

**AN INTEGRATED VIEW OF CHILDREN'S NUMBER UNDERSTANDING**  
*A multi-component analysis from early counting to place value*

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Previous research has tended to focus on the development of separate number components (e.g. counting; addition; multiplication) and so, cannot comment on how development in *one* component affects development in *others*. In this study, 152 children from three different cohorts (aged 4, 5 and 6) answered to several maths tasks - three times along one school year - assessing their understanding of 5 separate number components, such as: counting and number-word sequence; structure of the decade numeration system; addition; multiplication; and written multi-digit numbers (place value). In the analysis, special emphasis was given to the separate role of each component and the developmental inter-relations amongst components, in children's understanding of progressively more complex ideas about number.

The evidence suggests that no progress seems possible without the inter-related development of several components, at key times. For example, no child could understand the structure of the numeration system without a previous *combined* understanding of advanced counting skills (i.e. continuation of counting), addition and multiplication. Also, children who failed to continue counting could not display understanding of addition or multiplication, although they all mastered the counting principles. Based on this longitudinal data, it was possible to outline a preliminary proposal about children's number development, which included the identification of important predictors. Evidence that over 97% of the participants fit the proposed model, suggests that the present approach is relevant and worth further investigation.

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- Fuson, K. C. (1988). *Children's counting and concepts of number*. NY: Springer-Verlag.  
Martins-Mourão, A. and Cowan, R. (1998). The emergence of Additive Composition of Number. *Educational Psychology*, 18(4), 678-695.  
Sinclair, A. et al. (1992). Constructing and understanding of place value in numerical notation. *European Journal of Psychology of Education*, Vol. VII (3), 191-207.