



# Classical anomia: a neuropsychological perspective on speech production

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## Abstract

We present data collected from two anomic aphasics. Thorough assessment of comprehension, oral reading and repetition revealed no underlying impairments suggesting that both patients were examples of *classical anomia*—word-finding difficulties without impaired semantics or phonology. We describe a series of experiments in which the degree of anomia was both increased and decreased, by cueing or priming with either a semantically related word or the target item. One of the patients also presented with an ‘acquired’ tip-of-the-tongue phenomenon. He was able to indicate with a high-degree of accuracy the syllable length of the target, and whether or not it was a compound word. Neither patient could provide the first sound/letter. The data are discussed in terms of discrete two-stage models of speech production, an interactive-activation theory and a distributed model in which the positive and negative computational consequences of the arbitrary relationship between sound and meaning are emphasised. © 1999 Elsevier Science Ltd. All rights reserved.

## 1. Introduction

All models of speech production assume that naming can falter for a number of reasons and that these different types of failure reflect the underlying organisation of speech production. Thus with careful study of patients with word-finding difficulties, it should be possible to improve our knowledge of the representations and processes that are required when moving from meaning to speech.

### 1.1. Does classical anomia really exist?

If we consider speech production from meaning to phonological encoding, then the first impairment that leads to anomia is damage to the semantic system itself. Disorders of conceptual memory typically result

in profound word-finding difficulties. In semantic dementia [28,64], patients often present with a history of progressive anomia, although with further assessment comprehension deficits can be identified. The patients’ gradual semantic deterioration is coupled to increasing word-finding difficulties. This *semantic anomia* can result in a pattern of semantic errors that seems to reflect the nature of the degrading semantic representations (cf. [27]). Of course, semantic anomia is not limited to progressive aphasia but can occur in other aetiologies too [9,19,20,26,51].

It is possible, at least theoretically, to identify patients without semantic (nor phonological) impairment who present with word-finding difficulties: for which we adopt the term, *classical anomia*—first used by Geschwind [21] to describe patients who could not name an object but could easily pick the correct label from a range of possible names provided by the examiner. There are some patients for whom a post-semantic, pre-phonological impairment is reported to have been central to their anomia. Graham, Patterson and Hodges [24] reported longitudinal naming and compre-

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hension data collected from patient, FM. Although initially presenting with profound anomia and a mild comprehension impairment, over a two year period her word-finding deteriorated even further but her scores on various comprehension tests remained unchanged (see Fig. 2 in [24]). Gainotti, Silveri, Villa and Miceli [20] were able to divide a group of anomic patients into two sets, one with an accompanying semantic impairment in whom the degree of semantic impairment predicted the severity of anomia and another group who presented without a comprehension impairment. Interestingly, the range of naming accuracy for both groups was the same. This would seem to reject the possibility that the degree of anomia is only a function of the level of semantic impairment. Other patients have been reported with anomia who perform well on comprehension tests [4,18,25,29,35,38,51,59] including the much cited case EST [33]. EST only managed to name 22% of the items from the Boston Naming Test [22] but performed within the normal range on a variety of taxing comprehension assessments including the Pyramids and Palm Trees Test [31] and the word-picture matching test constructed by Shallice and McGill [62] which includes very infrequent concrete, emotion and abstract targets.

These studies imply that speech production can break down as a result of a post-semantic, pre-phonological impairment. If we adopt the strictest criteria, however, most of these cases would not be called classical anomics. Let's consider first, the evidence presented against a semantic impairment. In this regard it is imperative to note that receptive comprehension assessments are nearly always less sensitive to a semantic impairment than expressive tasks. Thus for a patient to be described as being unlikely to have any central semantic impairment (of course it is impossible to prove the null hypothesis that the patient definitely has no deficit), assessment should include a wide range of sensitive comprehension tests that require precise understanding of infrequent concrete and abstract<sup>1</sup> words which go beyond the items used in the production tasks—this is especially true if semantic representations exhibit graceful degradation [17] such that mild impairments lead to little or no measurable comprehension deficits. Some studies that have included a greater number of semantic tests have highlighted subtle semantic impairments. For example, two of the anomic patients described by Laine et al. [35] completed word-picture matching and classification tasks

without error—but when tested further the patients' performance was outside the normal range when they were required to pick a specific semantic feature for the unnamed pictures.

A small proportion of the patients noted above have been tested and have passed a wide variety of comprehension assessments (e.g. EST: [33]) but they do not meet the second part of the criteria for classical anomia because there is evidence for an impairment within phonology itself. Some patients produce phonologically related errors in naming [4,33,51] or are unable to use phonology correctly when words and nonwords are presented for repetition and reading [11,33,59]. In summary, the existing literature provides little evidence for the existence of classical anomia. The word-finding difficulties described in most cases can be explained as a collateral effect of semantic and/or phonological deficits.

### 1.2. *Manipulating the degree of anomia*

It has been known for some time that patients' word-finding difficulties can be alleviated, at least temporarily, if they are provided with an appropriate cue. Pease and Goodglass [55] presented a range of cues to an unselected group of aphasics with word-finding difficulties. Presenting the first sound of the target or a sentence to complete were the most effective types of cue. In addition they found that the effectiveness of cueing (overall) was related to the degree of anomia—greatest benefit was shown by the patients with the mildest impairment. Patterson, Purell and Morton [54] used a different method to improve performance. When the patients were unable to name a picture, the examiner provided the correct name to the patient, which they were asked to repeat. This repetition procedure was found to facilitate later retrieval if the picture was presented again after a few intervening trials. In a subsequent experiment Patterson et al. found a significant improvement in word retrieval if the patients were presented with the first phoneme and even more so when the length of the cue was progressively increased.

Attempts to improve patients' naming are relatively common. It is unusual to find reports of experiments in which the degree of anomia is temporarily increased. This is not surprising given that it seems a little cruel to increase a patient's deficit. However, the identification of a method, or methods, by which an impairment can be both increased and decreased may reveal a great deal about the underlying deficit and, in turn, about the nature of speech production itself. For the sake of brevity we shall postpone a comparison of three broad types of speech production theory (two-stage lexical access, interactive activation models and distributed architectures) until all the relevant patient

<sup>1</sup> It may seem a little odd to include abstract word knowledge within the assessment of an anomic patient who cannot name pictures of concrete items. However, we believe it useful to include these items, as abstract concepts tend to be less familiar to normal subjects and thus potentially sensitive to any underlying semantic impairment.

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