Is synaesthesia a female trait?

Validating the synaesthesia battery with novel prevalence and sex-ratio data

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Overview

- Aim 1: prevalence and sex ratio?
- Aim 2: methodological question

- How was synaesthesia evaluated previously?
  - Consistency is key

- What does synesthete.org do?

- What we did

- What does it mean?

Consistency

- Why is it important?
  - Provides objective measure of subjective experience

- Good way to test for synaesthesia
  - Of every 5 self-reported synaesthetes, only 1 genuine

(Simner et al., 2006)

  - Cheap and easy

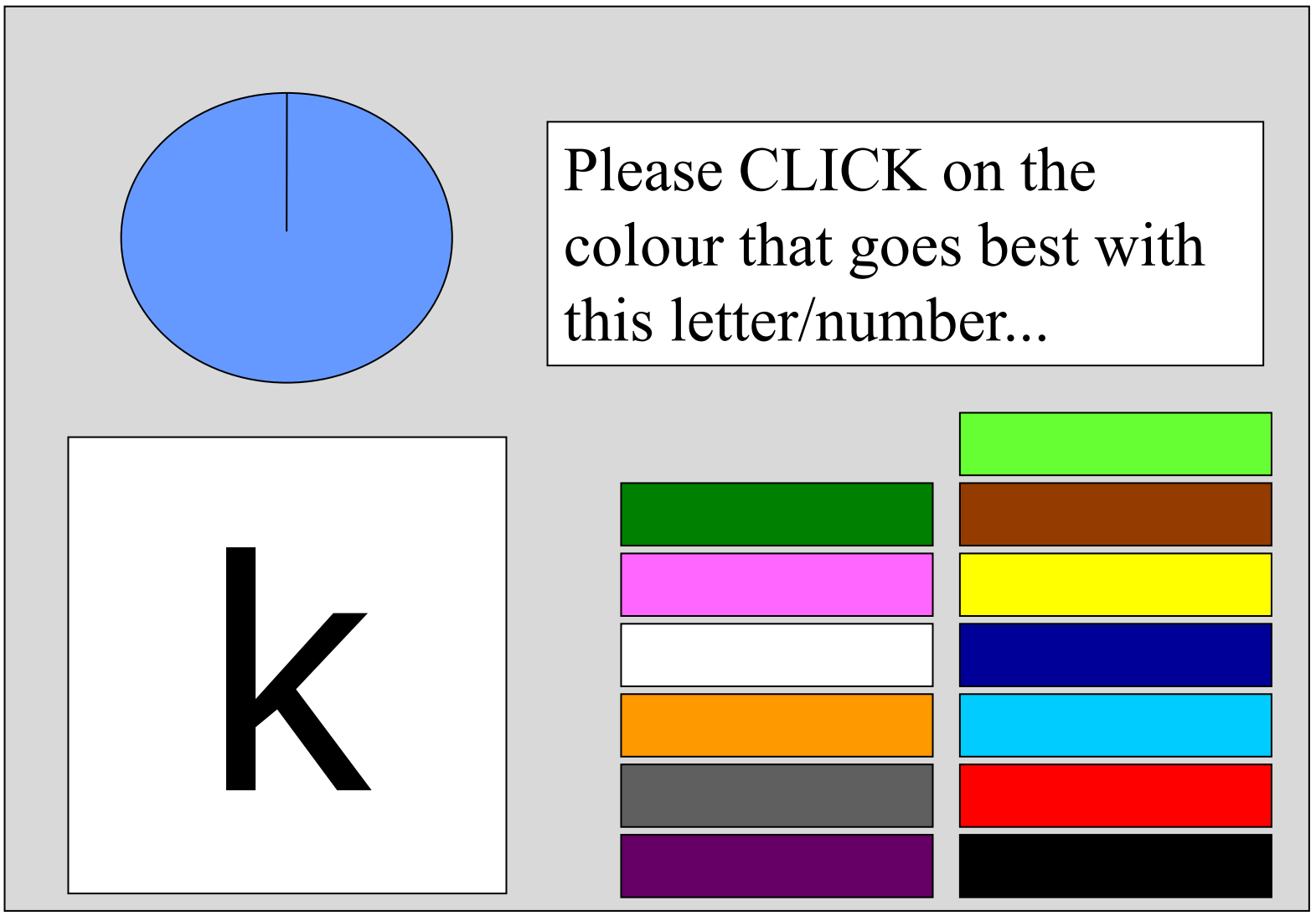
What happened before?

