The Role of Recursive and Pragmatic Utterances in Second Order Theory of Mind in Preschool Children

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INTRODUCTION

Complement clauses are recursive linguistic structures in which one proposition is embedded inside another, analogically as it happens in embedded representations involved in second-order false belief (FB) reasoning. Following Juan & Astington [1] we assume that the use of embedded, complement structures should assist children with the representation of conflicting perspectives, indispensable for second-order FB understanding. Also, as all language structures are acquired by children via language use [2] and pragmatic language functioning is strongly related to ToM development [3], we argue that not only the recursive syntax but also the pragmatics of other than recursive linguistic productions should be linked to children's second order FB reasoning. The main aim of the study was to assess the extent to which the syntax and pragmatics of children's utterances and their second-order ToM are related. To this aim we developed two new tasks to measure the production of recurisve syntax in preschool children.

METHOD

Participants: 142 children (72 boys and 70 girls) between 66 and 71 months of age (M=68, SD=1,08).

Recursive Syntax Production

Picture Task
The child was asked to describe pictures created by the Experimenter using complement clauses.

Narrative Task
The child was asked to describe the thoughts of protagonists in stories narrated by the Experimenter using complement clauses.
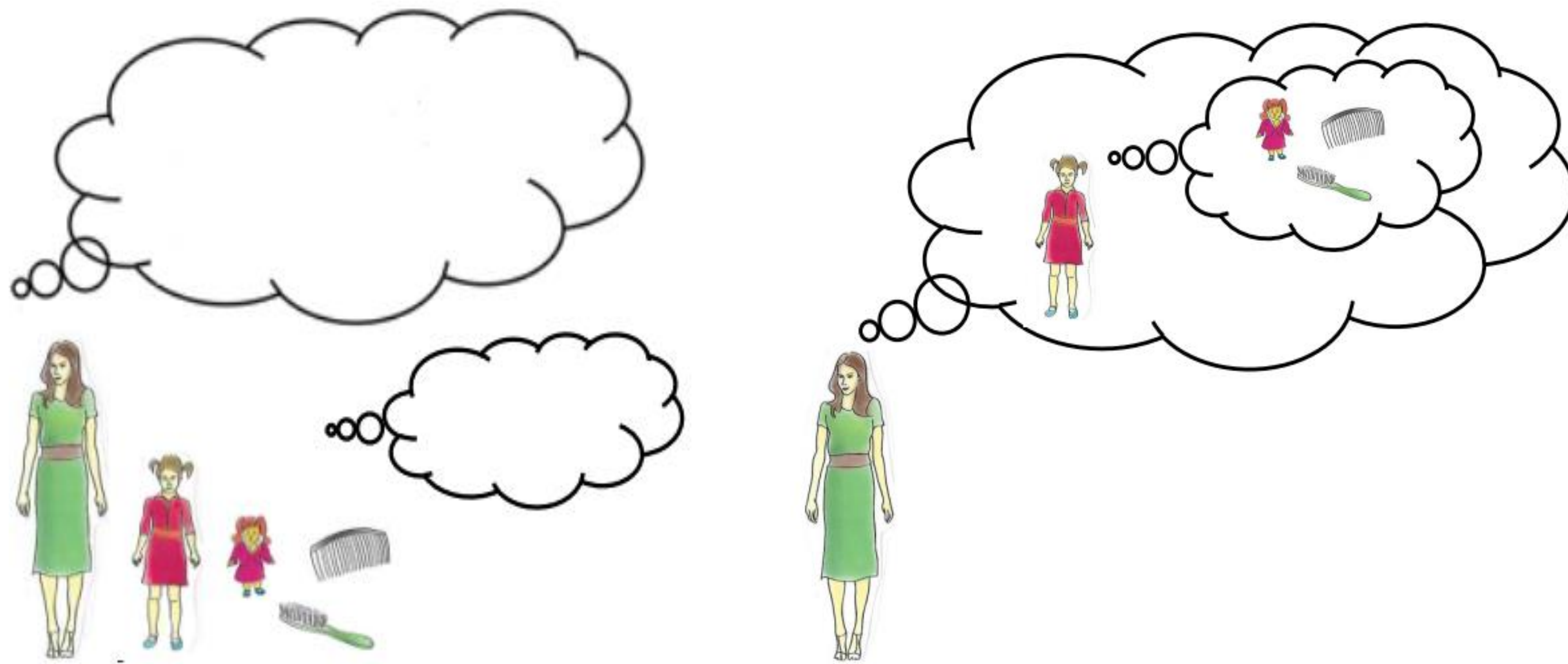
Expected production: *Mom thinks that the girl thinks that she will brush the doll's hair*

Expected production: *Lady thinks that the girl thinks that it's a coin laying on the ground*

All the productions from both tasks were assigned to 2 mutually exclusive categories.

