The frequency of connectives in preschool children's language environment

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The basis of logical reasoning is a set of logical connectives such as AND, OR, and NOT. The rate at which each is produced and comprehended by young children differs significantly between connectives. For example, on average children produce AND and NOT around 27 months, yet do not produce OR until age 5 (Fenson, et al, 1994). One possible explanation for these differences is the frequency of logical connectives in children's language environment. The little research jointly examining children's logical reasoning and their language environment (e.g., Scholnick & Wing, 1992) suggests that children's language environment does influence the rate of understanding and production of logical connectives.

The present study examined transcriptions of audiotaped conversations obtained through the CHILDES database (MacWhinney, 2000) to compare the frequency of production and reception of connectives by children between the ages of 2.0-5.5 in conversational situations with at least one adult. The connectives selected were AND, OR, NO/NOT (NOT was also coded for the number of uses as a word and in the form of a contraction). A total of 187 databases were coded containing 81,676 conversational turns (mean = 456.2, SD = 282.6).

Results and Discussion

A total of 10,201 No/Nots, 5,149 Ands, and 396 Ors were produced. Table 1 displays the distribution of connectives per 100 conversational turns by producer (adult/child) and age of the child (six-month intervals based on the child's age during data collection).

Overall, NOT was more frequent than AND and OR (Fs (2, 165) = 4.9 and 22.7 respectively, ps <.01), while AND was more frequent than OR (F (2, 165) = 10.6, p<.01). Results suggest significant differences in the use of NOT across age groups (F (6, 102) = 3.7, p<.002) but no significant differences for AND and OR (p>.10).

When split by producer (adult v. child), adults produced OR and AND significantly more than children (Fs (6, 102) = 4.3 and 3.2 respectively, ps <.05 and significantly more negations as contractions than non-contractions (F (6, 102) = 3.7, p<.002).

Age-related changes for children's connective use indicate significant increases in the use of OR (F (6, 123) = 5.2, p<.001), AND (F (6, 123) = 3, p<.01), and the contraction form of NOT (F (6, 123) = 4.1, p<.001) from age 2 to 5.5. Changes in adult usage by child's age were significant only for NOT as a contraction (F (6, 132) = 3.4, p<.01).

Table 1- Connectives per 100 conversational turns

	NOT (Contractions)		AND		OR	
Age	Adult	Child	Adult	Child	Adult	Child
2-2.5	2.63 (2.80)	2.23 (0.53)	2.98	0.98	0.26	0.01
2.5-3	2.06 (3.69)	2.82 (1.68)	3.23	2.97	0.40	0.02
3-3.5	2.60 (3.98)	3.06 (2.47)	3.97	2.59	0.38	0.05
3.5-4	2.93 (4.38)	3.45 (3.21)	3.39	3.00	0.37	0.19
4-4.5	2.99 (3.97)	3.08 (3.16)	3.32	2.99	0.45	0.21
4.5-5	3.00 (5.02)	3.04 (3.58)	3.63	3.95	0.46	0.11
5-5.5	3.47 (2.62)	2.70 (3.45)	3.79	2.86	0.32	0.14
Mean	2.73 (3.81)	2.90 (2.38)	3.46	2.62	0.37	0.09

Overall, the most notable difference is the overall production levels of each connective. NO/NOT is approximately 25.7x as frequent as OR and twice as frequent as AND while AND is 13x as frequent as OR in conversation. Children's use of contractions (e.g., don't) increases significantly with age. AND use by children increases dramatically from ages 2-4 to a level by age 3.5 that is similar to the levels adults use when talking to children. The use of OR by both children and adults is significantly lower than AND and NOT and children's production rates remain well below the levels adults use when talking to children. Thus, results suggest that those connectives produced at earlier ages (e.g., NOT) are associated with higher levels of adult production than connectives produced at later ages. One explanation for these results is that adult production rates may vary in proportion to child comprehension rates exhibiting a reciprocally causal relationship.

References

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