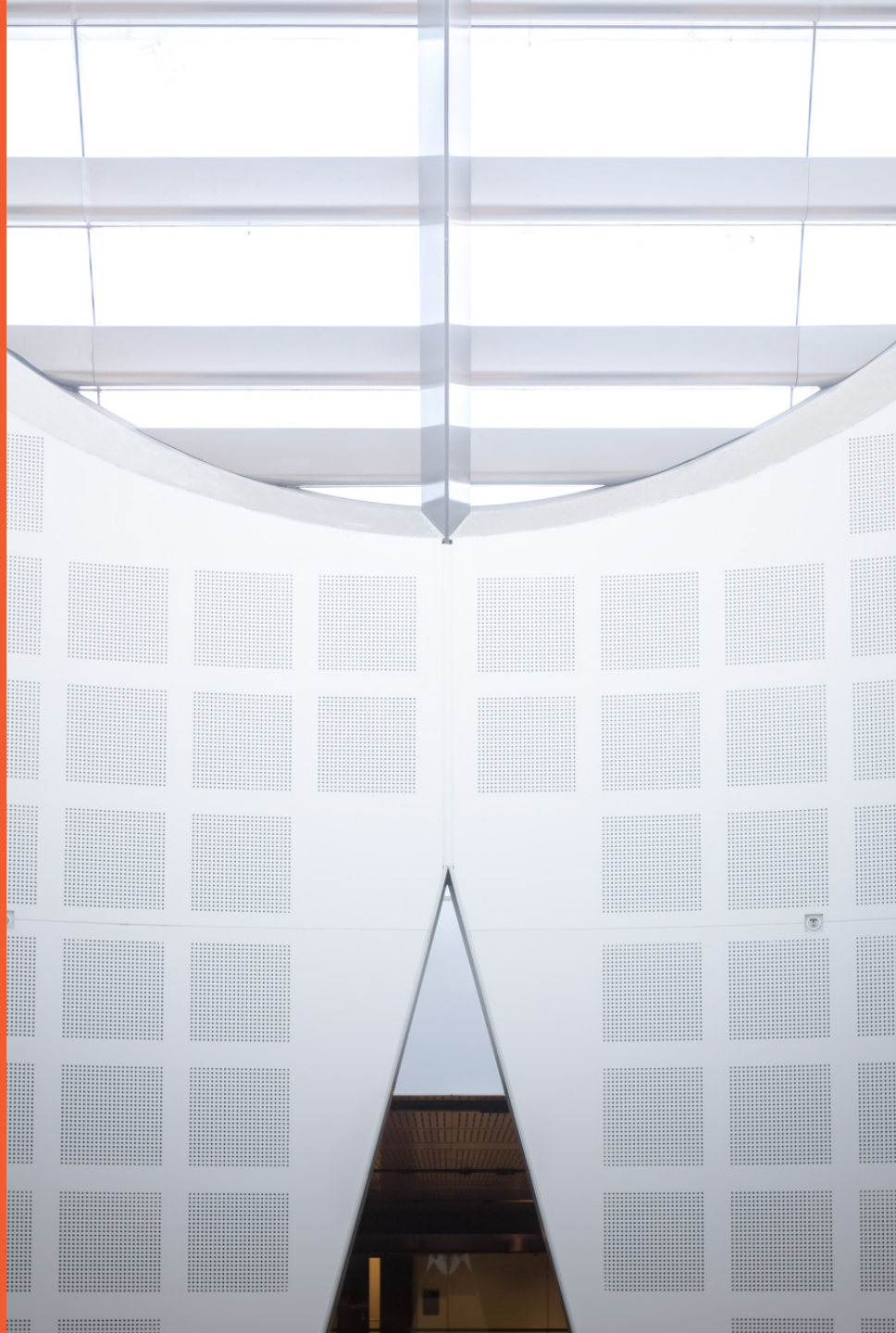
Training recognition familiarity does not improve visual working memory performance

William X.Q. Ngiam, Kimberley L. C. Khaw,

Alex O. Holcombe, Patrick T. Goodbourn

THE UNIVERSITY OF SYDNEY



Visual working memory

Visual working memory is the system responsible for ”online” maintenance of visual information

The amount of visual information that can be maintained online is limited

Visual working memory has a limited capacity

The amount of visual information that can be maintained online is limited

- Limited to approximately 3-4 items' worth of information

- Linked to cognition:
  - Strongly correlated to measures of cognitive ability and scholastic achievement (Cowan et al., 2005, Fukuda, Vogel, Mayr and Awh, 2010)

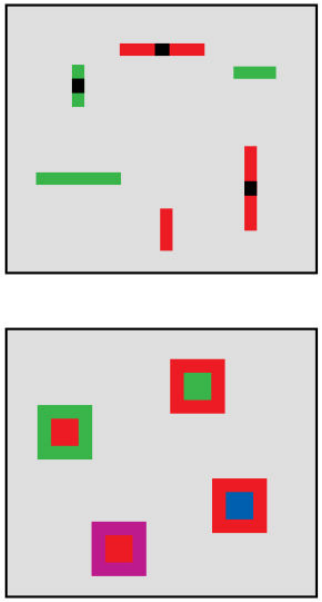
What influences visual working memory performance?

