



Two routes to naming: A case study

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Abstract—We report the case of an aphasic patient, KP, whose spontaneous speech and ability to communicate verbally were severely reduced. His comprehension of written words was preserved. Naming was relatively preserved for objects but impaired for actions. We designed experiments to investigate his verb processing and sentence completion. KP's knowledge of verb syntax was impaired in contrast to his relatively preserved knowledge of verb semantics. His ability to retrieve a noun on visual confrontation was significantly better than his ability to retrieve the same pool of nouns through propositional language. We interpret the data in terms of two 'routes' to noun-retrieval, a nominal route and a propositional speech route. Furthermore, we suggest that the dissociation between verb syntax and verb semantics can also be accounted for within this framework. Copyright © 1996 Elsevier Science Ltd.

Key Words: anomia; aphasia; word retrieval.

Introduction

Naming difficulties are observed in all the major aphasic syndromes. In some patients, such difficulties occur in the context of otherwise fluent speech. The opposite pattern of performance, relatively well-preserved naming abilities in the context of markedly non-fluent spontaneous speech was first described by Lichtheim in 1885 [17]. He interpreted this syndrome as the result of disruptions between concept centres and the centres for motor images of words. Lichtheim termed this type of language dysfunction "traumatic aphasia" (case II; p. 447). Wernicke [42] accepted Lichtheim's description of the syndrome and re-termed it as transcortical motor aphasia (TMA) [8]. TMA is characterised by a disproportionately reduced spontaneous speech, compared with verbal comprehension, retained ability to repeat words and sentences, name objects and read aloud. The first published case in which naming isolated items was intact, whereas composition of sentences from given words was defective, was reported by Heilbronner [12; cited by De Bleser, 7]. Perseverations are not uncommon in TMA; when present, they contaminate written, pointing and spoken responses. Thus, Luria and Hutton [20] distinguished two forms of transcortical motor aphasia,

"perseverative aphasia" and "dynamic aphasia". In the former syndrome the patient is able to repeat only single words. Dynamic aphasic patients do not have perseverations and, consequently, repetition of sentences is accurate but, here also, spontaneous speech is sparse even to the point of lacking content words. As in the original descriptions of transcortical motor aphasia, these patients' naming is accurate and in marked contrast to their impairment of spontaneous speech.

An additional feature observed in some anomic patients is the evidence of selective impairments in the processing of certain classes or categories of words. Dissociations between semantic classes such as animate versus inanimate categories [40, 41] as well as between grammatical classes such as nouns versus verbs have been observed [22, 24, 26, 45].

Naming abilities are usually assessed by means of picture naming tasks. However, the context in which the target is to be produced can affect the level of performance. Williams and Canter [43, 44] demonstrated that Broca's aphasic patients were able to retrieve a noun significantly better on a confrontation naming task than on a picture description task. By contrast, their Wernicke's aphasia patients performed significantly worse on the confrontation naming task than on a picture description task. A further contextual factor that affects the level of naming performance is whether the target is produced as an isolated word, typically naming to visual confrontation, or within a sentential context. Zingeser and Berndt [45] reported that their patient, HY, produced

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nouns significantly better when he was given a sentence frame than when he was asked to name objects to visual confrontation. Similarly, Breen and Warrington's [4] severely anomic patient, NOR, was able to retrieve nouns significantly better within a sentence context than on visual confrontation. Both patients, HY and NOR, presented with a grammatical class dissociation: they named verbs significantly better than nouns.

The converse pattern of performance, very poor action naming together with impaired sentence generation, is characteristically shown by agrammatic patients. Some studies have focused on the dissociation of syntactic from semantic processes involved in language reception and production [34]. Further investigations have focused on patients whose productive syntactic deficits selectively affect the constructional aspect of sentence generation, sparing the morphosyntactic processing [1, 28].