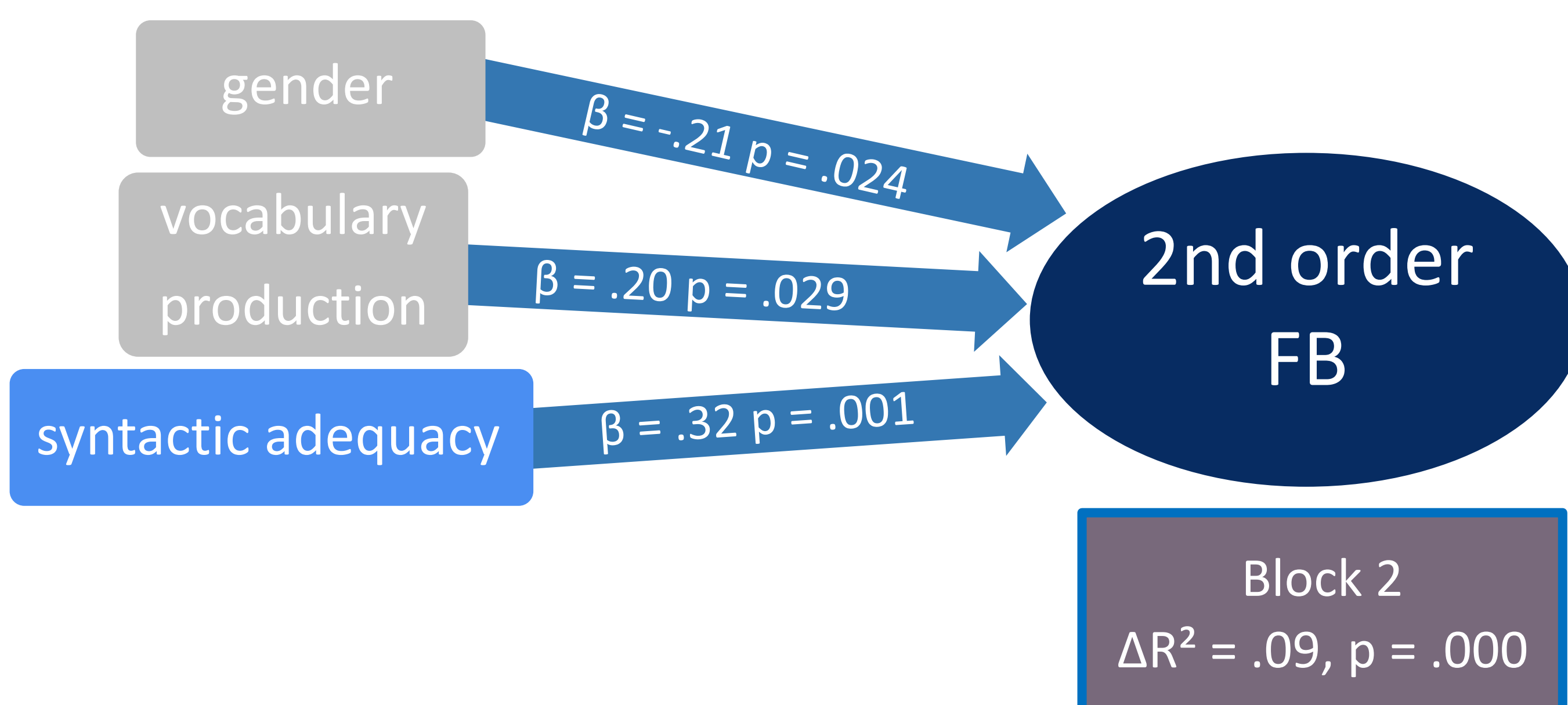| CATEGORY	DESCRIPTION	EXEMPLARY PRODUCTIONS
Syntactic adequacy	target productions with appropriate persons', objects' and actions' names and appropriate number and placement of embedded clauses within the sentence structure	Lady thinks that the girl thinks that it's a coin laying on the ground
Pragmatic adequacy	productions having other than expected syntactic structure, yet still describing appropriate behaviors and actions associated with presented situations	Lady thinks that the girl is picking it up because she thought it was a coin and it was a button