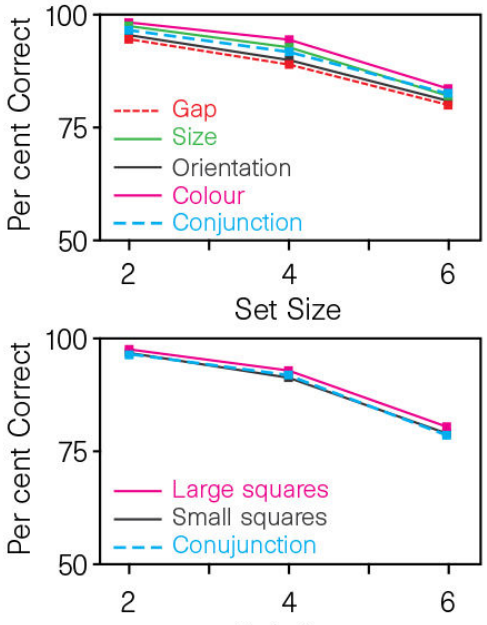
Do we store the same amount of objects no matter what the object is?

The influence of stimulus complexity

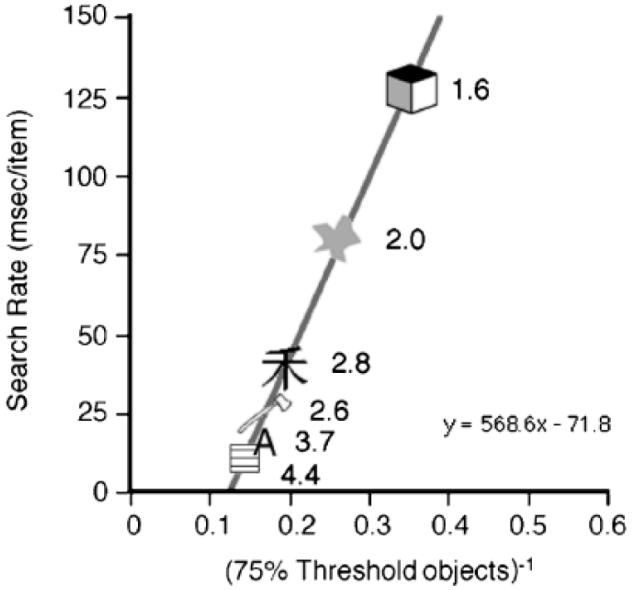
Different models of visual working memory

– Slots model (Luck and Vogel, 1997)

