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# From Beetle to Bug: Progression of Error Types in Naming in Alzheimer's Disease

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The distributed feature approach to semantic memory organization has been supported by data from patients with Alzheimer's disease (AD) (e.g., Gonnerman et al., 1997). This account makes specific predictions about the types of errors one would expect in AD as semantic memory deteriorates, with initially more contrast coordinate errors, followed by superordinates, and finally an increase in unrelated responses. We investigate these predictions using a picture naming task, with both natural kinds and artifacts.

## Method

### Participants

The young normal (YN) group included 25 USC undergraduates, the old normal (ON) group 24 healthy elderly, and the Alzheimer's (AD) group 15 individuals diagnosed with AD, matched with the ON group for age.

### Materials and Procedure

Participants named 144 color pictures, with 12 items each from six natural kinds and six artifacts categories, controlled for familiarity, imageability, frequency, and typicality.

## Results & Discussion

The YN group correctly named 86% of the pictures, ON 85%, and AD 62%, indicating a significant impairment in naming for the AD group, ( $t(15) = -4.15, p < .0009$ ), but no significant difference between YN and ON controls.

To examine the types of errors AD patients made as their naming impairment progressed, errors were coded into three categories: 1) *contrast coordinate*, giving the name of another category member (e.g., calling a *zebra* 'horse'); 2) *superordinate*, giving the category label rather than the object name (e.g., 'bug' for *beetle*); and 3) *unrelated*, where the response was not from the same category (e.g., 'flute' for *cucumber*). No responses, 'I don't know', and machine errors were not included in the analysis.

To determine if the prevalence of a given error type was affected by the degree of damage, ratios of each error type over the total number of errors were calculated. Overall, there were initially significantly more contrast coordinate errors than superordinates ( $t(327) = -4.7, p < .00001$ ), followed by unrelated responses ( $t(190) = -3.5, p < .001$ ). This is consistent with the progression of errors in studies of patients with semantic dementia (Hodges et al., 1995).

We were most interested in the progression of errors within natural kind versus artifact categories (see Figure 1 below). The pattern of change varied by domain. As expected, there were more contrast coordinate errors in both natural kinds and artifacts early on, declining with increasing damage. Interestingly, while superordinate errors increased for natural kinds, they decreased for artifacts. The distributed feature approach provides a natural account of this pattern. As damage increases, the core features of natural kinds concepts are still available because they have more intercorrelations. The activation of these core features permits activation of the superordinate name, whereas the lack of similar correlations in artifact categories leads to a steady decrease in superordinate responses for artifacts. Finally, there is a greater increase in unrelated responses in artifacts compared to natural kinds in later damage stages.

## Acknowledgments

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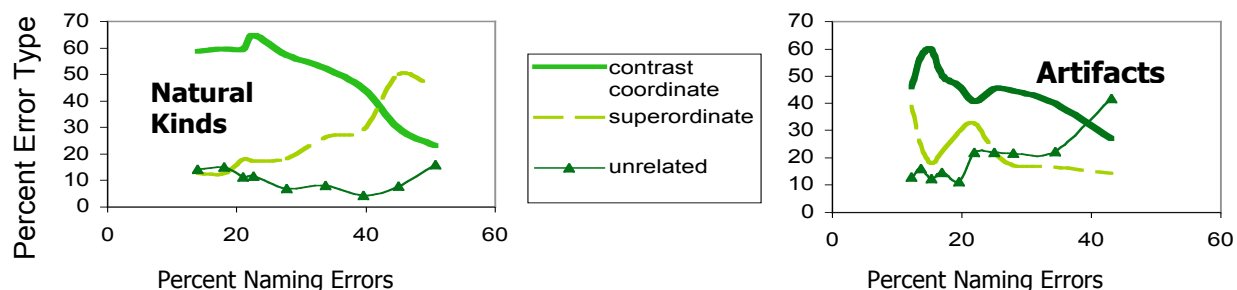


Figure 1. Percentage of error types as naming errors increase for natural kind (left) and artifact (right) concepts.