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Learning the language of time: Children's acquisition of duration words



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ABSTRACT

Children use time words like *minute* and *hour* early in development, but take years to acquire their precise meanings. Here we investigate whether children assign meaning to these early usages, and if so, how. To do this, we test their interpretation of seven time words: *second*, *minute*, *hour*, *day*, *week*, *month*, and *year*. We find that preschoolers infer the orderings of time words (e.g., hour > minute), but have little to no knowledge of the absolute durations they encode. Knowledge of absolute duration is learned much later in development – many years after children first start using time words in speech – and in many children does not emerge until they have acquired formal definitions for the words. We conclude that associating words with the perception of duration does not come naturally to children, and that early intuitive meanings of time words are instead rooted in relative orderings, which children may infer from their use in speech.

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1. Introduction

Time is an ephemeral yet central dimension of human experience. The nature of time – and how it is mentally represented – has been a source of fascination for centuries, beginning with early philosophical inquiries (e.g., Augustine, 398/1992; James, 1890; Kant, 1781/2009; McTaggart, 1908), and extending to modern debates in cognitive and developmental psychology (e.g., Bender & Beller, 2014; Boroditsky, 2011; Casasanto, Fotakopoulou, & Boroditsky, 2010; Piaget, 1969; Whorf, 1956).

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Many of these debates concern the role that natural language plays in mental representations of time. Linguistically, reference to time is pervasive both in speech and in written text (Brysbaert & New, 2009; Kucera & Francis, 1967). However, learning to encode time in language is difficult. Although both temporal syntax (e.g., tense marking) and time-related lexical items (e.g., *before*, *after*, *today*, *minute*) emerge early in children's language production (Ames, 1946; Brown, 1973; Dale & Fenson, 1996; De Villiers & De Villiers, 1978; Grant & Suddendorf, 2011; Harner, 1982; Weist & Buczomska, 1987), the meanings of time words are learned slowly in development, resulting in a long period of frequently incorrect usage and incomplete comprehension (Ames, 1946; Clark, 1971; Grant & Suddendorf, 2011; Harner, 1982; Shatz, Tare, Nguyen, & Young, 2010; Weist, Wysocka, & Lyytinen, 1991). Here, we investigate the lag between production and comprehension of duration words, such as *minute* and *hour*. We ask how children interpret these abstract words before they receive formal instruction, and thus whether they construct interim meanings for time words early in development. Characterizing the initial meanings children assign to time words may contribute both to our understanding of how time is represented in the child's mind and to our understanding of how abstract words are learned more generally.

Time words pose a difficult problem for children during language acquisition. First, although time and its passing are fundamental to experience, duration words like *second*, *minute*, and *hour* carve out relatively arbitrary units that cannot be directly seen or heard. Their boundaries are rarely demarcated explicitly in conversation—and, in fact, can only be precisely indicated via the use of measuring devices like clocks. Second, and relatedly, the units that define such time words are couched in a system of numerical knowledge that children take many years to master. For example, to acquire an adult-like understanding of the word *hour* (i.e., that it contains 60 minutes), children must also learn about minutes (which comprise 60 seconds), and in turn about seconds. In each case, mastery of the number words in question is difficult and protracted, and is typically not achieved until 5 or 6 years of age, if not later (for discussion of the stages of number word development, see Carey, 2004, 2009; Davidson, Eng, & Barner, 2012; Fuson, 1988; Fuson & Hall, 1983; Gelman & Gallistel, 1978; Le Corre & Carey, 2007; Schaeffer, Eggleston, & Scott, 1974; Wynn, 1990, 1992). Third, because duration words depend on numeracy, children are not explicitly taught formal definitions of these time words until very late in development, generally when they enter grade school. In standard US K-12 curricula, an introduction to clocks and time measurement begins in Grade 1, when children are 6 or 7 years of age, and instruction on time telling continues until Grade 3 (Common Core State Standards Initiative, 2010). Finally, children's experience with time words and how they are used in speech is relatively haphazard, given the variety of uses for words like *minute* and *second*. For example, a word like *minute* is frequently used informally in expressions like “just a minute” and “wait a minute,” which only rarely reflect precise or accurate durations (Tare, Shatz, & Gilbertson, 2008).

Perhaps because of these challenges, children do not acquire an adult-like understanding of duration words until quite late in development. Given this, two questions arise: When children use these words early in development, what do they mean, if anything? And, if these words have meaning for children, how are these meanings learned? Previous studies suggest that very early on, children recognize that time words are relevant to questions about time and that they form a class of lexical alternatives. For example, when asked questions regarding temporal extent, children typically respond with duration words like *minute* and *hour* despite failing to use them accurately (Shatz et al., 2010). Beyond this, however, remarkably little is known about the acquisition of time words, and what happens between the point when children begin using these words, and when they acquire their formal definitions many years later. One early study reported that at age 6, more than 50% of children had still not learned the precise meaning of the word *hour* (i.e., that an hour is 60 minutes; Ames, 1946), and no studies have documented how children acquire other duration words, like *second* and *minute*, though it is known that their ability to read this information from clocks remains imperfect until age 9 or later (e.g., Friedman & Laycock, 1989).

In the present study, we investigate children's early interpretation of duration words like *second*, *minute*, and *hour*, and ask whether children assign early preliminary meanings to these words before they acquire formal definitions in grade school, and if so, how these meanings are learned. Specifically, we explored two types of meanings that children might assign to duration words early in

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