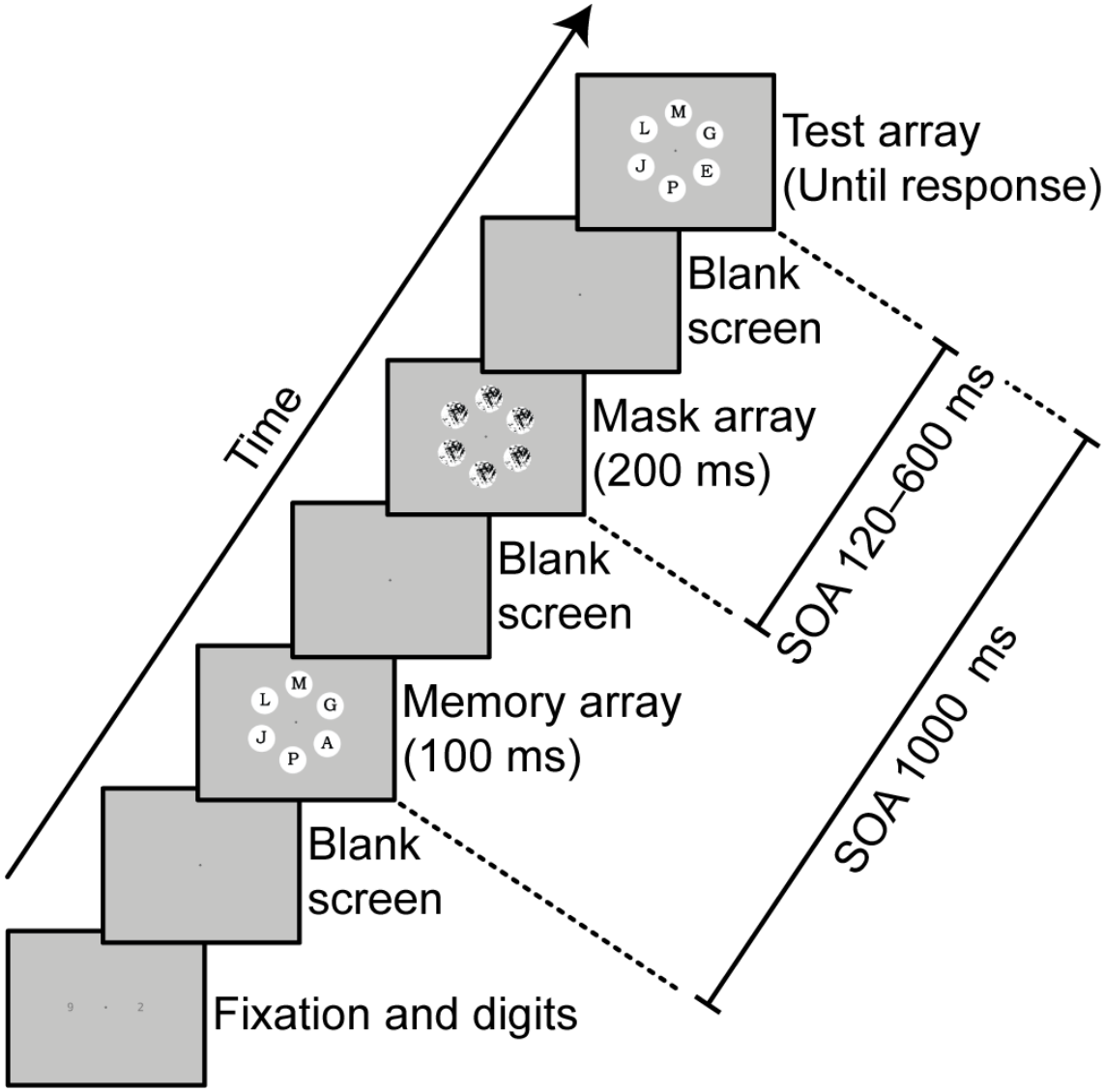




– Resources model (Alvarez and Cavanagh, 2004)

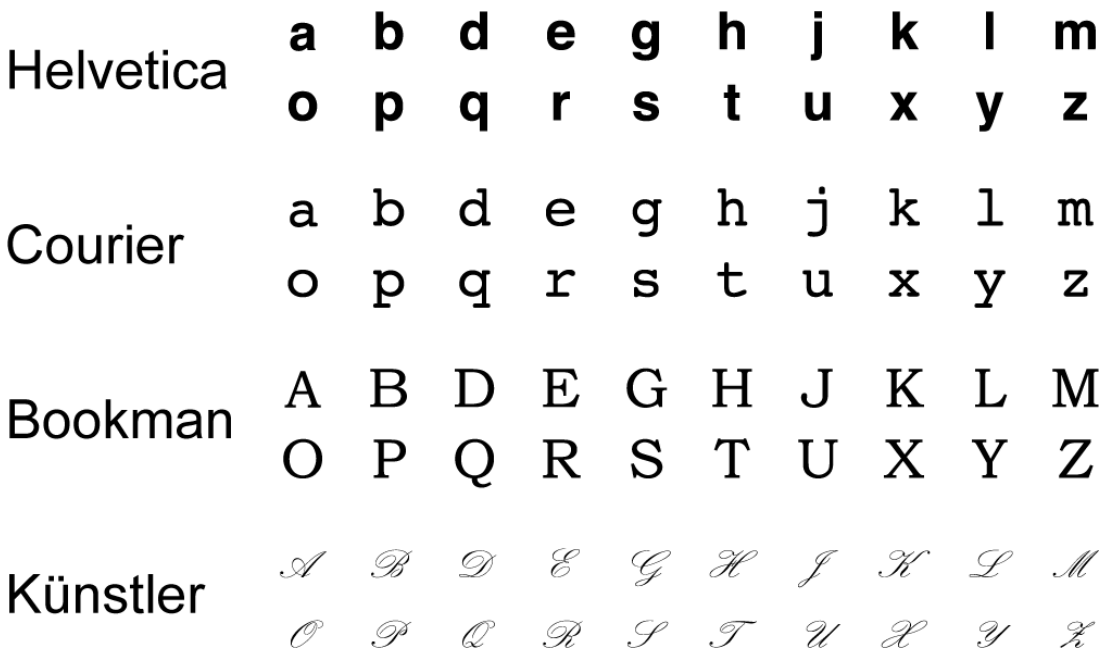


Experimental Method



Stimulus complexity

Our previous research found that stimulus complexity had no influence on VWM performance