- Multiple test sessions
  - (Baron-Cohen et al., 1996, Asher et al., 2006, Simner et al., 2006)

- Consistency assessed in variety of ways:
  - verbal, visual, questionnaire

- Disadvantages:
  - No standard methodology
  - Limited set of colour stimuli
  - Hard to compare data across groups

Limited colour palette

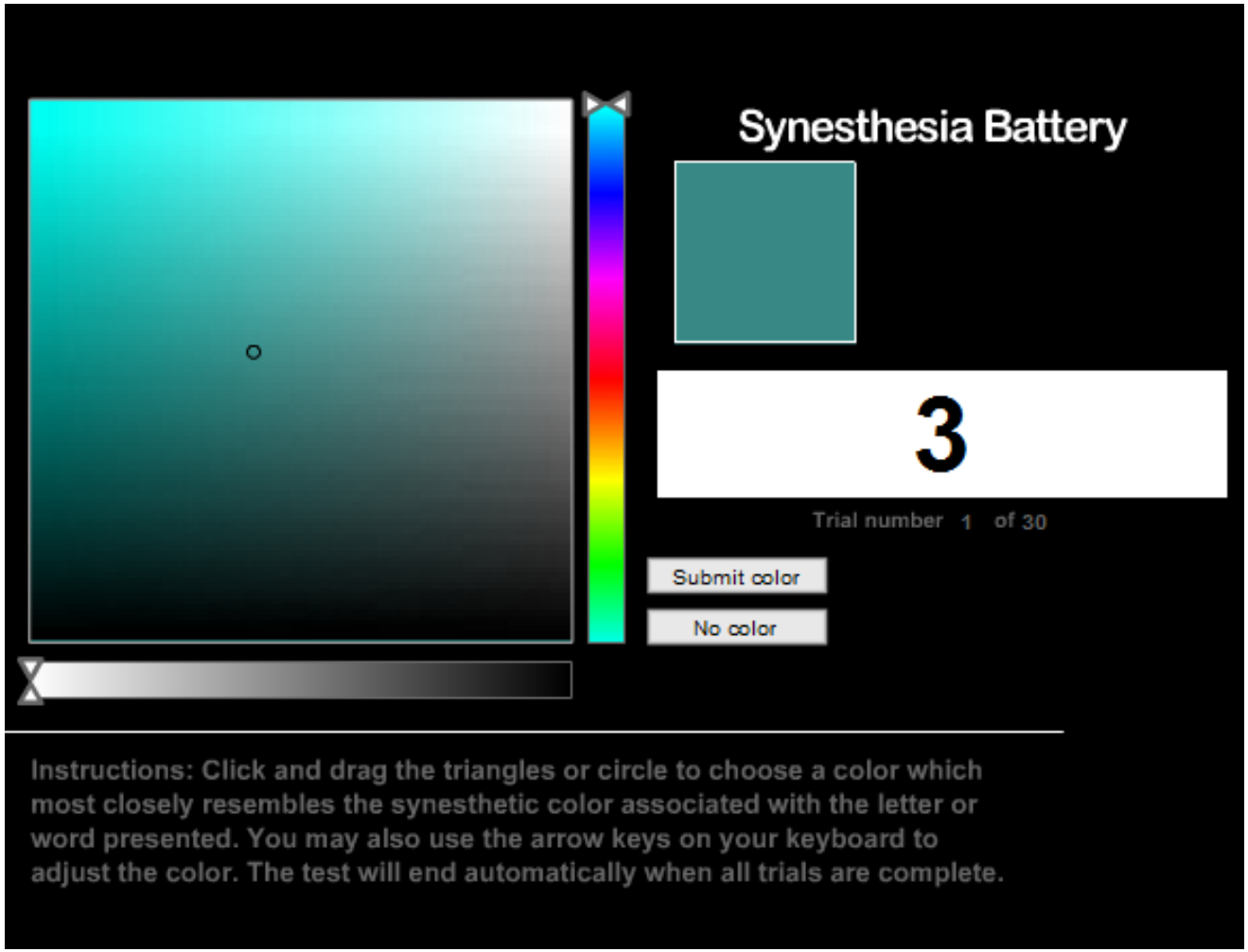


Simner et al., 2006, Simner et al., 2009

www.synesthete.org

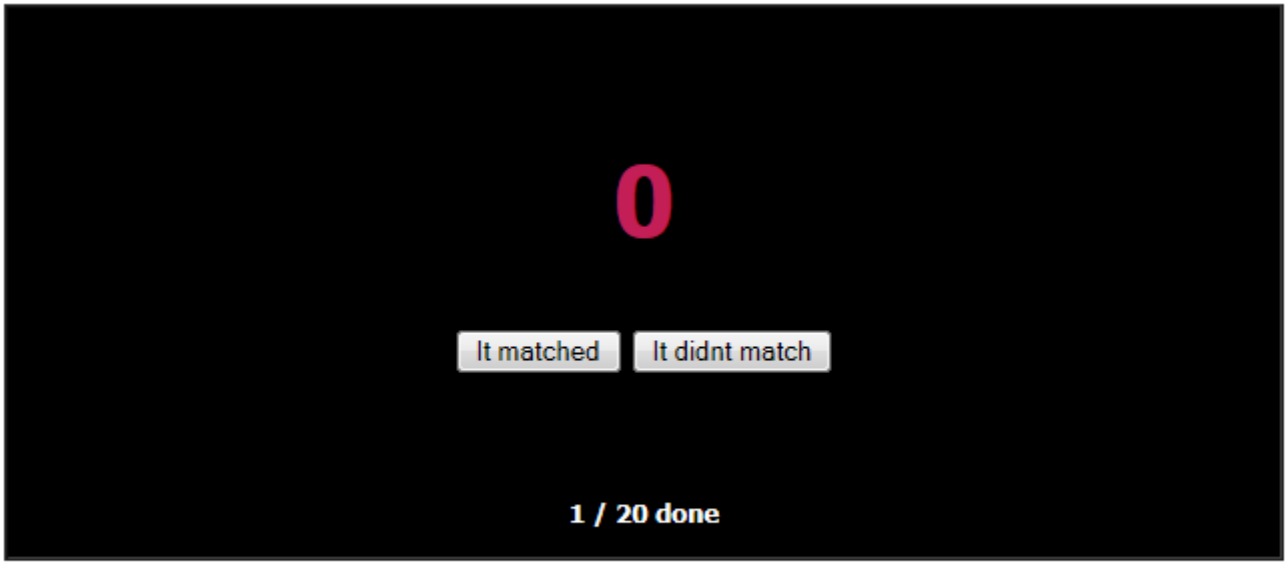
- Online testing battery
- Assess genuineness in a single test session
  - Consistency test
  - Speed-congruency test
- Quantitative measure of consistency
- Provides a widely accessible, standard test

