C*H*_*A*_*I*_R C*H*_*O*_*I*_R C*H*_*E*_*E*_R	40 %	YES / NO
LIGHT	S*K*_*I*_*R*_*T* S _ _ _ _ S _ _ _ _	100 %	YES / NO
LOCK	T*I*_*M*_E R T*U*_*N*_E R T _ _ E R	80 %	YES / NO

RAR-QAP methodology

Cue Word	Produced Candidates	Confidence	Report Decision
TABLE	CHAIR CHOIR CHEER	40 %	YES / NO
LIGHT	SKIRT S____ S____	100%	YES / NO
LOCK	TIMER TUNER T__ER	80 %	YES / NO

MEASURES:

- **Production quality**
- **Candidate monitoring**
- **Best-candidate monitoring and control**
- **Free-report performance**

Production quality:

- **1st-Candidate target percent**– % of items for which the target is the first candidate that comes to mind.

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Candidate monitoring – proportion of identified* produced targets (hits), minus proportion of identified non-targets when the target was not produced (false alarms). *[corrected hit rate]*

**"Identified" = chosen as best-candidate answer with confidence > 50%.*

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MEASURES:

- **Production quality**
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Best-candidate monitoring – relationship between subjective confidence and objective correctness of best-candidate answers. *[(1) calibration bias; (2) within-subject gamma correlation].*

Report criterion – subjective confidence level above which answers are volunteered and below which they are withheld.

RAR-QAP methodology

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MEASURES:

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Free-report quantity – % of *items* for which the target was produced and volunteered.

Free-report accuracy – % of *volunteered answers* that are correct (targets).

Current Research

- Literature review for controlled processes at retrieval (Koriat, Goldsmithm & Halamish, 2008):
  - Previous research has emphasized various back-end processes

    (e.g., Brainerd, Reyna, Wright, & Mojardin, 2003; Goldsmith & Koriat, 1999; Jacoby, Kelley, & Dywan, 1989; Johnson, Hashtroudi, & Lindsay, 1993; Kelley & Jacoby 1998; Kelley & Rhodes, 2002; Koriat & Goldsmith, 1994, 1996; Whittlesea, 2002; Whittlesea & Williams, 2001a, 2001b; Dodson & Schacter, 2001, 2002)

  - Scarce work on front-end processes

    (Higham & Tam, 2005, 2006; Jacoby, Shimizu, Velanova, & Rhodes, 2005; Jacoby, Shimizu, Daniels & Rhodes, 2005)

➢ **In this project we have focused on possible means of front-end control.**

- Source constrained retrieval
- Choice of retrieval strategy

Source-constrained retrieval

Self-initiated use of source information to constrain what comes to mind during retrieval (Jacoby et al., 2005)

- mental reinstatement of encoding operations

Source-constrained retrieval

Questions:

- Do rememberers use source-constrained retrieval in attempting to enhance recall?
- What is the locus of source-constrained recall?
  - Front-end (*production*)
  - Back-end (candidate or best-candidate *monitoring*)
  - Both?
- Does source-constrained recall actually enhance recall performance?

Source-constrained retrieval

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Source-constrained retrieval

Exp. 1 Method

Phase 1: reading

List 1

Read the following pairs:

salad - glass

bee - clip

Phase 2: levels of processing

Lists 2 / 3

Within

Deep

Which word is more pleasant?

bucket - circus

lighter - street

Shallow

Which word has more syllables?

food - tango

tunnel - bead

Filler task (5 min)

Phase 3: cued recall

Lists 2 / 3 +1

Within

Deep

Recall targets compared on pleasantness

bucket – c_____

Salad – g_____

Shallow

Recall targets compared on # of syllables

food – t_____

bee – c_____

Filler task (15 min)

