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Paul Goldenberg* (pgoldenberg@edc.org). *Mathematical habits of mind and the language-learning brain: mathematics as a second language.*

Language plays a surprising behind-the-scenes role in elementary arithmetic. Numbers weren't born with names. We named them, and we did so in a way that simplifies mathematical thinking by allowing certain mathematical ideas to be handled as if they were purely linguistic ones. The actions of the language-brain are less subtle in algebra. Algebra is both a set of ideas and a language in which to express them. We use the language aspect of it first to describe things we already know—an essentially semantic use of the language. Then, by manipulating these descriptions strategically according to the syntax of the language, we can derive things we did not previously know.

Young children, for the most part, cannot take that second algebraic step, using abstract manipulations to derive what they don't know. Because that is such a central part of the way we see algebra, we tend to overlook the descriptive side of algebra that young children can learn easily and excel at. In fact, young children are the best linguists of us all and, given the chance, can put their linguistic talents to good use in learning mathematics: not only in learning the language-part of algebra much the way they learn their native language, but also in understanding number, and in performing certain computations.

This talk will illustrate several mathematical ways of thinking that have linguistic roots, and suggest an approach in successful use that explicitly takes advantage of those roots. (Received September 17, 2008)