Investigating Implicit Mentalizing: Do bilinguals have an advantage?

Zuzana Nikodemova, Hannah Kin, Hannah Partington, & Sarah J White

Institute of Cognitive Neuroscience, University College London

UCL

INTRODUCTION

MENTALIZING = the propensity to represent other's mental states to predict and understand their behaviour

- Neurotypical bilinguals perform better on explicit mentalizing tasks than monolinguals (Schroeder et al. 2018)
  - Is this bilingual advantage in mentalizing due to bilingualism's direct effect on mentalizing or due to skills other than mentalizing? (White et al., 2014)
- Implicit mentalizing tasks provide a more direct measure of mentalizing (Senju et al., 2009) → rely on measuring anticipatory eye movements under the conditions of true and false belief

AIMS OF THE CURRENT STUDY

1) To replicate the bilingual advantage in explicit mentalizing reported in the literature.
   H2: Bilingual neurotypical adults will perform better on an explicit mentalizing task than monolingual neurotypical adults.

2) To investigate whether bilingual advantage would be observable in implicit mentalizing.
   H1: Bilingual neurotypical adults will perform better on an implicit mentalizing task than monolingual neurotypical adults.
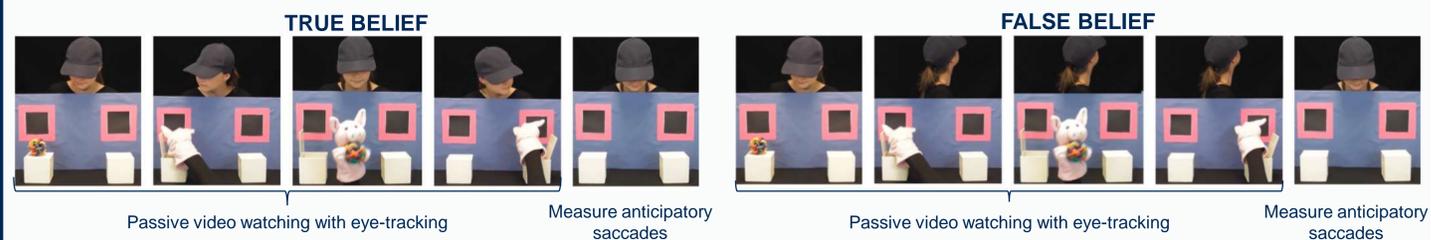
METHOD

SAMPLE
- 99 neurotypical adults; split into monolingual and bilingual group based on age of acquisition of L2 (0-6 years = monolingual; 6+ years = bilingual)
- **Monolinguals** (N = 75) – age: M = 33.43, SD = 11.39; 38 female, 36 male, 1 non-binary
- **Bilinguals** (N = 24) – age: M = 28.92, SD = 7.53; 14 female, 9 male, 1 non-binary

PROCEDURE
1) **Explicit mentalizing task -** the Frith-Happé animations task with multiple-choice response (White et al., 2011)

Mental interaction subscale was primary measure of interest – reflects mentalizing abilities
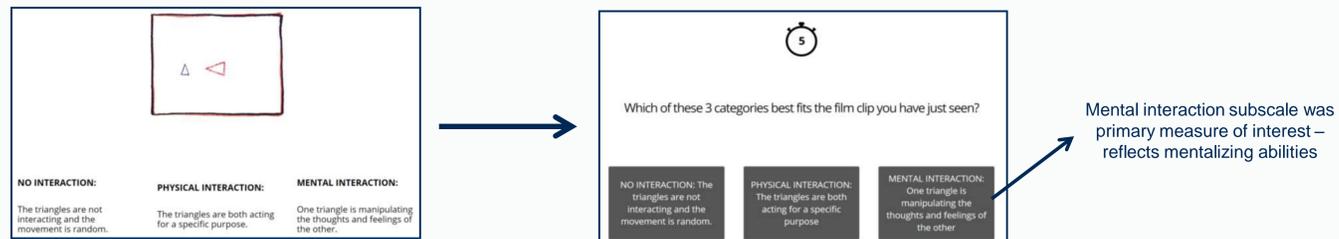
2) **Implicit mentalizing task –** multi-trial implicit mentalizing eye-tracking paradigm with non-mentalizing (true belief) and mentalizing (false belief) conditions (Senju et al., 2009)

TRUE BELIEF — Passive video watching with eye-tracking — Measure anticipatory saccades

FALSE BELIEF — Passive video watching with eye-tracking — Measure anticipatory saccades

3) **LEAP-Questionnaire** – used to split participants into groups based on acquisition age of L2 (Marian et al., 2007)

