# The origin of the bilingual advantage in false-belief reasoning


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## Abstract

In the Sally-Anne task – a standard measure of Theory of Mind development, Sally puts a marble in a box before going out to play. During her absence, Anne moves the marble to a basket, setting the scene for the false-belief question: 'When Sally comes back, where will she look for her marble?' (Baron-Cohen et al., 1985). Children under 4 err by predicting that Sally will look for her marble in the basket, rather than in the box where she left it.

This paper investigates the origin of the bilingual advantage that has been found in false-belief reasoning relative to monolinguals, both in children (Goetz, 2003; Kovács, 2009) and in adults (Rubio-Fernández & Glucksberg, 2012).

In particular, **a new eye-tracking study with monolingual adults is reported that makes possible to re-interpret the results of Rubio-Fernández and Glucksberg (2012) and put their findings in line with recent research on the origin of the bilingual advantage and the role of attentional processes (Bialystok, 2010, 2015; Costa et al., 2008; Martin-Rhee & Bialystok, 2008)**.


## Rubio-Fernández & Glucksberg (2012): An unfounded criticism

Rubio-Fernández and Glucksberg (2012) report that bilingual adults are less susceptible to an egocentric bias than monolinguals in a false-belief task that used eye-tracking measures of processing (i.e. first fixation locations and latencies to look at the target object) as well as response times.

Ryskin et al. (2014: 47-48) argue that these results are challenging to interpret because of known delays in bilingual linguistic processing: "At the time when monolinguals were interpreting the critical test question that queried their understanding of false-belief, bilinguals may have been processing an earlier part of the sentence that mentioned the target object and *this* may have guided their eye fixations, rather than better understanding of false belief."

As it turns out, the prior mention of the target object was 6 seconds before the critical test question (a detail that wasn't given in the manuscript). **Since the bilingual delays referred to by Ryskin and colleagues are *subtle* (by their own admission: see p.66) the above criticism is entirely unfounded.**

## New findings by Rubio-Fernández (2013)

Rubio-Fernández (2013) used the same task design as Rubio-Fernández and Glucksberg (2012) in a Theory of Mind study with adult monolinguals.

The results of this new study revealed that the visual disruption of the scene that had been used by Rubio-Fernández and Glucksberg (2012) had a critical effect on participants' performance as it effectively disrupted their perspective tracking compared to a 'visually-continuous' version of the task (see Table 1).

**In view of these results, Rubio-Fernández (2013) concluded that perspective-tracking is a continuous process that is dependent on attentional resources and can therefore be disrupted by task manipulations, even in adults.**