Second order FB reasoning
The Ice Cream Story [4] and the Birthday Puppy Story [5] were used to assess second-order FB understanding.
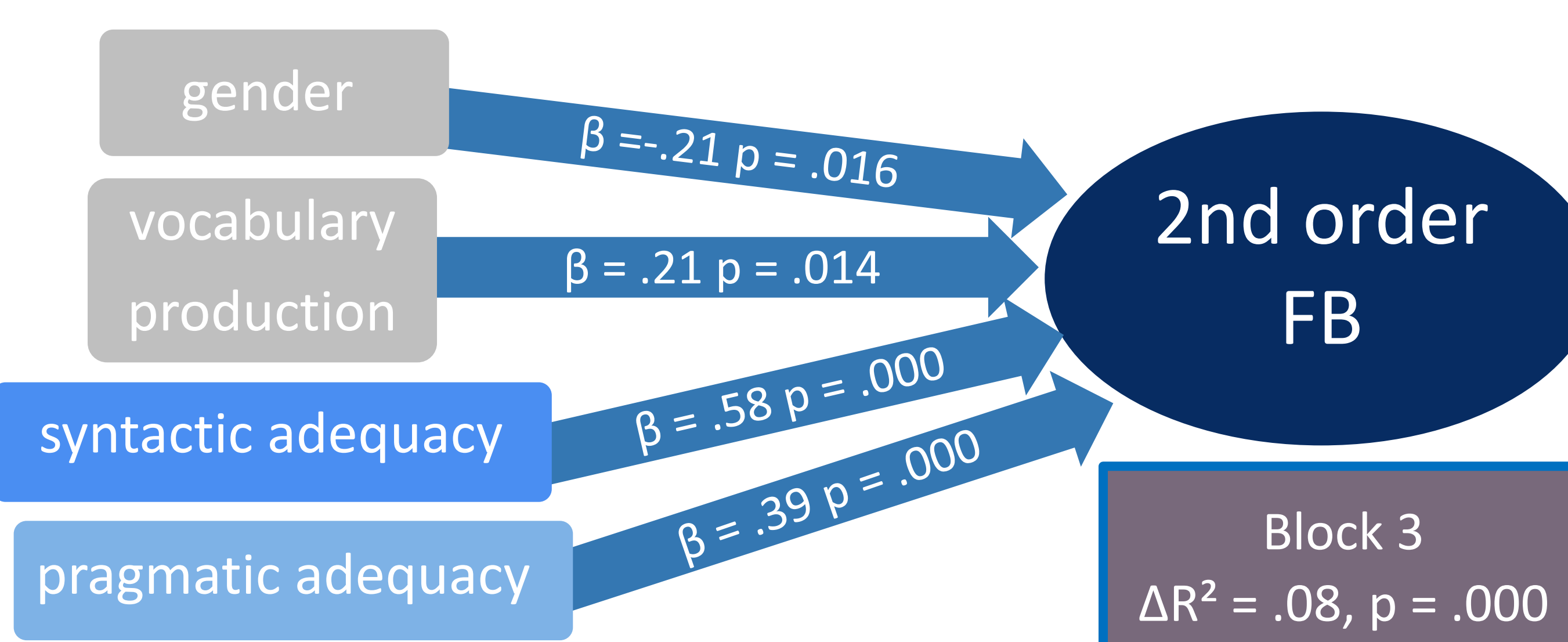
Memory and language
We used the Digit-Span Test – forward and backwards [6] to measure working memory and polish standardized tests to assess vocabulary production [7] and grammar comprehension [8].

RESULTS

gender → 2nd order FB: β = -.21 p = .024
vocabulary production → 2nd order FB: β = .20 p = .029
syntactic adequacy → 2nd order FB: β = .32 p = .001

Block 2
ΔR² = .09, p = .000

Insignificant predictors: grammar comprehension and working memory

gender → 2nd order FB: β = -.21 p = .016
vocabulary production → 2nd order FB: β = .21 p = .014
syntactic adequacy → 2nd order FB: β = .58 p = .000
pragmatic adequacy → 2nd order FB: β = .39 p = .000

Block 3
ΔR² = .08, p = .000

Insignificant predictors: grammar comprehension and working memory

DISCUSSION

- syntactic and pragmatic adequacy of sentence productions both predict second-order FB reasoning in 5 and a half year old children

- recursive complement structures can serve as a representational tool enabling complex, recursive forms of reasoning involved in second-order FB understanding

- a more general, pragmatic ability to effectively use language to infer and refer to what is relevant in a given context can rest upon recursive mental processes such as the ones engaged in complex ToM reasoning

- recursive syntax nad pragmatic language use might both provide children with resources that permit complex forms of representation

- new recursive syntax production tasks enabled the assessment of syntactic and pragmatic adequacy of children's productions

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