Phase 4: recognition

Lists 1 + distractors

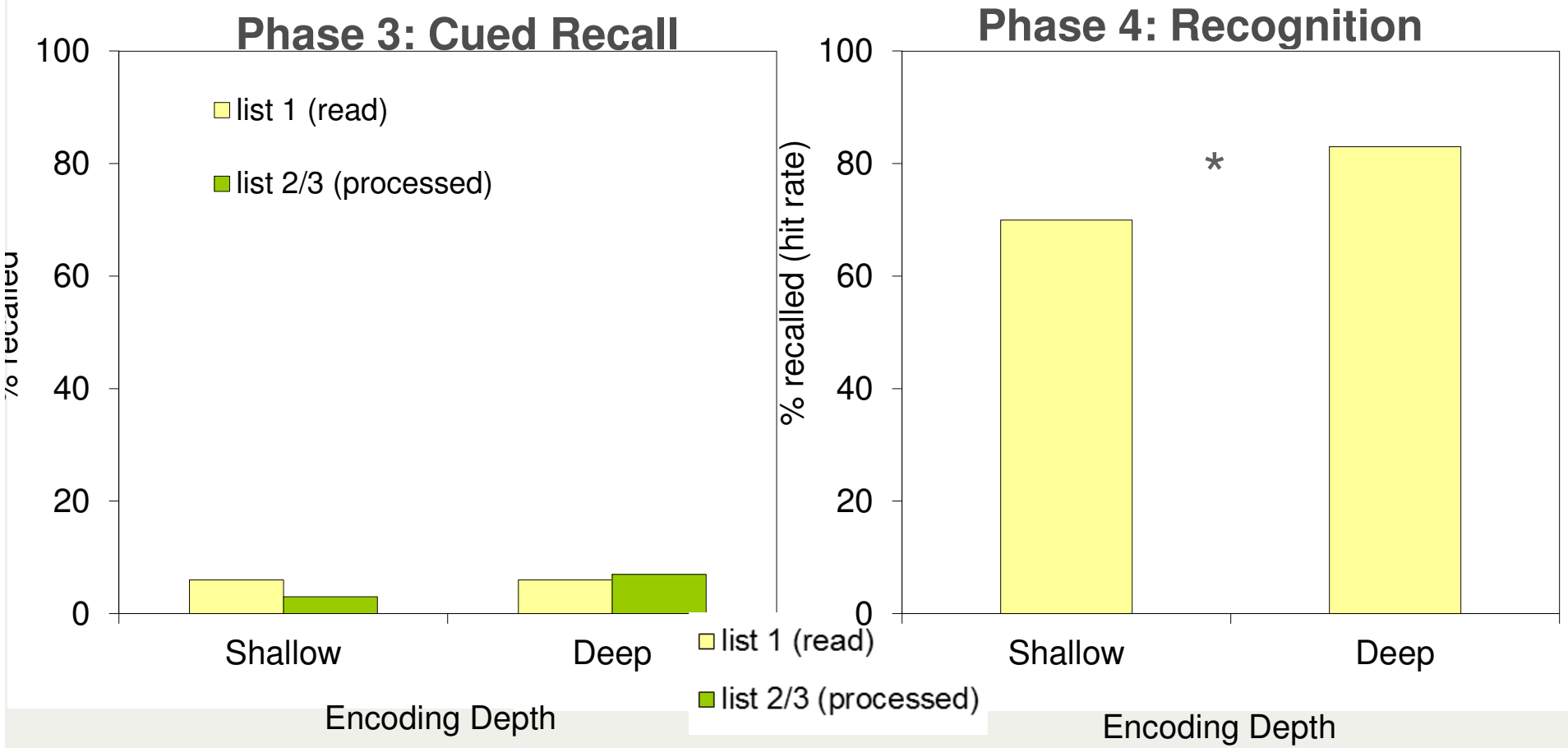
Was this word presented before (as a cue)?

