A continuum of language comprehension: college students, agrammatics, and everyone in between

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A fundamental question driving research on aphasia is the following: does the pattern of language deficits in aphasia reflect a *qualitative* difference between the mechanisms subserving language processing in aphasics and normal populations, or does the same pattern of deficits gradually emerge upon a continuum of increasing demands on the processing system?

In the 1970s and 80s, linguistically inspired research on Broca's and Wernicke's aphasia tended to portray these syndromes as the result of destruction of tissue responsible for syntactic and semantic information, respectively; more recent proposals contend that Broca's aphasia in particular results from the deletion of generative rules, or from lack of access to closed-class lexical items. (Grodzinsky, 1995) However, studies of aphasic patients across languages suggest that deficits resulting from neurological insult may be better characterized as a global reduction in general processing, in that patients retain the processing strategies unique to their language but manifest them in a degraded form. Indeed, comprehension and production deficits qualitatively similar to those observed in aphasia have been reported for orthopedic patients and elderly controls, suggesting that the receptive agrammatism profile may reflect more general effects of stress on weak or vulnerable elements in the processing chain. (Bates, Friederici, & Wulfeck, 1987)

In fact, a number of recent studies have replicated the characteristic Broca or "agrammatic" profile of deficits by subjecting normal comprenders to a variety of perceptual or attentional stressors. (Kilborn, 1991) In addition, connectionist simulations of neurological damage to a general learning mechanism lend support to the claim that seemingly discrete and selective processing deficits can arise in a distributed and domain-general processing system. (Marchman, 1992)

The present study addresses this issue by comparing the performance of impaired populations and normal undergraduates in a task that assesses comprehension of complex syntactic structure. Participants in the study included Broca's aphasics, Wernicke's aphasics, anomics, elderly controls, and college students. All participants performed the same basic task, which was to identify the agent in a series of auditorily presented active, passive, subject cleft, and object cleft sentences. All sentences were generated by randomly selecting two semantically neutral nouns (animal names) and a transitive verb for insertion into the sentence frame. One trial consisted of the following: pictures of two animals were displayed on a video screen and were named auditorily. A sentence containing both nouns was then presented. The participant was asked to push the button under the animal doing the "bad action".

College students (but not impaired or elderly participants) were randomly assigned to one of six stress conditions: normal listening, 50% speech rate compression, 50% partial noise mask, digit load, digit load and speech compression, and digit load and noise mask.

Analyses of correct response and reaction time measures indicate that 1) all aphasic groups share a similar profile of deficits across sentence types, 2) this profile is shared (to a lesser degree) not only by age-matched controls, but also by college students under noise or compression, and 3) surprisingly, digit load had no effect on syntactic comprehension, in contrast to findings in previous studies that showed a deleterious effect of digit load on comprehension of inflectional morphology. These data provide additional support for the view that language deficits caused by neurological insult may be better characterized as the result of severe strain on a distributed processing system rather than the result of damage to a discrete area of a domain-specific processor. In addition, they suggest that processing of morphological and syntactic structures may be differentially vulnerable to stress.

References

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