

Branching Directionality May Contribute to Bilingual Children's Understanding of Recursive Structures in English: Evidence from Recursive Adjectives and Possessives

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Aims

Most research on children's acquisition of adult-like recursion has focused on monolinguals with little attention to bilinguals. The few existing studies on indirect recursion (i.e., iterative embedding of one phrasal category inside another of the same type) with simultaneous bilingual children found that they performed similarly to monolingual counterparts (Pérez-Leroux et al., 2017; Pérez-Leroux et al., 2021) and occasionally outperformed them (Leandro and Amaral, 2014).

We hypothesize that right, left, and mixed branching directionality (as found in English and other languages), may influence the acquisition path of recursive nominal phrases in bilingual children, an issue that remains unexplored to our knowledge. Specifically, we predict that branching directionality of possessive and adjectival nominals (i.e., in bilingual children's non-English language/s vis-à-vis that of English), impacts comprehension and production of indirect recursion.

Method

A story-cum-picture task (Foucault, et al., 2022) (Fig. 1) administered via Zoom was used to assess children's adult-like use (comprehension and production) of 4 recursive types in English: 2-Level and 3-Level left-branching recursive gradable (set/subset) adjectives and recursive possessives (e.g., *small big mushrooms*, *big small big mushrooms*; *the deer's friend's mushrooms*; *the deer's friend's sister's mushrooms*). Children had to help the deer, the deer's friend and the deer's friend's sister pick various sized groups of mushrooms, put them in trucks of various sizes and go to the market to sell them to three squirrels, i.e., Chippie, Chippie's father, Chippie's father's friend. For comprehension, children drew circles around objects (mushrooms/trucks) and drew arrows between groups of objects or animals to identify Recursive-Adjective (R-Adj) and Recursive-Possessive (R-Poss) and responded to questions for production.

Our sample (to date) comprises 45 English-speaking children (age-range 4;0-12;0) in the US and Canada. Based on a language background questionnaire, 21 children were identified as bilinguals (Simultaneous=16; Sequential=5) who regularly use another language besides English (mean age: 7;6 [6 < 7 and 15 ≥ 7]), with all, except one, reporting English as their stronger language. The remaining 24 were monolinguals (mean age: 6;11 [14 < 7; 10 ≥ 7]).

The bilingual children's non-English languages were categorized into three types based on the branching directionality of possessive and adjectival nominal phrases: (Group 1) *Left-branching* (Hindi, Mandarin, Marathi, Cantonese, Kannada; N=8; 6 simultaneous and 2 sequential), (Group 2) *Right-branching* (Spanish, Italian, French; N=7; 4 simultaneous and 3 sequential), (Group 3) *Mixed-directionality* (German, Russian, Bulgarian; N=6; all 6 simultaneous).

Each session was recorded and viewed independently by two researchers, who coded the child's responses for accuracy. The children's responses were categorized using a three-way system: 0=Incorrect; 1=Correct on 1st attempt; 2=correct on 2nd attempt (upon receiving feedback). We focus on the results based on children responding correctly on the first attempt.

Figure 1. Sample Pictures from the Protocol

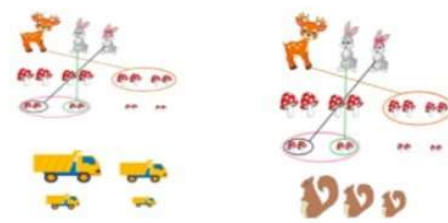


Figure 2: Monolingual & Bilingual Children's Median % Accuracy Scores for 2-Level and 3-Level Recursive Adjectives and Possessives

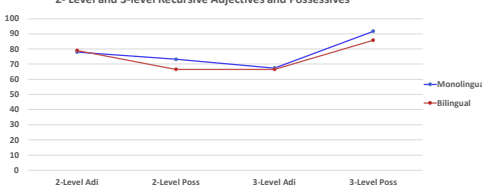


Figure 3: Bilingual Children's Median % Accuracy Scores by Branching Directionality Type for 2-Level and 3-Level Recursive Adjectives and Possessives

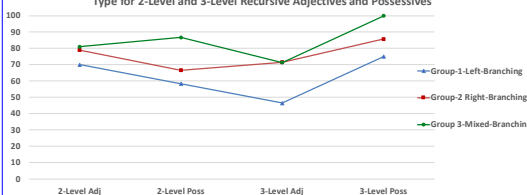


Table 1: Proportion of Bilingual Children's Accurate Responses (Mean % and Median %) by Branching Directionality Type for the four types of recursive phrases

Branching Direction	Recursion Type											
	2-Level Adj			2-Level Poss			3-Level Adj			3-Level Poss		
	Med %	M %	SD	Med %	M %	SD	Med %	M %	SD	Med %	M %	SD
Gp 1 (Left) (N=8)	70.0	67.1	24.5	58.3	59.1	38.0	46.5	40.5	38.0	75.0	70.0	34.4
Gp2 (Right) (N=7)	78.95	80.8	15.3	66.7	68.9	26.7	71.4	66.4	20.8	85.7	82.5	19.6
Gp3 (Mixed) (N=6)	80.95	83.3	10.4	86.6	81.7	19.8	71.3	61.2	28.8	100	88.9	20.2

Results

Bilinguals Vs Monolinguals: Bilingual children had numerically lower Median Accuracy scores (comprehension and production combined) compared to their monolingual counterparts for all except 2-Level adjectives (Fig 2). However, the results of a Kruskal-Wallis test showed the differences to be non-significant, with both groups patterning similarly across the four different recursive types.

The results of a Friedman test of Repeated Measures revealed statistically significant differences in Accuracy scores according to the four Recursive Types for both groups (Monolingual: Chi-square= 14.135; df=3; p=.003; Bilingual: Chi-square= 14.005; df=3; p=.003). Post-hoc analyses with Duncan (with Bonferroni correction applied) showed that both groups performed significantly worse on 3-Level Adjectives than 3-Level possessives (Monolingual: p=.005; Bilingual: p=.003).

Branching Directionality Impact (Fig 3): The Left-branching group (group 1) received the lowest Median Accuracy scores, even though the branching directionality of their other language matched that of the target recursive possessive and adjectival phrases in English. The Mixed-branching group (group 3) received the highest Accuracy scores on all except the 3-Level recursive adjectives, for which the Right-branching group received slightly higher median scores (Table 1). A Kruskal-Wallis test failed to find the differences to be significant.

Conclusion

Despite the nonsignificant results, the numerical trends in relation to the three branching groups' accuracy on recursive possessives and adjectives suggest a potentially important role for branching directionality for bilingual children. Specifically, regular use of a mixed branching directionality language could be advantageous for left-branching recursive structures in English, itself a mixed directionality language. In the current research, only the stronger language (English) and only Left-branching (prenominal) recursives were assessed. Further research, where bilinguals are assessed in both of their languages, and on both left and right branching recursives, is necessary for a fuller understanding of the impact of branching directionality on bilingual children's use of recursive structures.

Selected References

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