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Children's understanding of *yesterday* and *tomorrow*



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ABSTRACT

A picture–sentence matching task was used to investigate children's understanding of *yesterday* and *tomorrow*. In Experiment 1, 3- to 5-year-olds viewed two pictures of an object with a visible change of state (e.g., a carved pumpkin and an intact pumpkin) while listening to sentences referring to past or future actions (“I carved the pumpkin yesterday” or “I’m gonna carve the pumpkin tomorrow”) and selected the matching picture. Children performed better with past tense sentences than with future tense sentences, and including *tomorrow* in future tense sentences increased accuracy. In the next two experiments, 4- and 5-year-olds (Experiment 2) and adults (Experiment 3) completed the same task but with sentences containing conflicting temporal information (“I carved the pumpkin tomorrow”). Children tended to select pictures depicting the outcome of actions regardless of tense or temporal adverb, whereas adults' judgments were based on temporal adverbs. In Experiment 4, 3- to 5-year-olds completed tasks requiring either forward or backward temporal reasoning about sentences referring to *before*, *after*, *yesterday*, *today*, and *tomorrow*. Across sentence types, forward temporal reasoning was easier for children than backward temporal reasoning. Altogether, results indicated that children understand *yesterday* better than *tomorrow* due to the increased cognitive demands involved in reasoning about future events.

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Introduction

Although newborns have an implicit sense of duration (Clifton, 1974), the understanding of time develops very slowly from infancy to adulthood. When and how children understand different aspects of time becomes an intriguing but complex question. The complexity of this question comes from the abstractness of time itself. Unlike other concepts, time cannot be seen, heard, smelled, or touched, yet units of time are referred to in language and represented by clocks, calendars, and so on. The development of temporal language is one indication of children's emerging concept of time. Researchers emphasizing the conceptual implications of temporal language use (Grant & Suddendorf, 2011; Weist, 1989) proposed that the emergence of temporal relations in children's language is sufficient to infer changes in children's understanding of time. It is plausible that children's conceptualization of time develops in parallel to, or at least intertwined with, their competence in using temporal language. With this interconnection in mind, the current study focused on the development of temporal language in relation to children's temporal reasoning ability.

Cromer's (1968) "decentering" model and Weist's (1986) four-system model describe children's temporal language development. Cromer proposed that children's language initially only refers to the here and now; later, with the ability of decentering, they are able to take a perspective other than the present. In Weist's model, each of the four proposed systems reflects a different level of competence in children's temporal understanding. The first system is the speech time (ST) system used by children from 12 to 18 months. Like Cromer's here-and-now focus, children's speech at this stage does not include tense, aspect, or modality. Later, between 18 and 24 months, the event time (ET) system develops, where event time can be expressed separately from speech time. Children begin to use past tense to mark an event anterior to speech time and use future tense to mark an event posterior to speech time. The third system is the restricted reference time (RT_r) system, appearing between 30 and 36 months. In this system, children start to reference time to indicate when an event occurs. For example, a child might say "Yesterday I was in Lodz" (Weist, 1989, p. 108). Both event time (i.e., past tense) and reference time (i.e., *yesterday*) exist in the RT_r system, and both are referenced in contrast to speech time. The last system is the free reference time (RT_f) system, emerging between 36 and 52 months. Children are now capable of coordinating reference time, speech time, and event time. They can also use one event to indicate the time of another event—for example, "While this one is playing [RT], that one will be playing [ET]" (p. 105). The separation of event time from speech time indicates children's developing concept of time and is manifested in children's use of tense and temporal adverbs to locate events in time relative to the present. Nelson (1991) argued that language encodes temporal relations through grammaticization (use of tense and aspect) and lexicalization (use of temporal adverbs.)

In most languages, the time of an action is indicated by tense, often marked on verbs (Harner, 1982b). English-speaking children use verb tenses to code temporal relations from approximately 3 years of age (Harner, 1981; Sachs, 1979). Their representation of tense is syntactical and independent of aspect. Valian (2006) found that even 2-year-olds could successfully distinguish the auxiliaries *will* and *did* for future and past actions. In that study, an experimenter brought two untied baby shoes, told children that she wanted to tie them, and proceeded to tie one of the shoes. After tying a shoe, she asked children either "Show me the one I did tie" or "Show me the one I will tie." Naturalistic data (Bloom, 1970; Nelson, 1989) show that different verb forms appear first in children's language, followed by temporal adverbs.

Terms locating specific time intervals, such as *yesterday*, *today*, and *tomorrow*, are among the first temporal terms used in children's speech. Research shows that children begin to use temporal terms between 2 and 3 years of age (Ames, 1946; Pawlak, Oehrich, & Weist, 2006; Weist, 1989). Ames (1946) observed 1.5- to 4-year-olds' spontaneous production of temporal terms. She found that terms representing the present emerged before references to the past and future; children produced *today* at around 24 months, *tomorrow* at around 30 months, and *yesterday* at around 36 months. Consistent with Ames's observations, Pawlak et al.'s (2006) longitudinal study found that *today* and *tomorrow* appeared at approximately the same age (2 years 10 months) and earlier than *yesterday* (3 years 3 months) for English-speaking children. Likewise, when Grant and Suddendorf (2011) asked parents

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