In this paper we report a patient, KP, whose spontaneous speech was severely non-fluent and who was unable to generate sentences. This was in contrast to his naming abilities which appeared to be relatively well preserved. Additionally, he presented with a grammatical-class dissociation: his ability to name objects was significantly better than his ability to name actions. Our aim therefore, was to document the scope of KP's impaired verb processing and to investigate to what extent this impairment contributed to his non-fluent aphasia.

Case report

KP (d.o.b. 20.12.27), a right-handed retired computer operator was referred to the National Hospital in 1992 for investigations of weakness in his right hand and forgetfulness. On examination there was a mild right-sided ataxia of the cerebellar type, diplopia and a slurring of speech. The only other finding of note was his cognitive decline which affected for the most part his language functions (see below). An MRI scan (27.2.92) showed diffuse high signal lesions predominantly adjacent to the ventricles. Over the next 2 years his neurological status deteriorated and his memory and language skills became more impaired. A dementing illness due to diffuse cerebrovascular disease was diagnosed.

Psychological test findings

KP was first tested on the Wechsler Adult Intelligence Scale-Revised (WAIS-R) in January 1992 when he obtained a verbal IQ of 91 (pro-rated from four subtests) and a performance IQ of 117 (pro-rated from three subtest scores). On this first assessment, his visual recognition memory was average (42/50) and his verbal recognition memory was low average (39/50) [37]. KP was re-referred to the department on 11 January 1994. Comprehensive formal assessment was no longer possible because of KP's difficulties in grasping instructions and in following test

demands. On this occasion, he was given selective subtests of the WAIS-R. He obtained a low average score in the digit span (six forwards and three backwards). His score on one nonverbal subtest (block design) was superior as it had been previously. His digit span was tested again in September 1994. On this occasion, his span forwards had deteriorated to two digits (he was not tested on digit span backwards). It was observed that identical performance was obtained with other stimuli: thus his span for both letters and words was also two.

On a short version of the Verbal Recognition Memory Test he scored below the 5th percentile (17/25) [38]. By contrast, visual recognition memory on the standard, more stringent test was again average (41/50). He was only able to name 4/12 famous faces, however, he recognised a further five stimuli.

Language assessment. His spontaneous speech was non-fluent and so sparse that his ability to communicate verbally was severely reduced. His speech was very mildly dysarthric but no phonemic paraphasias were observed. A single word repetition task was presented. The list consisted of one-, two- and three-syllable words; there were 90 words in each of two frequency bands: high frequency (A or AA) and low frequency (<10). KP repeated 140/180 words correctly. He had significantly more difficulty in repeating the low frequency words (63/90 correct) than the high frequency words (77/90 correct, $\chi^2 = 5.4$, $P < 0.25$).

His naming ability was strongly affected by the frequency of the items to be named. He named the 19/30 more common items of the Oldfield test [29]. On a further naming test, consisting of 50 high frequency items, 10 of each of five categories (objects, countries, animals, body parts and colours), performance was fairly satisfactory, he scored 45/50 correct (four errors were made on the animal category). By contrast, naming 30 high frequency verbs was markedly poor (3/30 correct) [22].

KP attempted a sentence completion task. A written sentence with the last word, a high probability terminal noun omitted was presented (e.g., "He sent the letter without a ---"). KP was required to read the sentence and either say aloud or write the missing word. His performance was poor, he was able to retrieve a suitable word (noun) for only 2/5 sentences.

His reading abilities were assessed on the National Adult Reading Test (NART) [27] in January 1994 when he obtained an average score (reading IQ equivalent = 90). He was presented with two further sets of words whose spelling to sound correspondences differed in the degree of irregularity. There were 20 "mildly irregular" words (e.g. shovel, castle, comb) and 20 "very irregular" words (e.g. plough, doughnut, parachute). KP scored 16/20 correct on both sets. On a further list of 50 closed-class words (pronouns, adjectives and conjunctions) he scored 43/50 correct.

Comprehension at the single word level was assessed on a stringent written two-choice synonym test for concrete and abstract words [39]. He obtained an average

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