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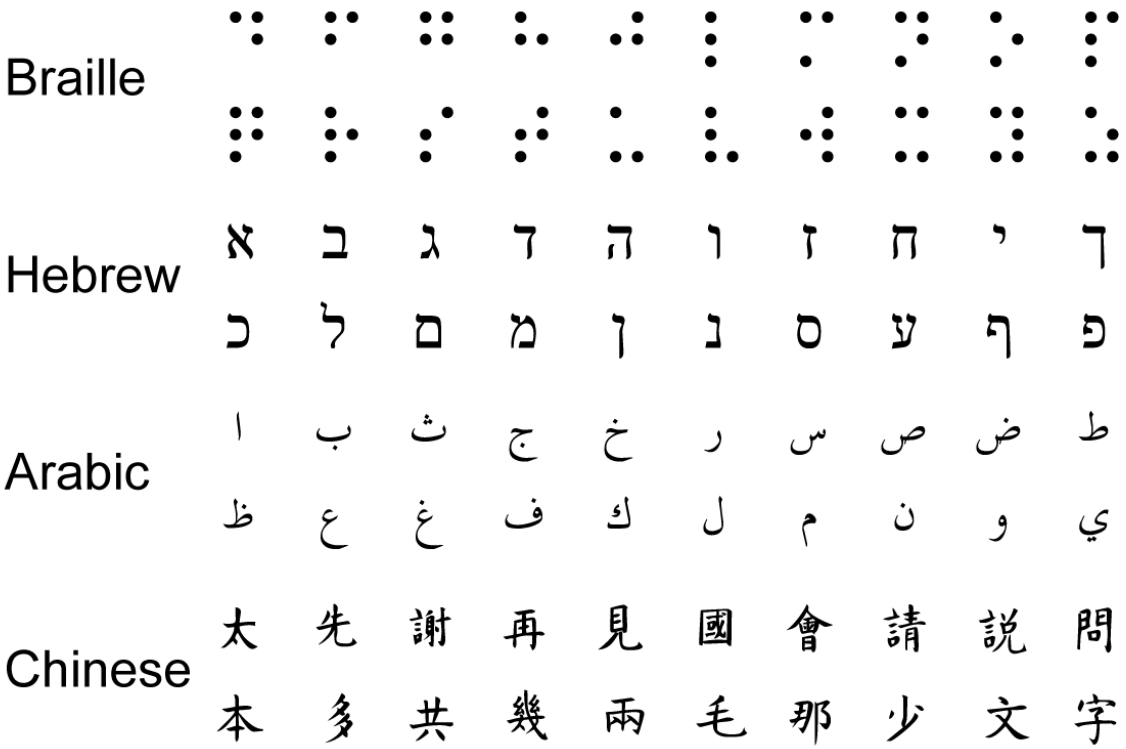