Grapheme-colour consistency test



Eagleman et al. 2007

Speed-congruency test



Eagleman et al. 2007

How it works

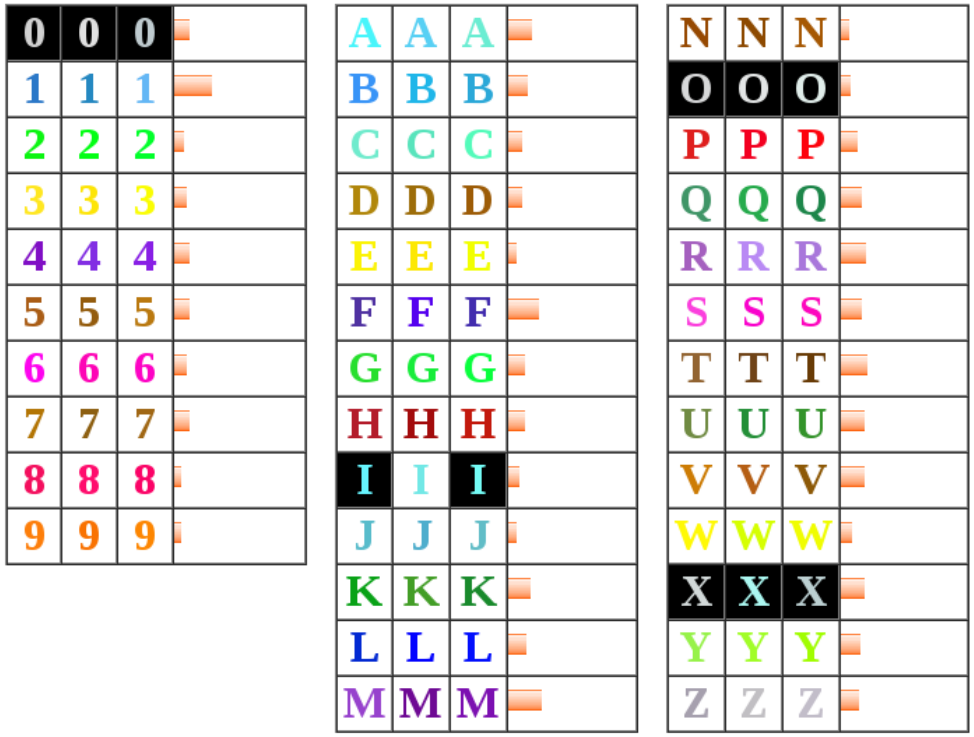
- each grapheme 3x in random order

- Calculates RGB value for each grapheme

- Consistency score calculated by taking average variation across all selected graphemes

Results

Grapheme Color Picker Test



Score: 0.65

In this battery, a score below 1.0 is ranked as synesthetic. Non-synethetes asked to use memory or free association typically score in the range of a 2.0. A perfect score of 0.0 would mean that there was no difference in the colors selected on each successive presentation of the same letter. For more information on the Synesthesia Battery and the details of how it is scored, please refer to *David M. Eagleman, Arielle D. Kagan, Stephanie S. Nelson, Deepak Sagaram, Anand K. Sarma. A standardized test battery for the study of Synesthesia. Journal of Neuroscience Methods, 2007 Jan 15;159(1):139-145.* [Click here for pdf] and or email us.

