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Consequences of a phonological coding deficit on sentence processing

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It is often difficult to determine the role of specific cognitive codes or processes in complex language skills, such as sentence comprehension, because of the number of operations and the flexibility that individuals display in combining these operations. Neuropsychological data from patients with brain injuries can be useful in constructing models of normal language processing by demonstrating how language breaks down when a specific code or operation is impaired. The work reported here examined the sentence processing abilities of a patient with a specific impairment in phonological coding. The pattern of abilities and deficits that emerges can be used to clarify the role that the phonological code plays in normal sentence processing.

The data were collected from E.A., a conduction aphasic with the primary repetition disorder and the good spontaneous speech and comprehension that characterize the syndrome. E.A.'s digit span was severely impaired (auditory = 1.5 items; visual = 2.4 items), but various tests suggested that the memory deficit was secondary to an inability to represent information in a phonological code. The main concern in this study, however, was with the consequences of a phonological code/short-term memory impairment on sentence comprehension and production. Comprehension tests of reversible active and passive sentences revealed that E.A. made few errors on the active sentences (5% overall) but frequently made subject-object reversal errors for the passive sentences with both auditory and visual presentation (33% and 19%, respectively). Thus, she appeared to use an S-V-O mapping strategy when assigning grammatical roles to the constituent noun phrases.

Production tests, including story completion and picture description tasks, demonstrated that E.A. was able to generate a variety of sentence constructions and was generally sensitive to the contextual cues that dictate what constructions are appropriate, although she did show some tendency to produce sentences in active voice. Many of her errors, however, involved the omission of grammatical morphemes from her written production and did not occur in spontaneous speech or in oral responses to the production task.

Overall, the data collected from E.A. help define the role of the phonological code and short-term memory in normal language processing. Specifically, these data suggest that a phonological code is the primary means by which important syntactic markers are represented and that the ability of intact adults to recompute grammatical roles when the S-V-O mapping is violated may be heavily dependent on a phonological representation.