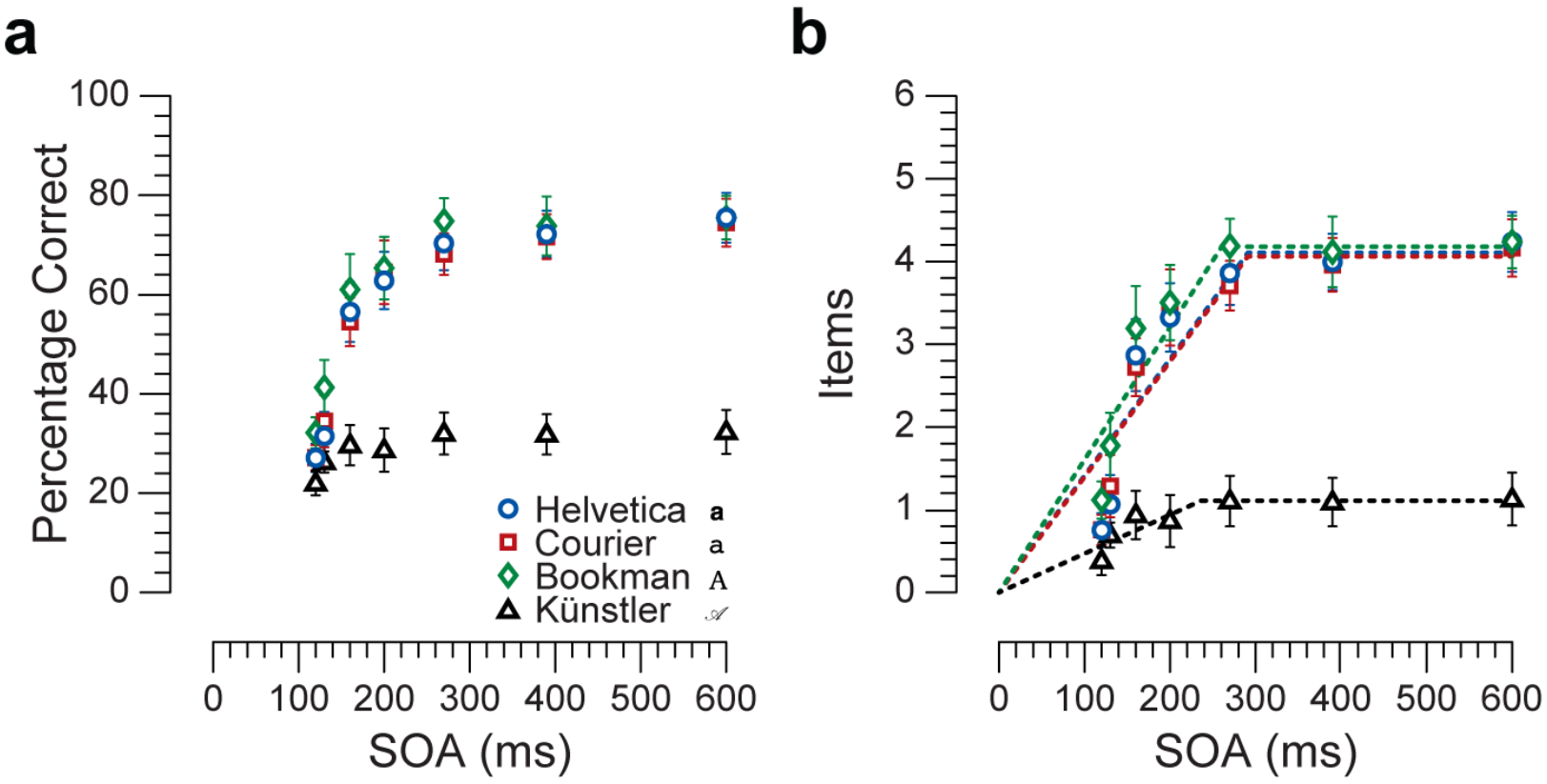
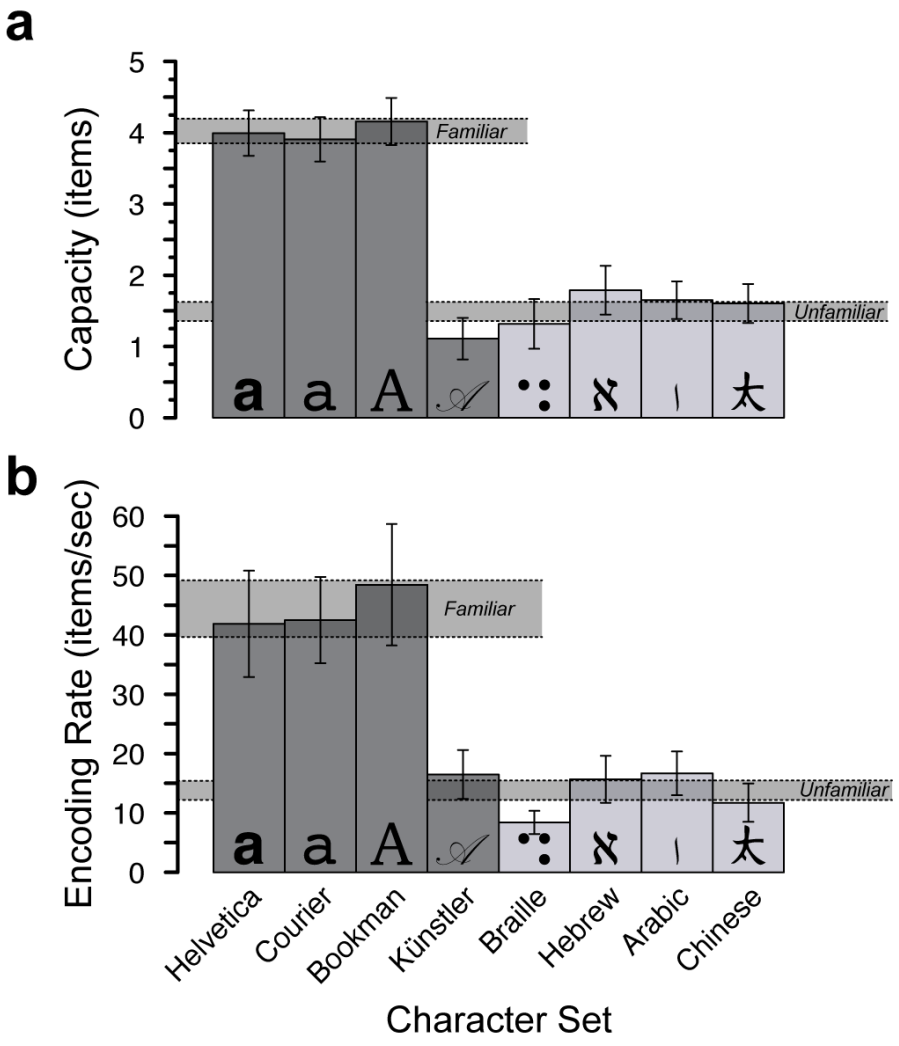