RESULTS

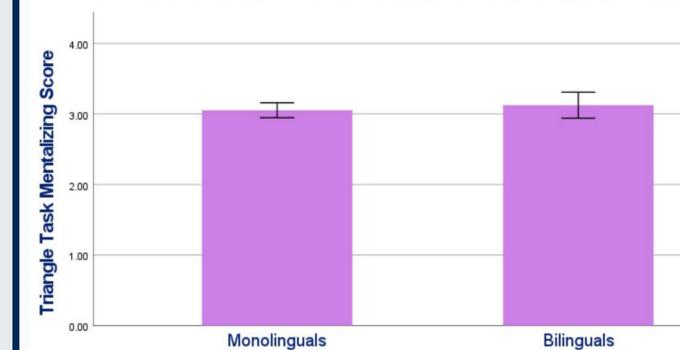### 1) EXPLICIT MENTALIZING

Bar Chart of Triangle Task Overall Score by Language Group
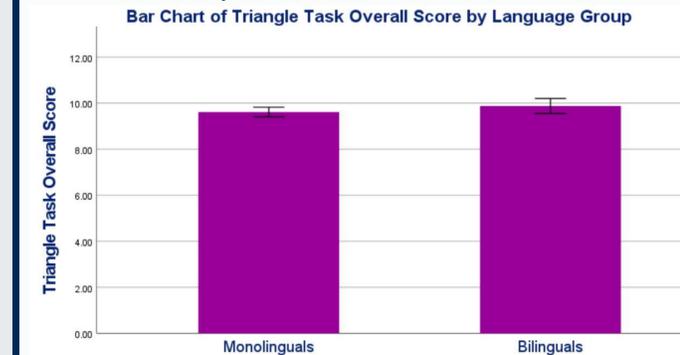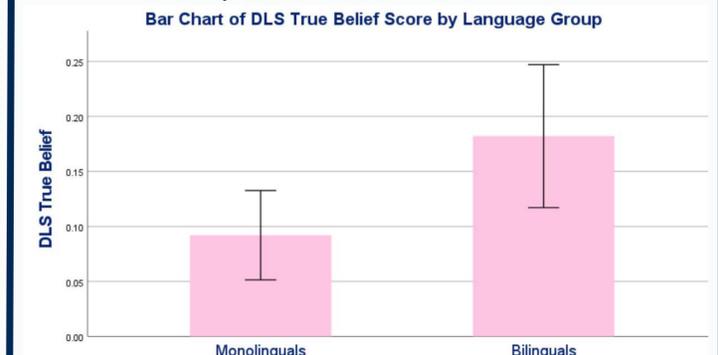

- non-significant difference between groups on the overall task scores (t(97) = -.624, p = .534, d = 1.78)

**Bar Chart of Triangle Task Mentalizing Score by Language Group**

- non-significant difference between groups on the mentalizing subset scores (t(97) = -.336, p = .738, d = 0.91)

2) IMPLICIT MENTALIZING

Bar Chart of DLS True Belief Score by Language Group

- non-significant difference on the differential-looking score for true belief trials (t(95) = -1.09, p = .280, d = 0.34)

Bar Chart of DLS False Belief Score by Language Group
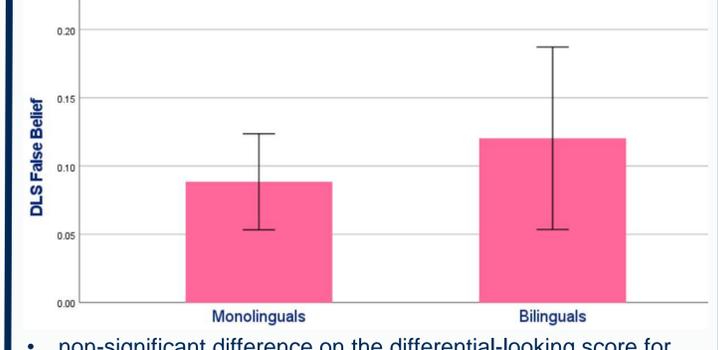
- non-significant difference on the differential-looking score for false belief trials – i.e. the implicit mentalizing measure (t(95) = -.429, p = .669, d = 0.31)

DISCUSSION

Contrary to predictions, there were **no significant differences** in implicit or explicit mentalizing between monolinguals and bilinguals.

1) EXPLICIT MENTALIZING
- Findings are not in line with the previous literature on explicit mentalizing, this could be due to:
  - different experimental designs (various explicit mentalizing tasks used across studies)
  - different definitions of monolingualism and bilingualism
  - different sample characteristics (explicit mentalizing was predominantly studied in children)

2) IMPLICIT MENTALIZING
- The failure to observe a bilingual advantage in implicit mentalizing could be due to:
  - the online administration of the eye-tracking task → less sensitive than lab-based eye-trackers
  - bilingual advantage might not exist for implicit mentalizing
- *Future directions:* use the implicit mentalizing task in in-person testing to determine whether the current results are an artifact of the methodology or whether there indeed is no bilingual advantage in implicit mentalizing