salad

bee

Source-constrained retrieval

Exp. 1 Results



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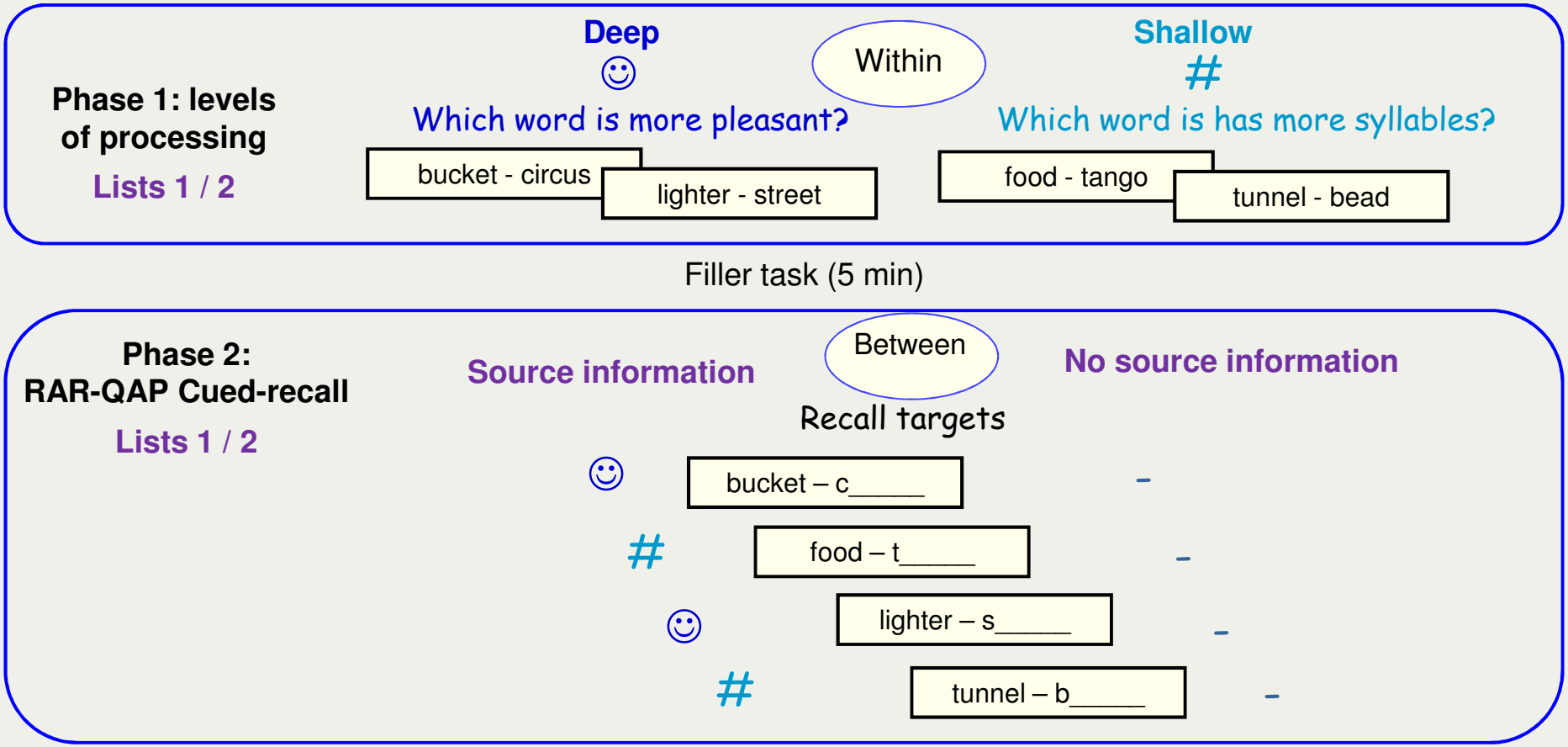
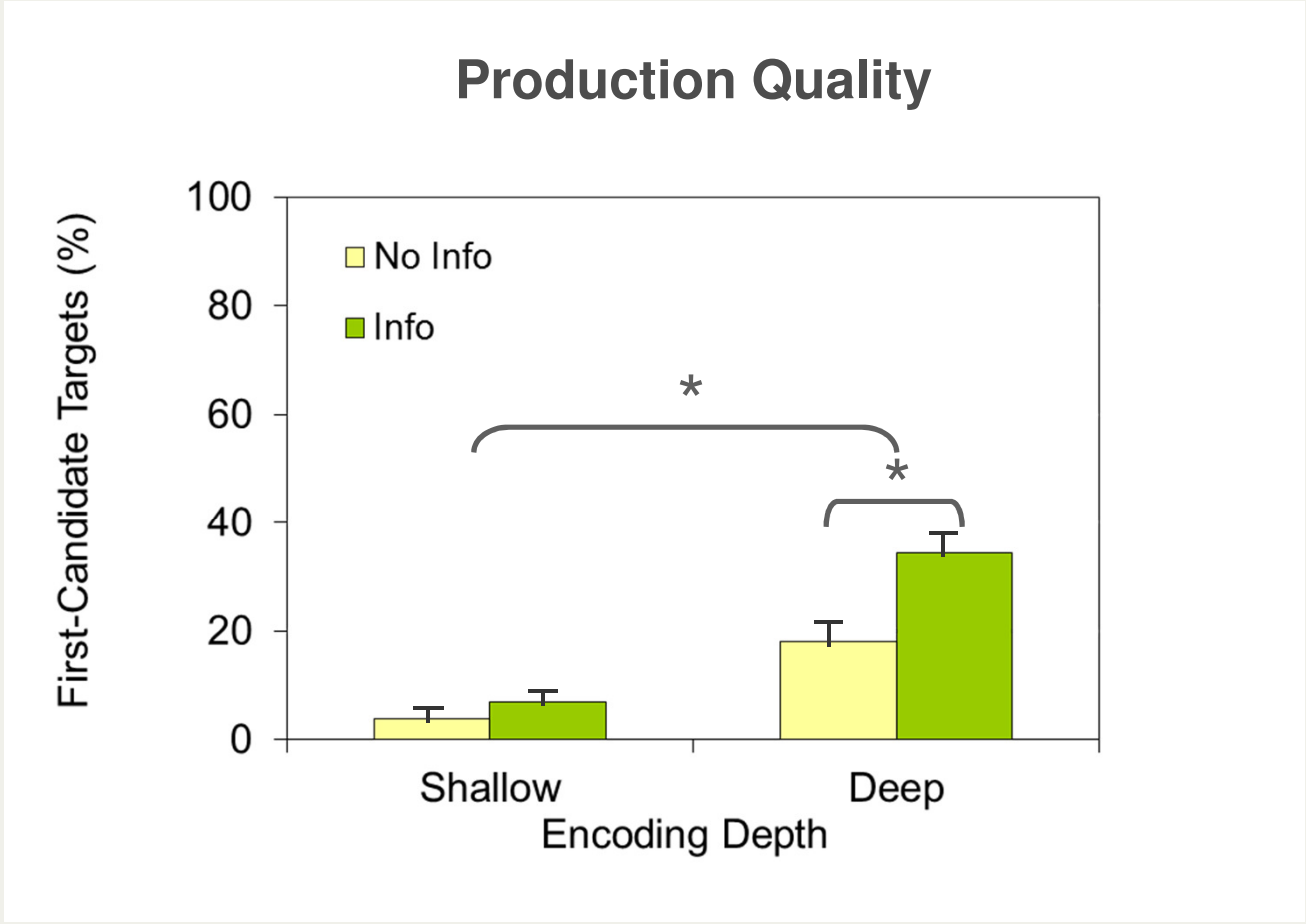
Source-constrained retrieval