a
Percentage Correct
100
80
60
40
20
0
Helvetica a
Courier a
Bookman A
Künstler
0 100 200 300 400 500 600
SOA (ms)
b
Items
6
5
4
3
2
1
0
0 100 200 300 400 500 600
SOA (ms)

An effect of familiarity but not complexity

There appears to be an overall effect of familiarity but not complexity

- Capacity and encoding rate **higher** for English letters than unfamiliar letters
- But stimuli are mismatched on complexity



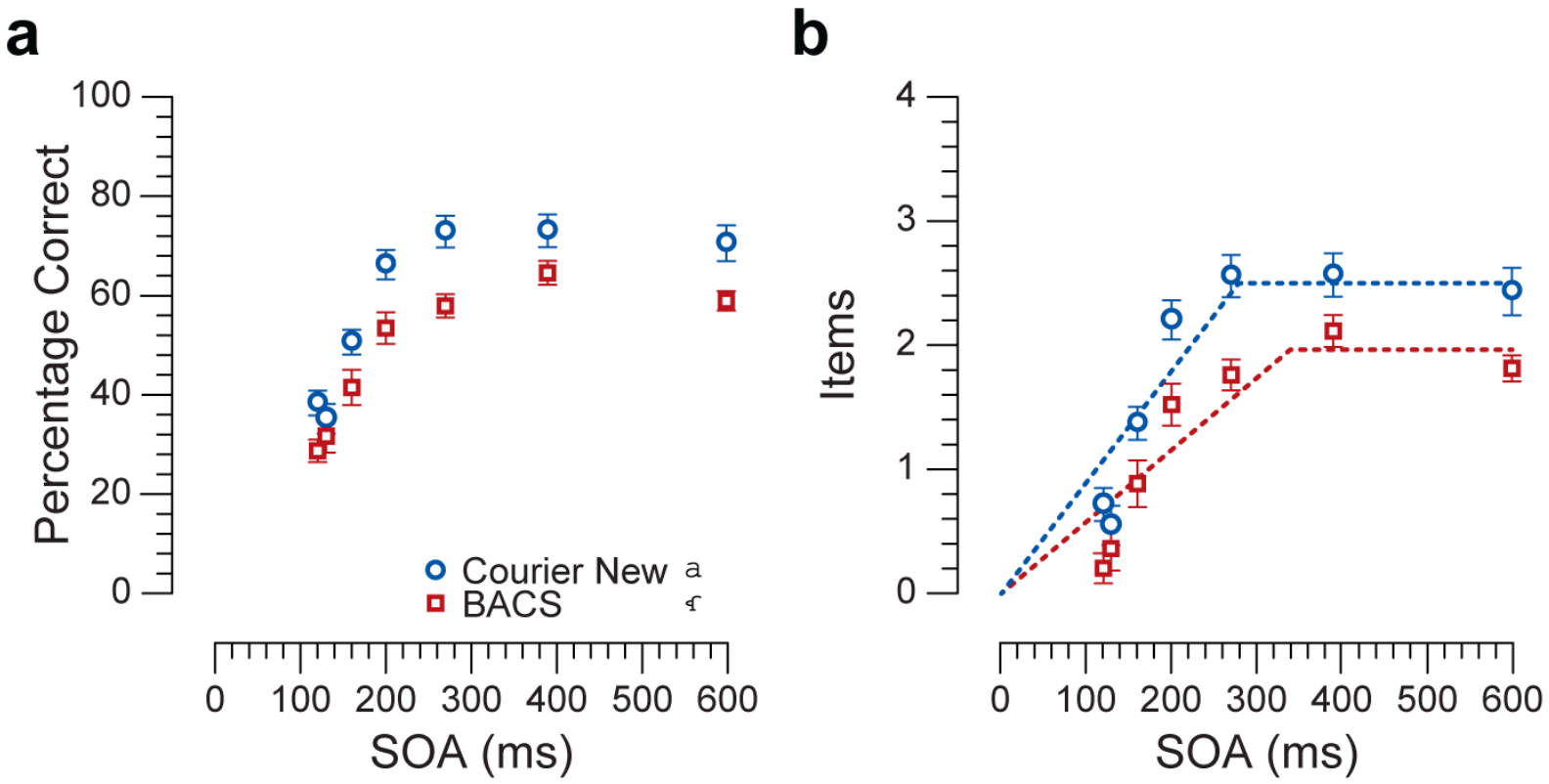
The effect of familiarity: A novel approach

- Isolating the effect of familiarity, controlling for stimulus complexity

The Brussels Artificial Character Set

- An artificial character set that matches the number of strokes, junctions and terminations of each English letter

Results


a
Percentage Correct
100
80
60
40
20
0
Courier New
BACS
0
100
200
300
400
500
600
SOA (ms)
b
Items
4
3
2
1
0
0
100
200
300
400
500
600
SOA (ms)

What creates this gap?

- Does being able to recognise the letters improve visual working memory performance?

Training VWM

Previous findings around training and visual working memory has been mixed

Psychological Research
DOI 10.1007/s00426-015-0648-y

ORIGINAL ARTICLE

Working memory training improves visual short-term memory capacity

Hillary Schwarb · Jayde Nail · Eric H. Schumacher

Memory & Cognition
2004, 32 (8), 1326-1332

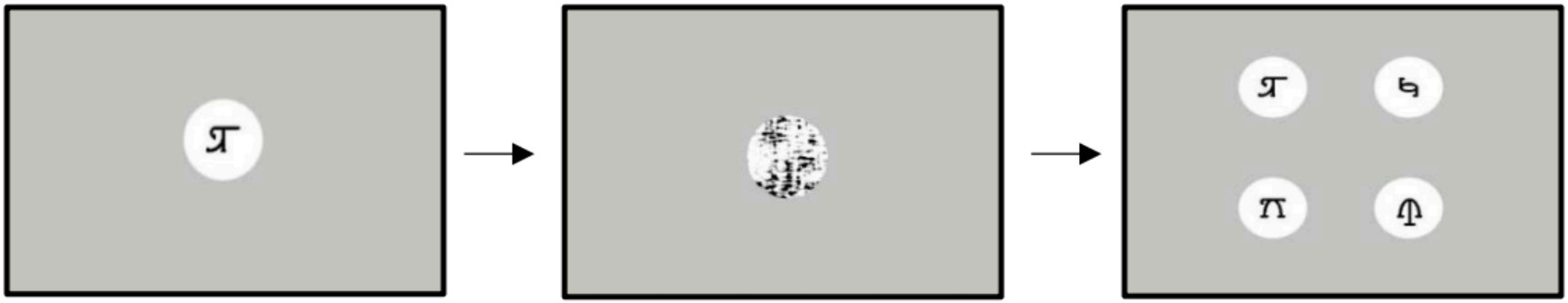
Visual short-term memory is not improved by training

INGRID R. OLSON
University of Pennsylvania, Philadelphia, Pennsylvania
and
YUHONG JIANG
Harvard University, Cambridge, Massachusetts

Training Improves the Capacity of Visual Working Memory When It Is Adaptive, Individualized, and Targeted