## Rubio-Fernández (2013): Task design

**[*] Design used by Rubio-Fernández & Glucksberg (2012) with bilingual and monolingual adults**

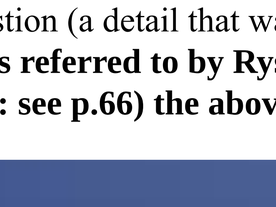
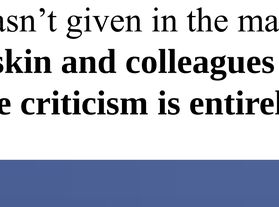
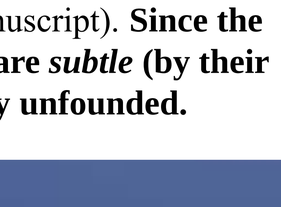
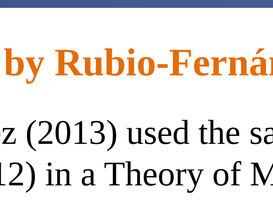
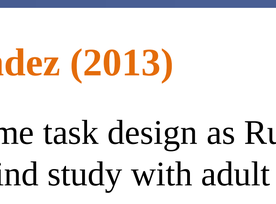
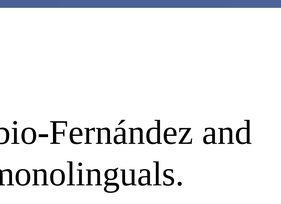
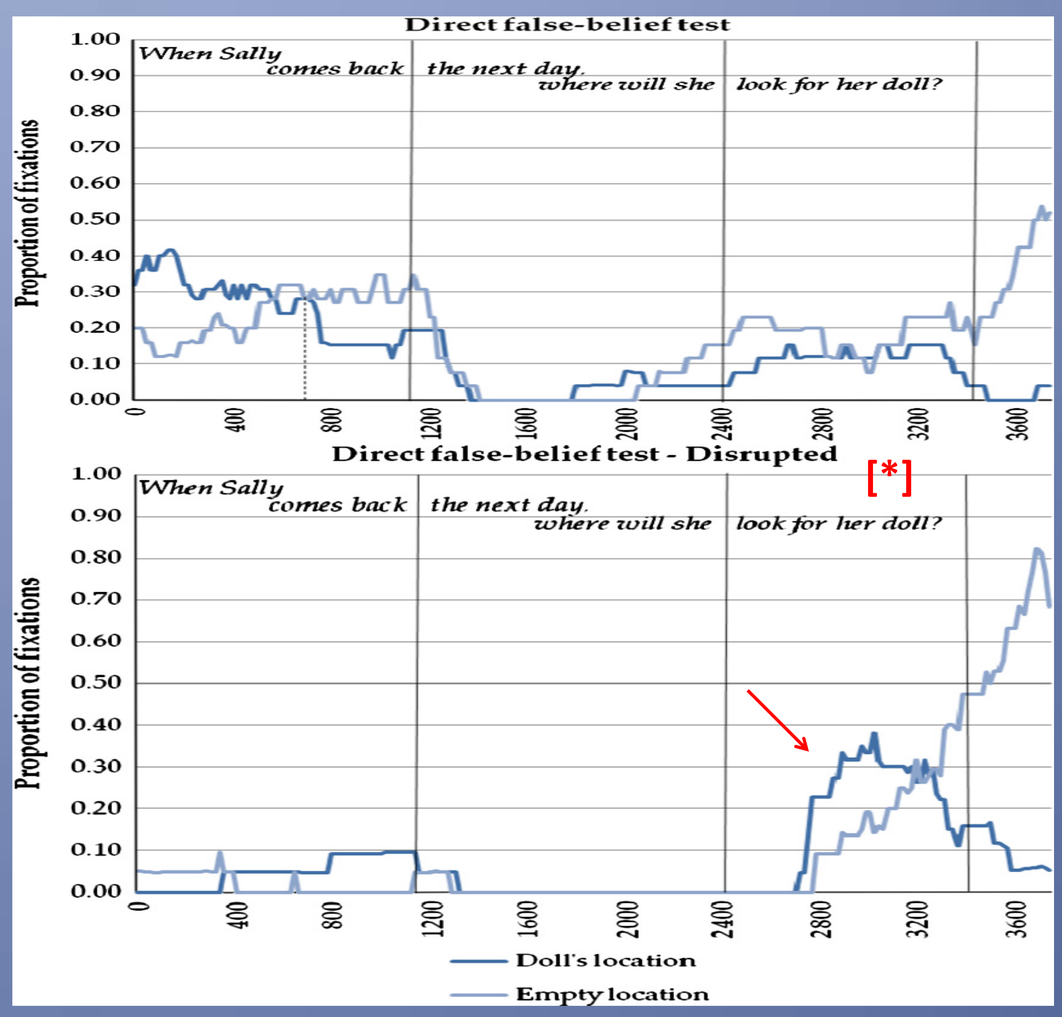
| | | | |
|---|---|---|---|
| **Experiment 1** |  |  |  |
| **Experiment 2** **[*]** |  |  |  |
| **Indirect test** | *When Sally comes back* [1309ms] | *the next day, she goes to* [2397ms] | *look for her doll in her basket.* [1904ms] |
| **Direct test** **[*]** | *When Sally comes back* [1105ms] | *the next day, where will she* [1309ms] | *look for her doll?* [1020ms] |

Table 1: Cartoon slides corresponding with the critical segments in Experiments 1 and 2.




## The role of attention in false-belief reasoning

Recent studies have shown that 3-year-old children are able to pass a standard false-belief task that allows them to focus on the protagonist throughout the narrative (Rubio-Fernández & Geurts, 2013).

The form of the false-belief question is critical for 3-year olds' success, as mentioning the target object draws their attention to the container that hides the object and increases the salience of the wrong response with negative results (Rubio-Fernández & Geurts, 2013; Rubio-Fernández, under review a).

**In view of these results, and contrary to the general view that false-belief reasoning requires response inhibition (e.g., Carlson & Moses, 2001), Rubio-Fernández (under review a, b) argues that inhibition is only required in false-belief reasoning in so far as the participant's focus of attention on the protagonist may be disrupted and the salience of the target object increased by task manipulations**.

## Then what's the origin of the bilingual advantage in FB reasoning?

In line with the traditional view, it had been generally assumed that the bilingual advantage in false-belief reasoning was related to their increased Executive Control; that is, bilinguals were better than monolinguals at inhibiting the prepotent response associated with their own knowledge of the situation (see, e.g., Rubio-Fernández & Glucksberg, 2012).

Rubio-Fernández's view of perspective-tracking as a continuous process that is dependent on attentional resources is more in line with Ellen Bialystok's most recent account (2015: 4): **"The bilingual advantage is not in inhibition; rather it is the *failure* of bilinguals to inhibit attention to the non-target language that leads to the involvement of executive function and the eventual consequences for its development and function"**.

Thus, **bilinguals are not necessarily better at inhibiting their own knowledge in a false-belief task but at managing their attention between the two perspectives, hence better recovering from potential disruptions by task manipulations**.

## References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