Exp. 2 Method



Source-constrained retrieval

Exp. 2 Results

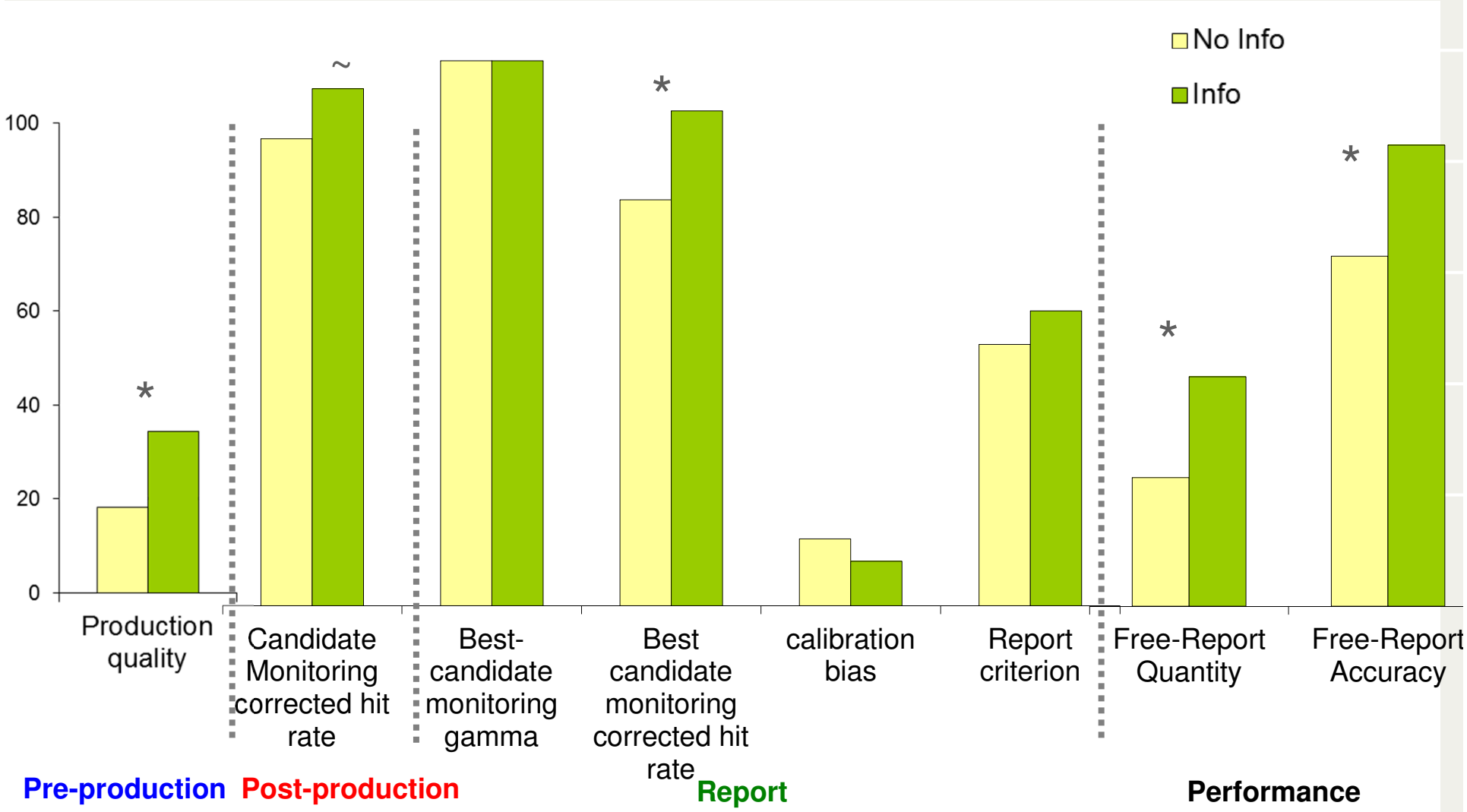


Source-constrained retrieval

Exp. 2 Results

Effects of Source Information

Deeply Encoded Pairs



Source-constrained retrieval

Questions:

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  - Front-end (*production*) ✔
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- Does source-constrained recall actually enhance recall performance? **YES**

Current Research

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- Scarce work on pre-retrieval processes

  (Higham & Tam, 2005, 2006; Jacoby, Shimizu, Velanova, & Rhodes, 2005; Jacoby, Shimizu, Daniels & Rhodes, 2005)

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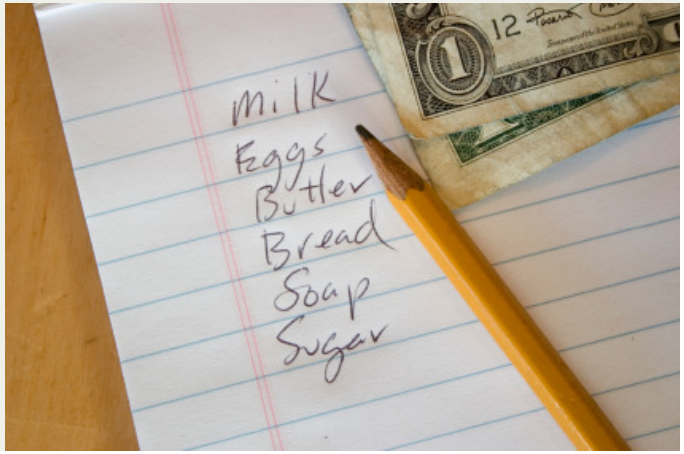
Choice of retrieval strategy