Speed-Congruency Test

Accuracy	**98.61 %**
Mean Reaction Time	**1.557 seconds +/- 0.406**

Eagleman et al. 2007

Our data

- Large-scale recruitment: n = 1527, F= 827, M= 700

- Randomly selected sample
    - Self referral bias removed

Prevalence

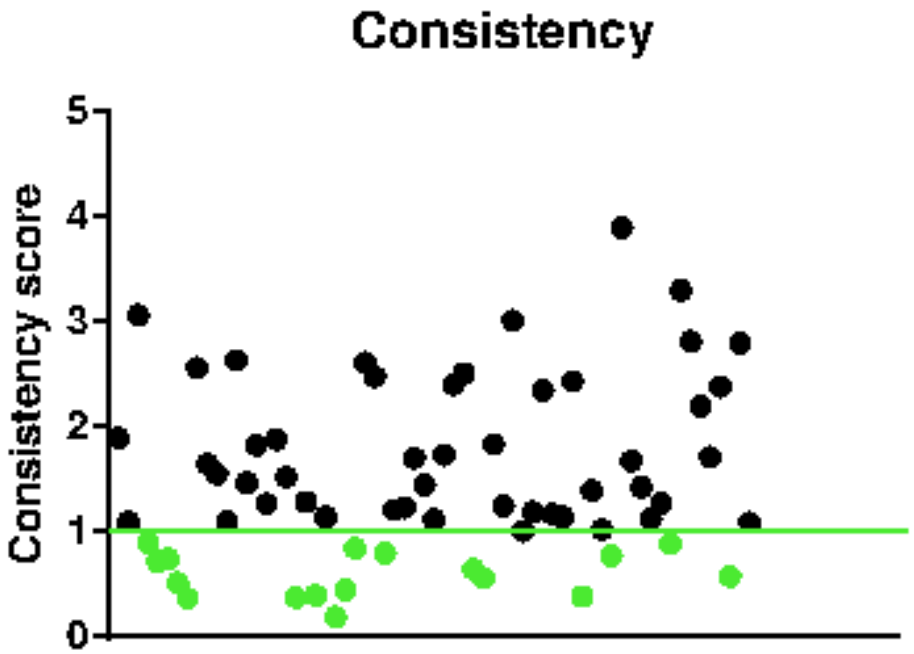
N = 1527

72 participants reported having grapheme-colour synaesthesia and completed the battery