Eunsam Shin, Hunjae Lee, Sang-Ah Yoo, Sang Chul Chong

Training recognition familiarity



Presentation of one BACS letter

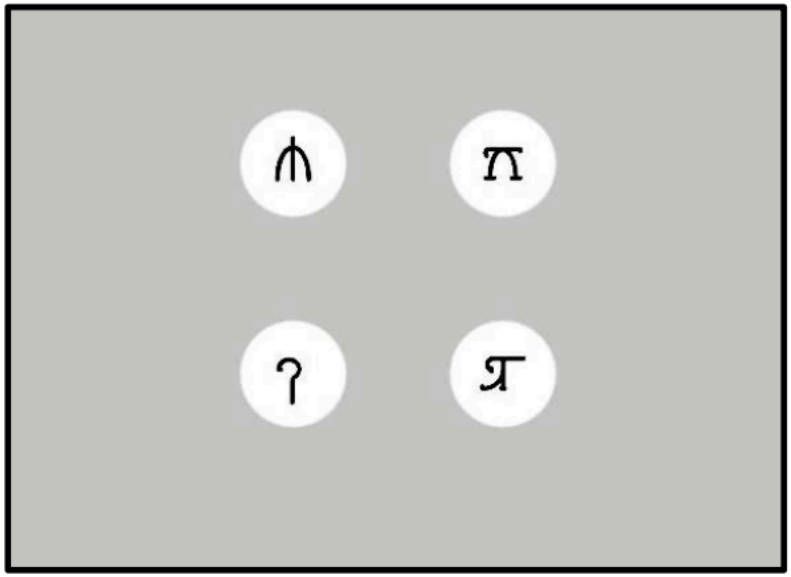
(200ms)

Mask array

(200ms)