Two modes of candidate production:

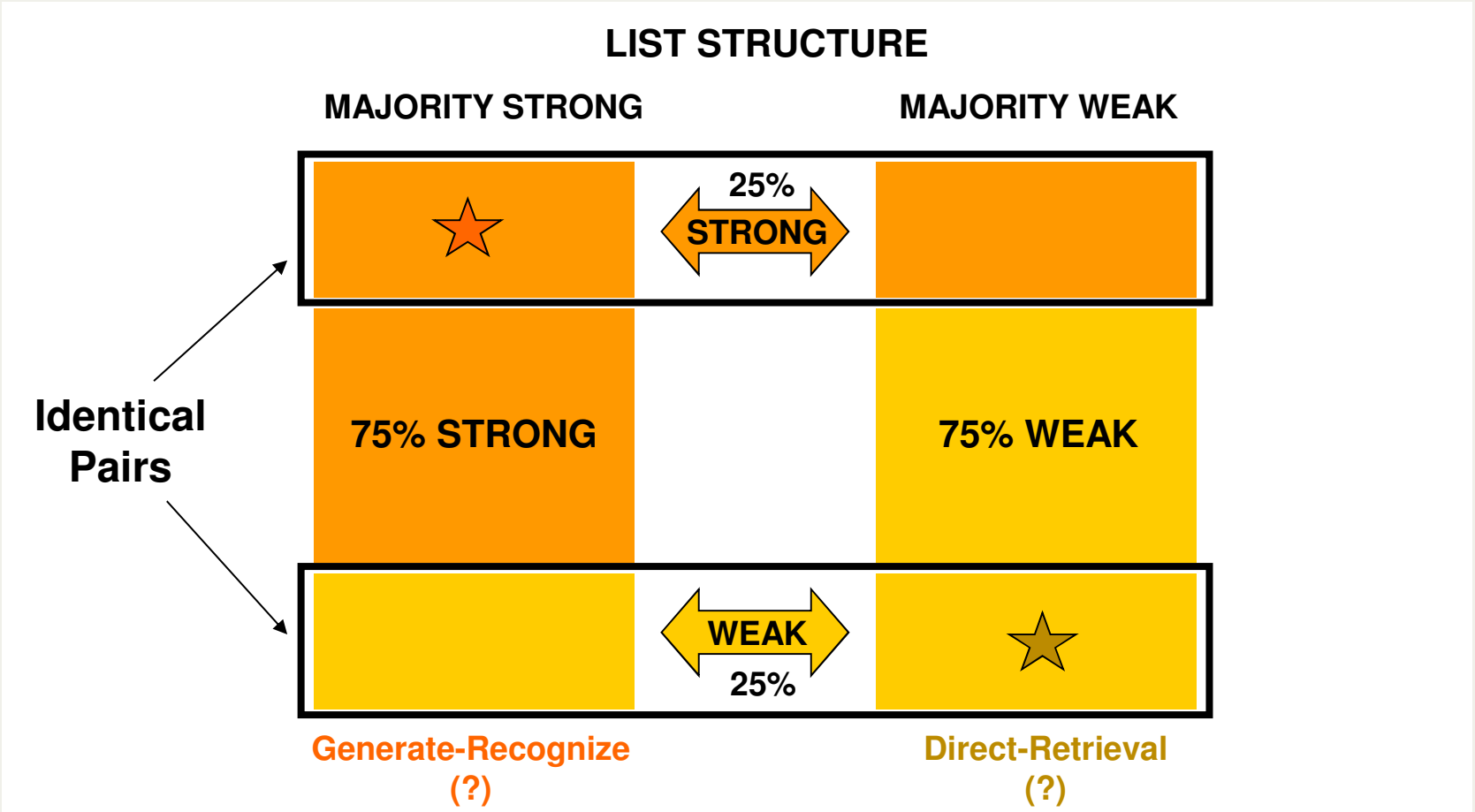
- **Direct retrieval** – "homing in" on the episodic memory representation, using relatively specific and constraining retrieval cues.
- **Generate-recognize** – "casting a wide net" using less specific episodic cues and relying more on semantic-associative cues to generate a set of candidates from which the target can be identified.

QUESTION: Are these two modes under strategic control?