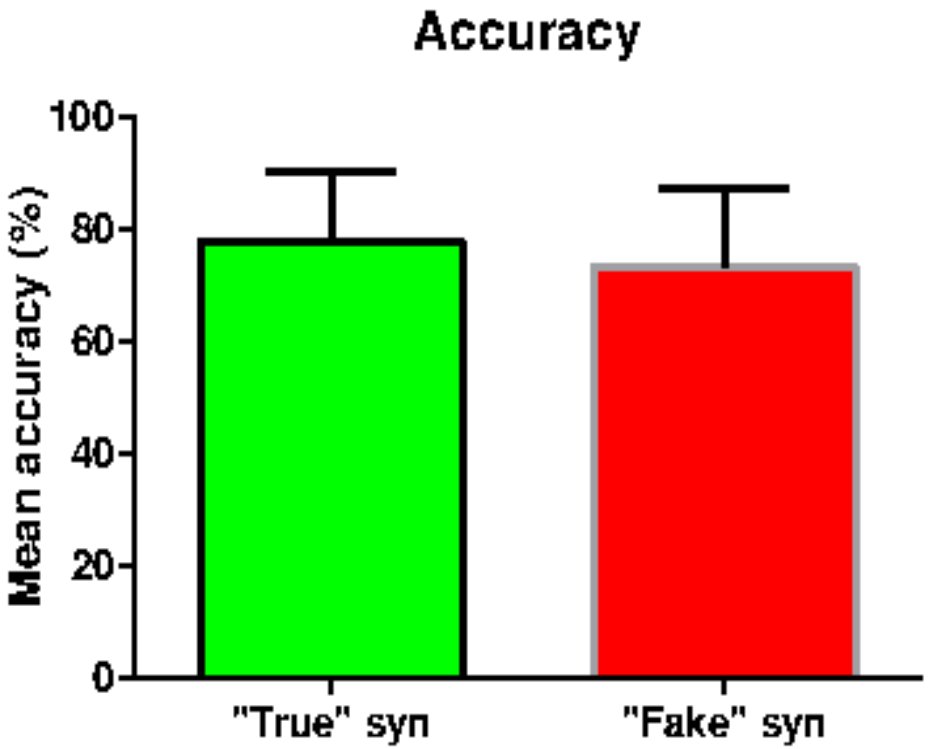
Prevalence

N = 1527

17 participants met synesthete.org's threshold of <1 consistency score

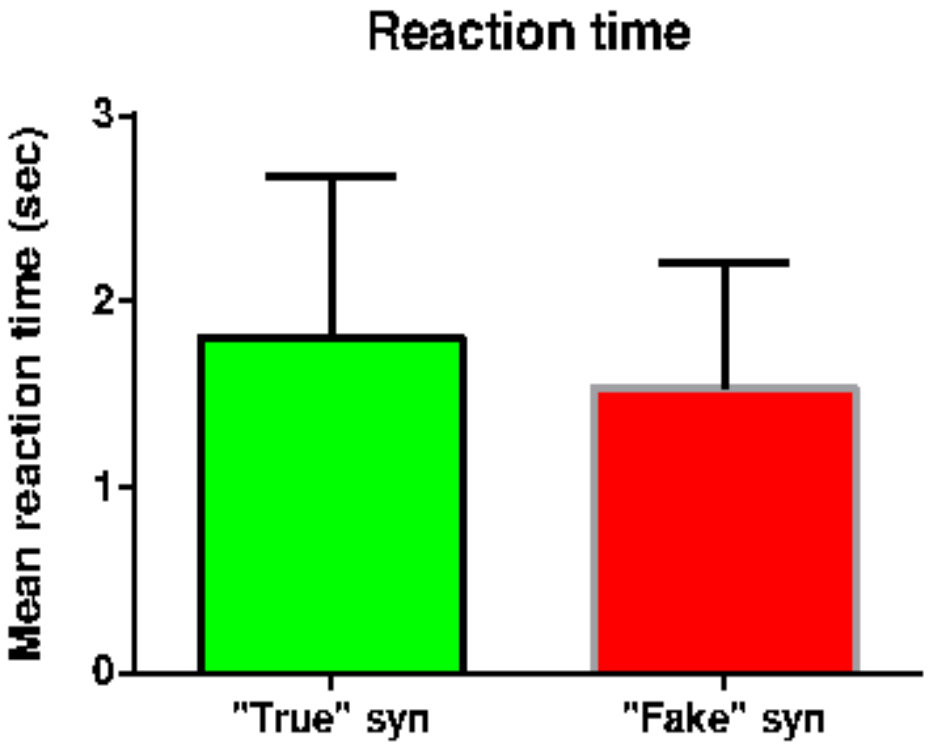


Speed-congruency test



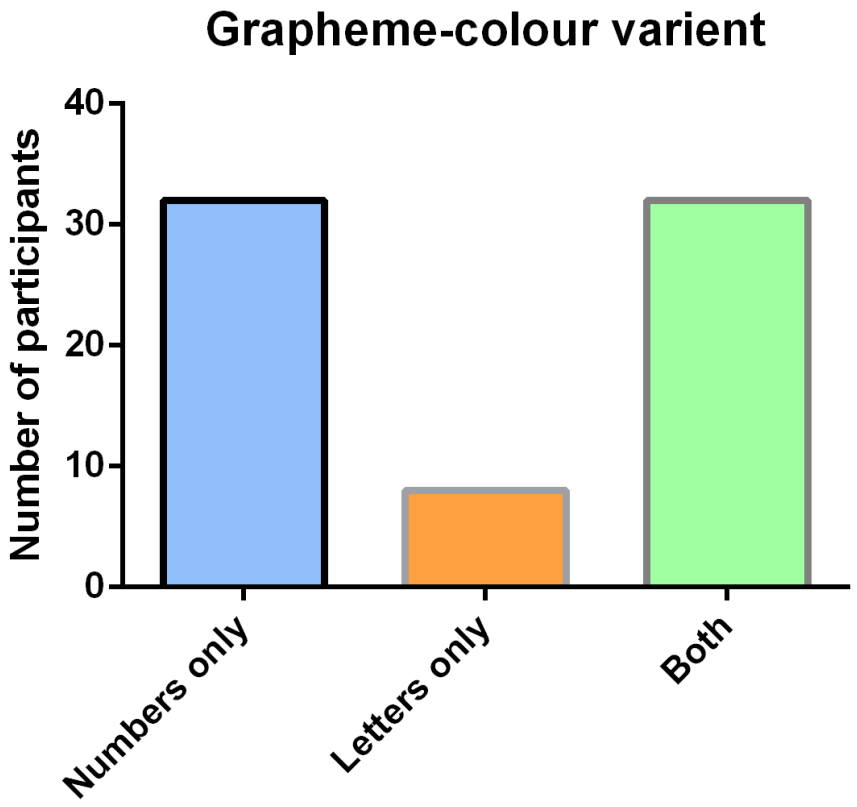
No signif difference

Speed-congruency test

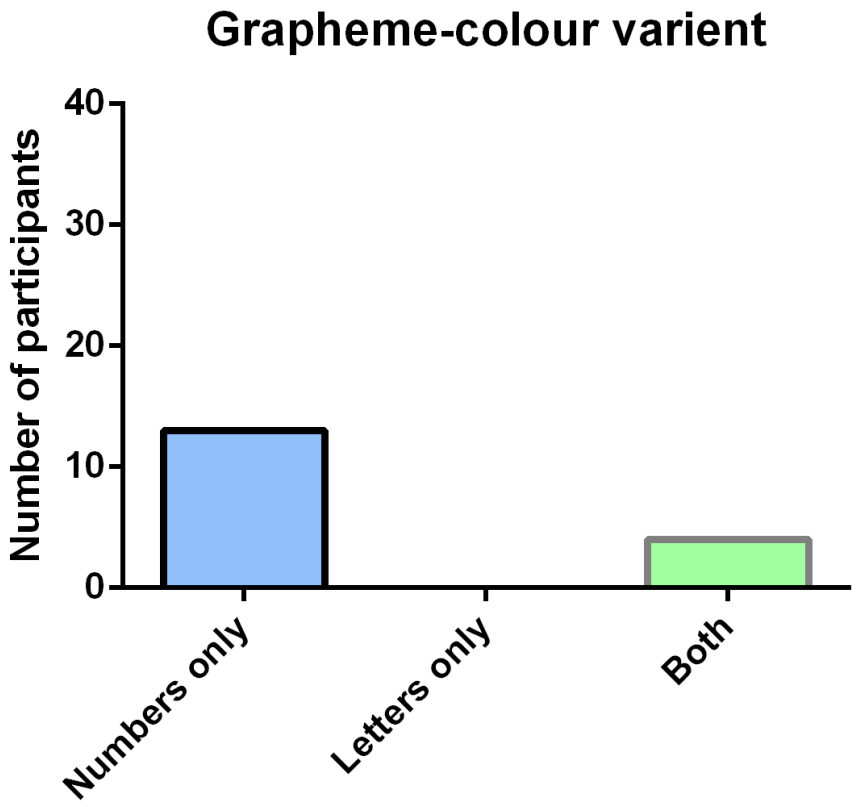


