

NUMBER-WORDS

by Emily S.W. Sum

Children learn how to say the number-word sequence and to count entities in their own culture before they enter primary schools. Chinese, and some Asian languages such as Korean, Japanese and Thai, have a regular named-value system of number words. The relative linguistic transparent number systems give a clear and consistent representation of the base-ten system. The regularity also helps Chinese students to construct multi-unit mental representation for multi-digit numbers. Research shows the arithmetic processing is sensitive to the linguistic representations of number words (Prior, Katz, Mahajna, & Rubinsten, 2015). Also, the mental representations of Chinese-based number systems allow students to add and subtract numbers with a sum between 10 and 18, and to add and subtract multi-digit numbers, more easily and accurately (Fuson & Kwon, 1991). And children from less regular counting systems have poorer understanding of the base-ten system (Mark & Dowker, 2015). In fact, many South-east Asian languages including Nepali, Urdu, Punjabi and Hindi have irregular number-word systems, and these irregularities affect students' learning and understanding of number concepts. Unlike the Chinese language, these systems do not directly name the ten and one values in two-digit numbers, making it difficult to see the underlying tens and

one structure and how the first nine numbers are re-used to make the decade words. Consequently, ethnic minority (EM) students would have difficulties in acquiring a new set of number words (either in English or Chinese), and they are more likely to make mistakes in place-value tasks and in multi-digit addition and subtraction, when compared with ethnic Chinese students.

Chinese number words have clear tens and ones that represents composition of numbers, e.g. 'ten one', 'two ten'. Therefore, teachers put less emphasis on the numbers

| | | |
|--|------|------|
| | 1 | 1 |
| | 43 | 43 |
| | + 19 | + 28 |
| | 62 | 65 |

that make ten with a given number. For example, eight plus seven, one needs to know that eight plus two (from the seven) is ten, plus the five left over from the seven is 'ten five'. EM students, who use a unitary representation or memorised number facts in adding and subtracting numbers to 20, may encounter difficulties in adding and subtracting multi-digit numbers accurately and/or meaningfully. Therefore, they need to develop a good understanding of tens and ones and the concept of place value. Perceptual and linguistic support on [Chinese] number words that focus on named-value rather unitary representation of two-digit numbers should be reinforced before the instructions of addition and subtraction take place.

References

- Fuson, K. C., & Kwon, Y. (1991). Chinese-based regular and European irregular systems of number words: The disadvantages for English-speaking children. In K. Durkin and B. Shire, *Language in mathematical education: Research and practice*, pp. 211-226. UK: Open University Press.
- Mark, W., & Dowker, A. (2015). Linguistic influence on mathematical development is specific rather than pervasive: Revisiting the Chinese advantage in Chinese and English children. *Frontiers in Psychology*, 6, 203.
- Prior, A., Katz, M., Mahajna, I., & Rubinsten, O. (2015). Number word structure in first and second language influences arithmetic skills. *Frontiers in Psychology*, 6, 266.