Choice of retrieval strategy

- Participants studied one of 2 lists. **List structure** (majority-strong or majority weak) manipulated between participants.
- **Cued recall test** using RAR-QAP procedure.



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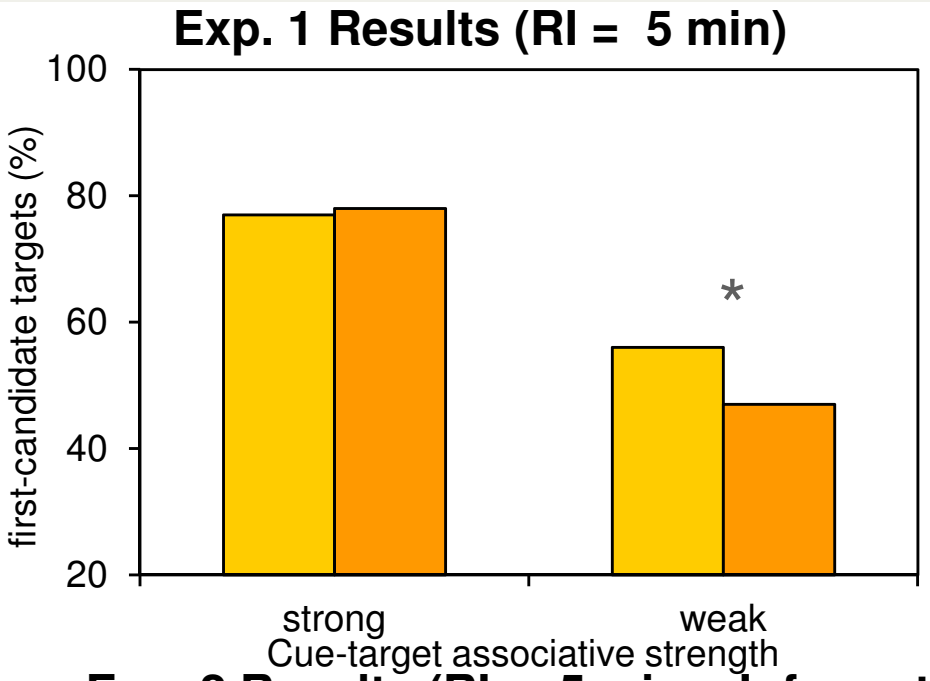

