When months are numbered while days are not
—Korean Children's acquisition of time words

The difficulties that children have in thinking about time concepts may result from the complexity of time as a concept, but may also reflect the idiosyncrasies of particular calendar systems. Previous investigation into children's acquisition of time concepts (e.g. Kelly et al., 1999; Liu, 2010) has shown that Chinese children outperform English children in using the days of the month (DOW) and the months of the year (MOY) – a result explained by the fact that Chinese encodes the DOW and the MOY using a numerical system (Monday is "weekday one," January is "month one," etc.), while English uses arbitrary names. These studies claim that the use of number terms facilitates the early mastery of time concepts.

However, their results could be alternatively attributed to cultural and educational factors that differ between the two language groups. Korean, as a "hybrid" language that has both numerical and arbitrary time words, serves as a perfect candidate in testing if numerical transparency of time words truly affects children's acquisition of time concepts. The Korean MOY system is like Chinese in being numerical, but Korean's DOW system is like English in being arbitrary. If it is the numerical transparency of time terms that affects the age of acquisition, and not cultural factors, then the Korean-speaking children should perform better on the MOY, with its transparent naming system, than on the DOW, *despite* the possibility that month terms occur with lower frequency and there is less exposure to them in daily life.

Fifty Korean children between the ages of three and seven participated in the experiment. Each child first was shown a set of seven picture cards, each corresponding to a day of the week (Figure1). They were told a story about the character in the picture cards, Pooh, engaging in his activities on each day. They were then asked questions with five levels of complexity to assess what level of mastery they had attained in comprehending and using time terms (Table1). The five levels progressively tested their ability to perform sophisticated manipulations of these abstract concepts. They were also tested with questions about MOY, based on another set of 12 picture cards describing Mickey Mouse's annual activities (Figure2). Each child was sequentially tested with the two sets of questions, DOW and MOY.

Results show that Korean children have better performance in MOY test than in DOW test for each age group. A repeated measures ANOVA, with Age as a categorical within-subject factor and Test-type as a between-subject factor, showed a main effect of Test-type, $F(1,45) = 9.656$, $p < 0.001$, confirming the observation that Korean children generally scored higher in the MOY test. The results can be explained as a consequence of the numerical transparency of MOY terms in contrast to the opacity of the terms for DOW.

The present study demonstrates that the Korean children better comprehend and use a numerical months of the year system than an arbitrary days of the week system. The study provides a piece of strong evidence supporting the hypothesis that symbolic system (such as language) has an effect on children's acquisition of concept systems (such as time), even within one language system. More specifically, a numerically transparent naming system can contribute positively to the early acquisition of time concepts.

Figure 1: The pictures on the story cards of the DOW

월요일	화요일	수요일	목요일	금요일	토요일	일요일
						
보트를 타요.	풍선을 날려요.	춤을 춰요.	책을 읽어요.	수영을 해요.	나무에 올라요.	꿀을 먹어요.

Figure 2: The pictures on the story cards of the MOY

일월	이월	삼월	사월	오월	유월
					
눈사람 만들어요.	기차를 타요.	축구를 해요.	그림을 그려요.	운전을 해요.	꽃을 배달해요.

칠월	팔월	구월	시월	십일월	십이월
					
물개와 놀아요.	빗속을 걸어요.	물건을 만들어요.	산책을 해요.	영화를 만들어요.	선물을 줘요.

Table 1: Description of complexity levels and sample questions in DOW (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 the temporal 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 the temporal 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?

References

Kelly, Melissa K., Miller K. F., Fang G., & Feng G. (1999). When days are numbered: calendar structure and the development of calendar processing in English and Chinese. *Journal of Experimental Child Psychology 73*, 289-314.

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