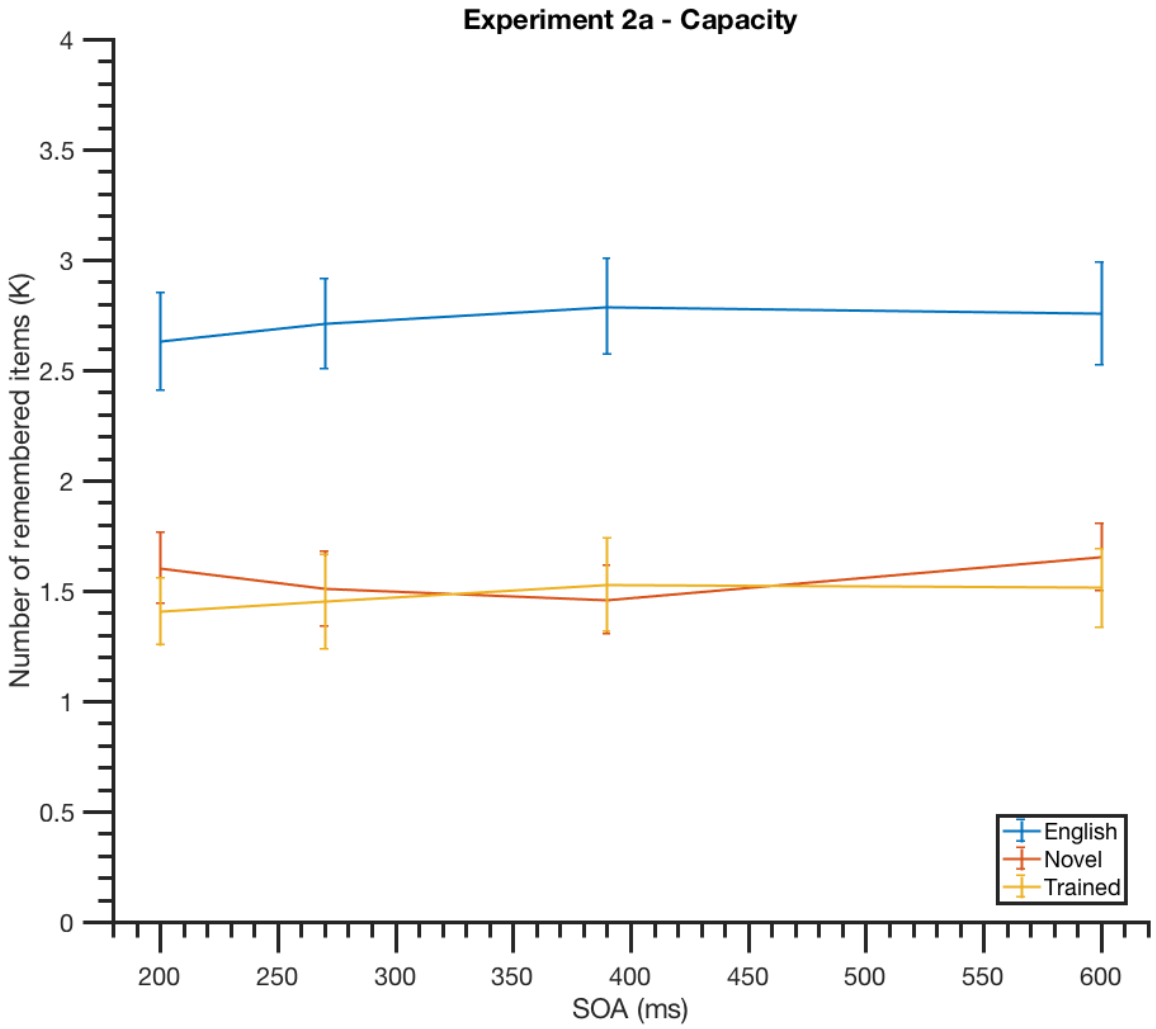
Recognition array

Testing recognition

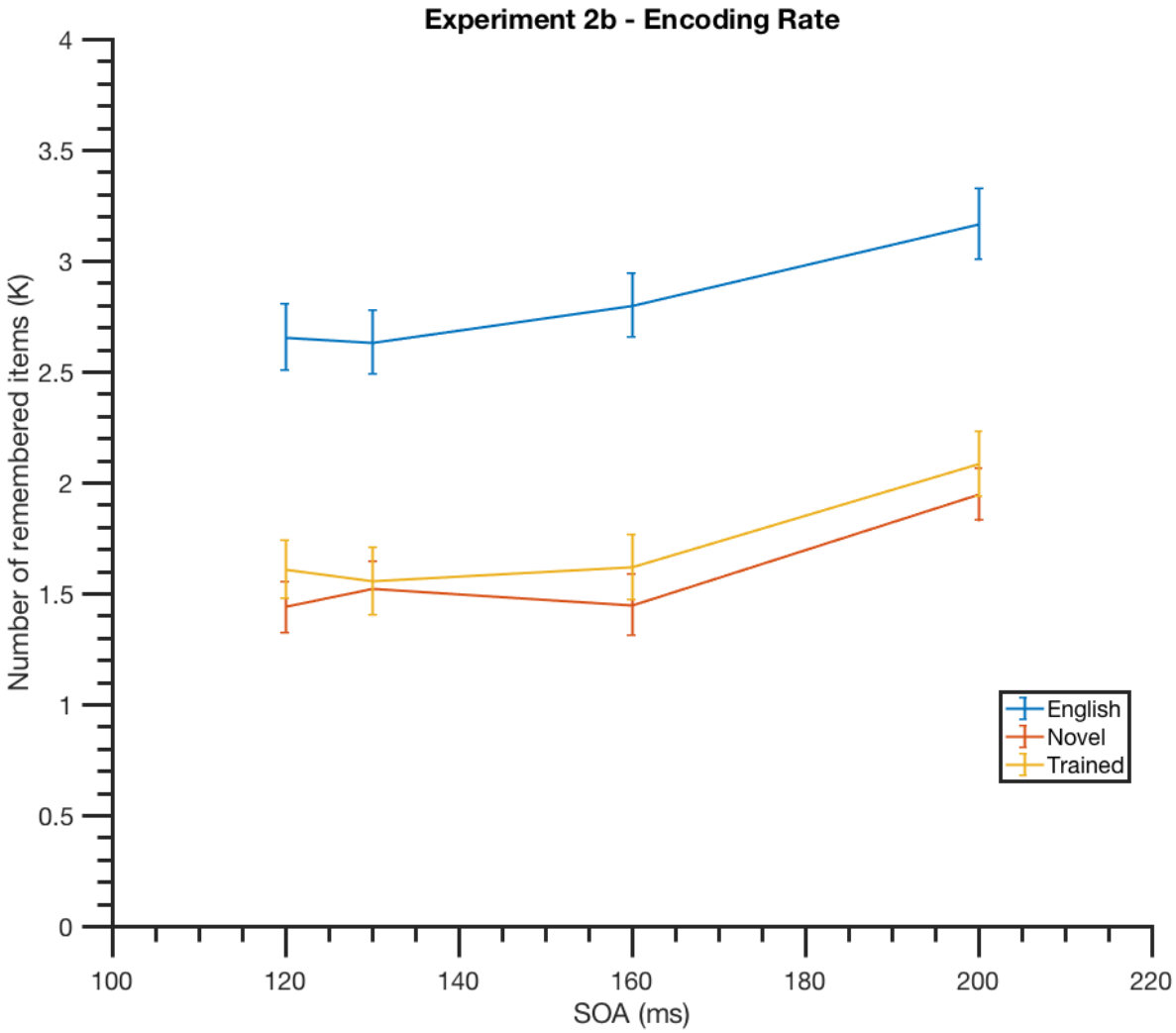


- Overall recognition accuracy for the 4AFC immediate recognition task was also high (M = .98, SD = .03)

Capacity


Experiment 2a - Capacity
Number of remembered items (K)
SOA (ms)
0
0.5
1
1.5
2
2.5
3
3.5
4
200
250
300
350
400
450
500
550
600
English
Novel
Trained

Encoding Rate



Overall conclusions

- Stimulus complexity: No effect on visual working memory
- Overlearned stimuli: Higher encoding rate and VWM capacity
- Learning to recognise a novel set of stimuli: No effect

- Improved ability to discriminate between letters?
- Faster encoding pathways for familiar stimuli?

Thank you for listening

Slides will be uploaded to

williamngiam.github.io

Kimberley Khaw

Alex Holcombe

Patrick Goodbourn

@will_ngiam

@ceptional

@ptgoodbourn

william.ngiam@sydney.edu.au

alex.holcombe@sydney.edu.au

p.goodbourn@unimelb.edu.au