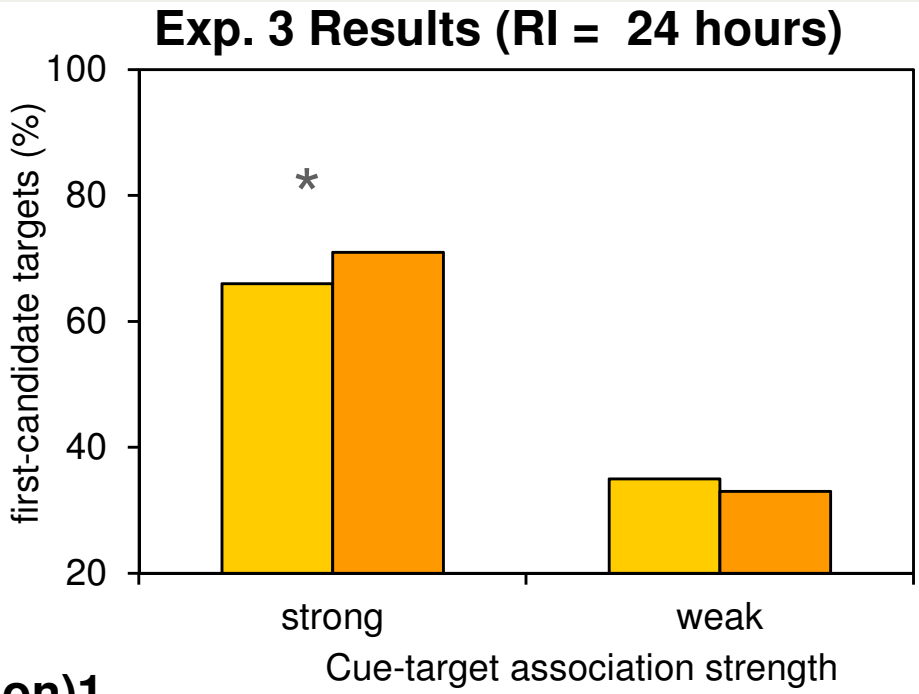

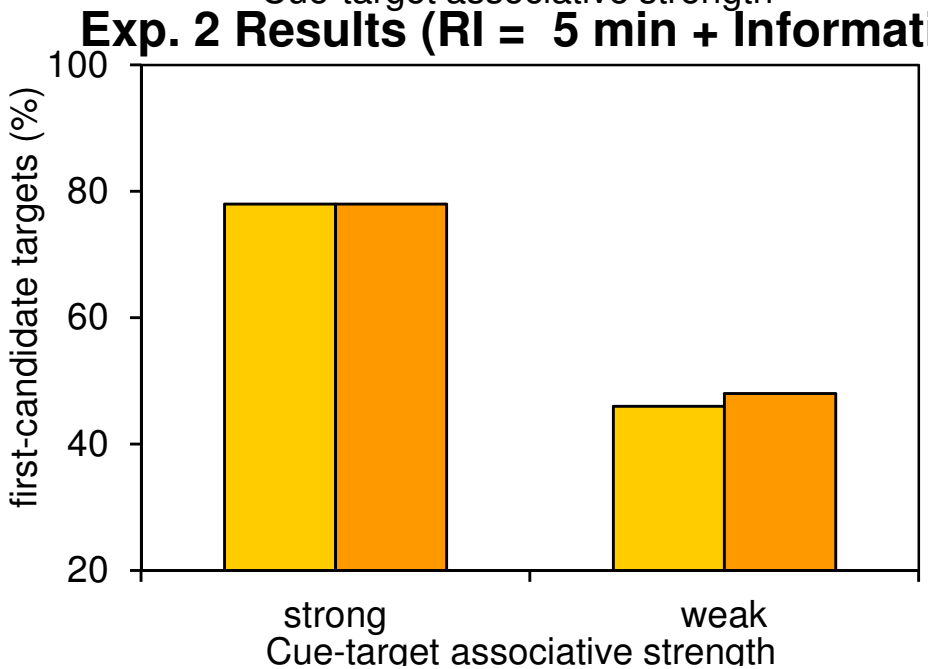

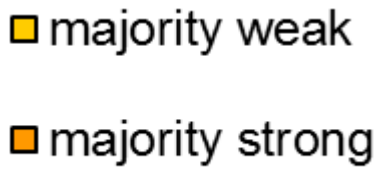

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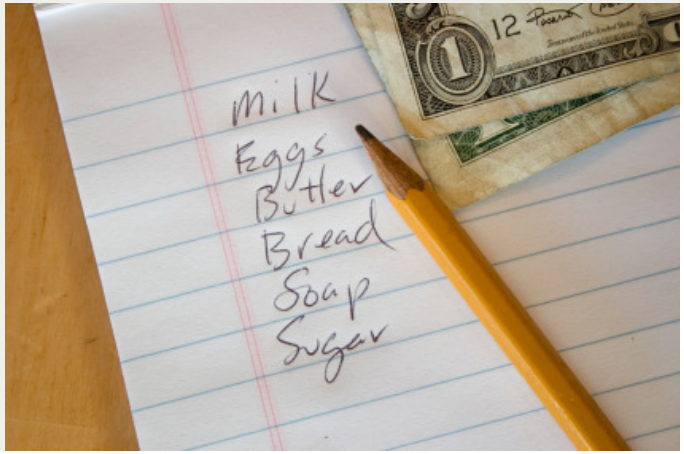

Conclusion

- Quality control in memory recall involves:
  - post-production monitoring and control processes that identify and screen out false information. *[back-end]*
  - control over the production process, so that less false information is produced in the first place. *[front-end]*

Application

- The META-RAR framework and accompanying RAR-QAP methodology are useful in guiding an integrated examination of both types of metacognitive control, and their performance consequences.
  - Cue reinstatement (Halamish & Goldsmith, in preparation)
  - Testing as a mean of studying (Thomas & McDaniels, 2012)
  - Experience with proactive interference (Wahlheim & Jacoby, 2011)

Thank you!

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