Linguistic Coding of Temporal Terms Affects Children's Acquisition of Temporal Concepts

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In this study we show that there is a significant difference in the pace at which Chinese-speaking children and English-speaking children acquire the ability to name, manipulate and perform abstract functions on the days of the week (DOW). This occurs because the Chinese system relies on a numeric-based set of time-related terms, while the English system uses entirely arbitrary names for the same concepts. This, we conclude, is a piece of evidence that different coding systems leads to different acquisition rate.

We argue that acquisition of abstract systems is built on already-acquired, less abstract systems. If this is correct then we would expect children acquiring a language which labels time-terms with (already-acquired) numbers (e.g. Chinese) to be at an advantage over children acquiring a language which uses entirely arbitrary terms for time (e.g., English): Unlike the arbitrary words for the DOW in English, Chinese DOW are based upon the number system (e.g. Monday = 星期一, *day-one*; Tuesday = 星期二, *day-two*, etc.). This predicts that Chinese-speaking children should acquire the ability to name, manipulate and perform functions on the DOW earlier than English-speaking children.

80 Children (34 Chinese, 46 English, 3-7 yrs) were shown seven picture cards (Figure1), and then told a story in their native language involving a cartoon character's activities in the seven days of a week. They were then asked, with pictures clearly visible, a series of questions reflecting five levels of complexity in assessing what level of mastery they had attained in comprehending and using time terms (Table1). Each progressive level tested the ability to perform more sophisticated manipulations of these abstract concepts.

Results show that Chinese children reach advanced levels of mastery at an earlier age than English-speaking children, $F(1,71)=18.89$, $p<0.01$. This apparent rapid development on the part of the Chinese speakers and the acquisition-differential between these two languages is because Chinese children have the benefit of a temporal system that is based on an already-acquired numeric system. English children, on the other hand, have no earlier system on which to base the acquisition of time concepts.

Thus, we have shown that there is a strong link between the early mastery of specific nomenclature systems, such as simple numeric sequences and the subsequent acquisition of more cognitively complex systems, such as time-related schema. Also, languages which have cognitively simpler coding systems in one aspect can facilitate children's acquisition process.

(399 words)

Tables and Figures

Figure 1: The pictures on the story cards (English version)

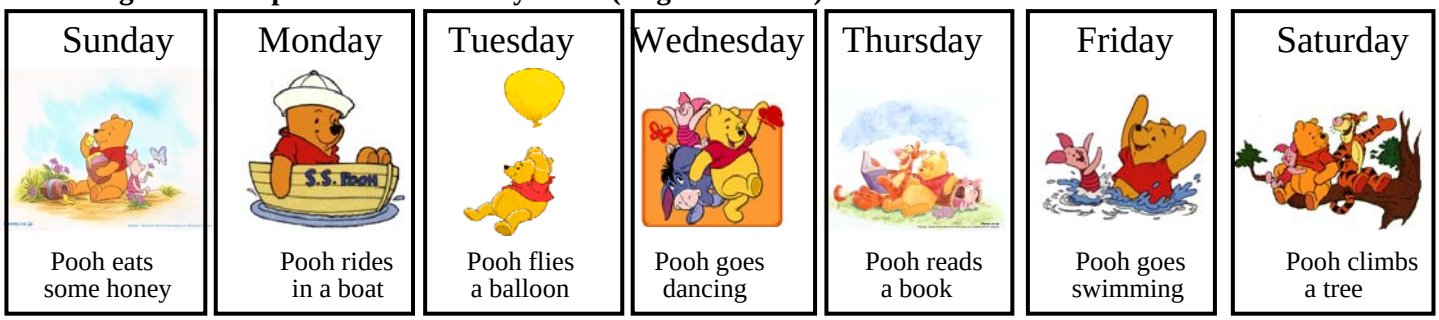

Table 1: Description of complexity levels and sample questions (5 questions per level for a total of 25)

	Level of Complexity	Description	Sample Question
1	Basic Composition	Knowledge of the week as an entity of time which has parts	How many days are there in a week?
2	Name Recognition	Knowledge of and the ability to distinguish the specific names of the days of the week	On what day does Winnie the Pooh go Swimming?
3	Adjacency Relationships	Knowledge that days are sequentially related with the ability to solve problems that involve days which occur next to each other	Today is Tuesday and Winnie goes swimming. What will he do tomorrow?
4	Within-week Proxemics	Ability to recognize, compute and verbalize about the distal relationship of days that are not simply adjacent, but are still within the scope of the same target week	Today is Sunday and Winnie eats some honey. On Tuesday he will fly a balloon. How many days must he wait to fly a balloon?
5	Cross-week Proxemics	Ability to recognize, compute and verbalize about the distal relationship of days that cross the boundaries of a conventional 7-day week as configured in the speaker's native language	Today is Friday and Winnie goes swimming. Next Monday he will ride in a boat. How many days must he wait to ride in a boat?

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