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# Determinants of lexical access in pure anomia

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## Abstract

Previous studies involving lexical access in anomic patients had employed regression analyses to separate the lexical variables. But it is now known that when the relevant variables are as closely related as frequency, age of acquisition (AoA), and familiarity, regression analysis loses efficacy. The aim of the present paper was to investigate which of these variables determines lexical access in anomic patients. In order to disentangle the effects of frequency from those of AoA, we conducted two picture-naming studies. In the first study, we used a semifactorial design in which we manipulated one variable and matched the other. In the second, we used an orthogonal factorial design in which the two variables were crossed to detect any interaction between them. The participants were pure anomic patients whose disorders affected lexical access exclusively; they had neither semantic nor phonological deficits. The statistical analyses show a clear effect of AoA, no effect of frequency, and no interaction between the two variables. The results of this study indicate that AoA is the main determinant of lexical access in anomic patients, and this must be taken into account in constructing materials for the assessment and rehabilitation of these patients.

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## 1. Introduction

The question of which variables determine lexical access during speech has received considerable interest in recent years. Words, generally, seem to come to mind effortlessly, but sometimes it is so costly to access a word that a speaker may spend minutes or even

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hours searching for it (the tip-of-the-tongue phenomenon) even when the meaning he or she wishes to convey is very clear. Why can some words be accessed so quickly and automatically, whereas others require an effortful mental search?

In investigations of the variables that determine lexical access, the methodology most often used is that of picture-naming, in which pictures of objects are presented on a computer screen and the time participants take to name them is measured. By manipulating the characteristics of words, we can discover which ones produce the longest naming times. Through this methodology, it has been confirmed that variables such as frequency of use and the age at which words are learned are extremely influential: less frequent words and those acquired later in life produce longer latencies (Barry, Morrison, & Ellis, 1997; Cuetos, Ellis, & Alvarez, 1999; Ellis & Morrison, 1998).

The variables that determine lexical access can also be investigated with aphasic patients. Whereas in healthy persons, the manipulation of a particular variable may lead to differences of a few milliseconds in a picture-naming task, in aphasic patients the same manipulation may mean the difference between correct naming of the picture and the inability to name it. Studies with aphasic patients not only have the advantage of providing information about the organization and functioning of the language-processing system both in normal conditions and with one of the components altered; but they also provide valuable information about the linguistic problems of such patients.

What types of words do aphasic patients access easily, and what types are less accessible? For some time, frequency was considered the principal determinant of lexical access for these patients. The first study that uncovered this relationship was that conducted by Newcombe, Oldfield, and Wingfield (1965), who observed an inverse linear relation between frequency of use and the time patients took to name objects (the higher the frequency, the shorter the naming time). This relationship was also demonstrated in later studies, in which patients' correct responses, rather than their reaction times, functioned as the dependent variable: the higher the frequency of use, the more correct responses the patients produced (Butterworth, Howard, & McLoughlin, 1984; Howard, Patterson, Franklin, Orchard-Lisle, & Morton, 1985; Kay & Ellis, 1987). However, many of the effects attributed to frequency were actually due to other, closely related variables that were not taken into account, such as familiarity, imageability, and length. All these variables are so closely interrelated (i.e. the most frequent words are also learned earliest in life, are the shortest and most concrete, and correspond to the most familiar objects) that it was not clear that it was frequency, and not one of the other variables, that accounted for the results.

One variable that has proven especially relevant to picture-naming in the reaction times of both healthy people and aphasic patients is age of acquisition (AoA): words learned early in life are more accessible than those learned late (Carroll & White, 1973; Morrison, Ellis, & Quinlan, 1992). In fact, the effects of AoA on naming in aphasic patients were reported even before the effects of frequency. More than 40-years-ago, Rochford and Williams (1962) confirmed that the age at which children can name an object predicts the proportion of aphasic patients who can name it. However, frequency was not controlled in that study, so the opposite problem of that pointed out above could occur—that is, an effect attributed to AoA might actually correspond to familiarity, frequency, or some other variable. The effects of each of the variables had to be disentangled to determine the actual influence of each one on patient response.

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