Moon's Day, Tiu's Day, Woden's Day versus One's Day, Two's Day and Three's Day

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The world's languages code time-related concepts, such as the days of the week and months of the year, differently. For example, English names of the days of the week are derived from planetary or mythical terms and thus – for a child learning English – are arbitrary symbols. However, Chinese uses a numerical system for naming months and days (Monday is "weekday one", January is "month one", etc.). The current study proposes to investigate whether the use of numerical systems in calendar names affects how children acquire time concept.

I first tested Chinese and English monolingual children. Each child was shown a set of seven picture cards, each corresponding to a day of the week (DOW), and then told a story involving a cartoon character and his activities on each day. 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. Each progressive level tested the ability to perform more sophisticated manipulations of these abstract concepts. They were also tested with questions about month of the year (MOY) based on another set of 12 picture cards describing Mickey Mouse's annual activities. So each child was tested with two sets of questions, DOW and MOY. The two tests were conducted sequentially, and the testing order was balanced across participants. The result shows that Chinese-speaking children scored higher in both tests, F (1, 73) = 38.60, p<0.001, and it may suggest that mathematically transparent naming of time concepts confers advantages on acquisition of time concepts.

However, the result could alternatively be explained by cultural factors. I pursue this line of research by studying two "hybrid" languages with respect to numerical transparency of time words. Latvian has numerically transparent names for DOW, similar to Chinese, but makes use of arbitrary names for MOY, like English. In contrast, Korean employs numerical MOY names but arbitral DOW ones. If it is the numerical transparency of time terms that affects age of acquisition, and not other cultural factors, then we should see contrasting acquisition pace of children speaking these two languages. Results confirmed the observation that Latvian children generally performed better in the DOW test, which results from the numerical transparency of terms for DOW in contrast with the opacity of terms for MOY, F(1,35)=23.82, p<0.001, while the pattern for Korean-speaking children is the opposite of the Latvian one—they performed better in the MOY than the DOW test, F(1,45) = 9.656, p = 0.003, despite the possibility that month terms occur with lower frequency and there is less exposure to them in daily life.

These results provide a piece of strong evidence supporting the hypothesis that the numerically coded calendar terms facilitate children's acquisition of the temporal terms. This research addresses a fundamental question about the relationship between language and cognition, namely whether linguistic coding of a concept shapes how people acquire and subsequently use that concept. It also investigates the 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 concepts. It provides a new piece of evidence suggesting that the differences in numerical transparency of time terms affect how early children acquire time concepts, and what sorts of cognitive mechanisms they use to reason about time, even within one language.