No signif difference

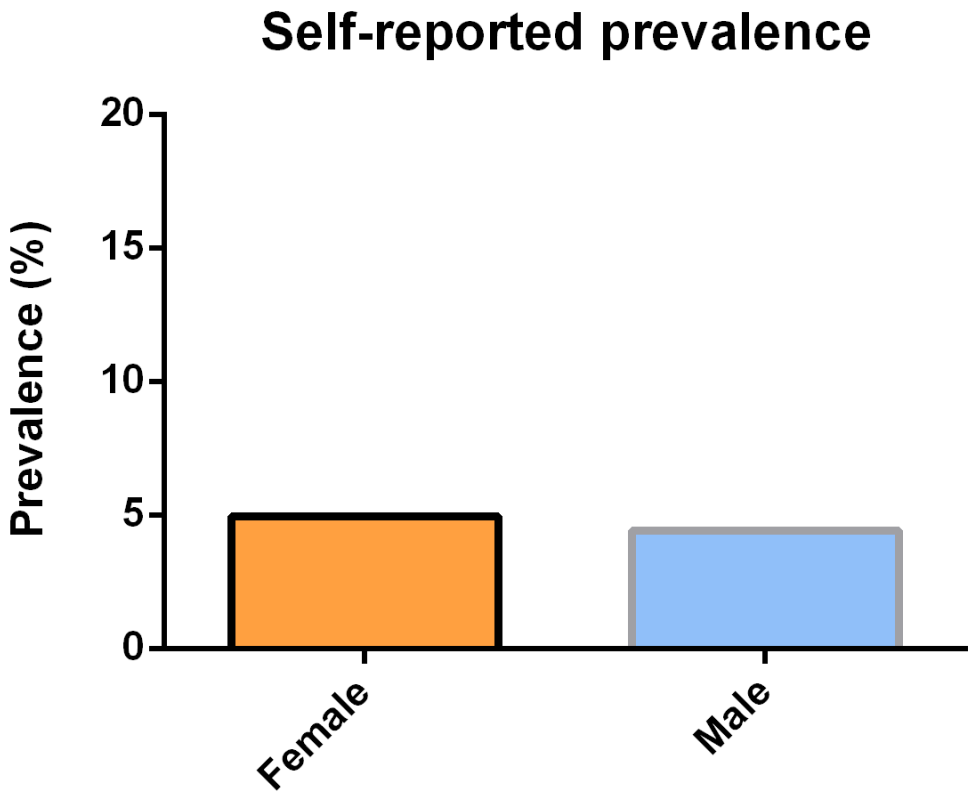
72 self-reported cases



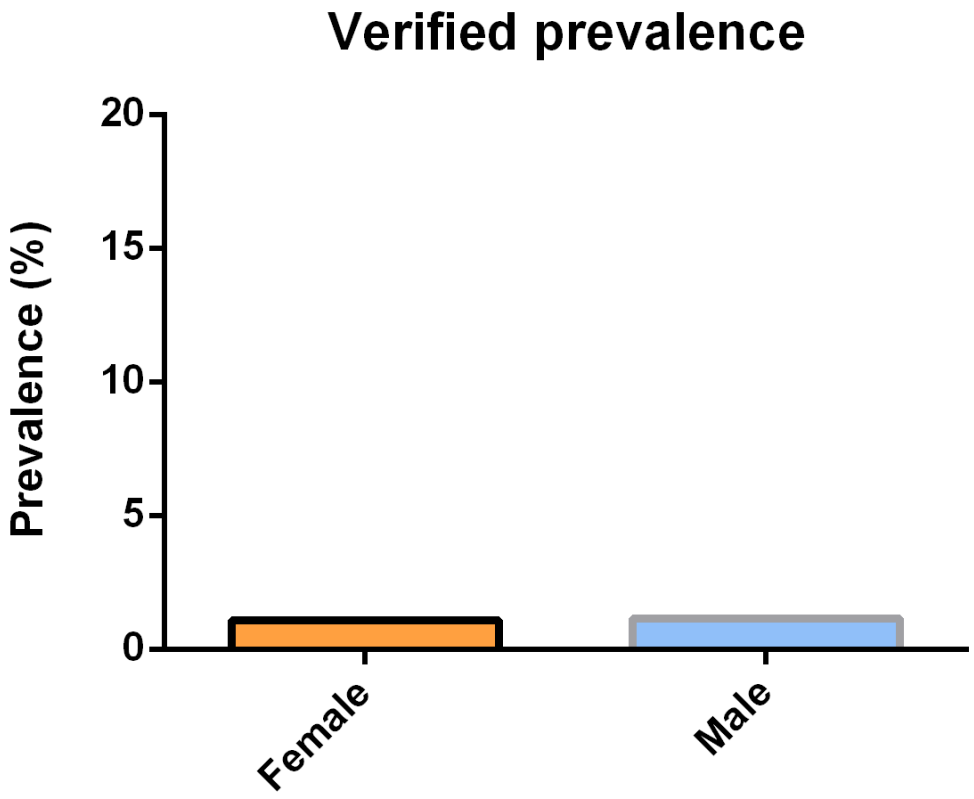
17 verified cases



Sex bias


Self-reported prevalence
Prevalence (%)
20
15
10
5
0
Female
Male

Sex bias



Conclusions

- Is there a sex bias in synaesthesia?

- Why have other studies reported different **sex ratios**?
  - Baron-Cohen et al. (1996) 6:1
  - Rich et al. (2005) 6:1
  - Barnett et al. (2008) 6:1
  - Ward & Simner (2005) 2:1
  - Tomson et al. (2011) 2.7:1

self-referral bias?

Conclusions

- How do our data fit existing **prevalence** knowledge?
  - Our study : 1.1%
  - Simner et al. (2006): 2%
  - Simner et al. (2009; children): 1.3%

- Quantitative vs qualitative?
- Consistency vs stability?

Acknowledgements

Julia Simner
Edinburgh University

David Eagleman
Baylor College, Texas

Richard Shillcock
Edinburgh University

$$v_j = \sum_{c=\{R,G,B\}} |x_1^C - x_2^C| + |x_2^C - x_3^C| + |x_3^C - x_1^C|$$

$$V = \frac{\sum_{j=\{A-Z,0-9\}} v_j}{N}$$

Eagleman et al. 2007