

## A Personal Case History of Transient Anomia

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The article presents a first-person account of a transient anomia or word-finding deficit; the assumption is that such an account, reported by someone with a professional background in memory, cognition, and language processes, may shed additional light on the nature of an omic episode and on the subjective experience of memory and language disruption due to brain-related abnormalities. During the 45-min episode, I was unable to retrieve and use specific content words and terms ('data,' 'experiment,' 'printout') in overt speech. I was completely conscious of these target concepts, although not of their names, and was aware of my inability to find the words. Neither word finding for 'everyday' words nor ongoing thought processes were particularly disrupted. The nature and quality of my thoughts during the episode indicate no loss of awareness of circumstances or 'presence of mind,' but no genuine awareness of the seriousness of the episode. I briefly consider the implications of my experience and the similarities to another published case history. © 1993 Academic Press, Inc.

**What is it like to lose one's language abilities? What is the inner experience, both cognitive and emotional, of an individual whose language or memory abilities are disrupted? Research on aphasic and amnesic syndromes has provided an impressive catalog of evidence about the behavioral consequences of brain abnormalities and damage, and there is no need to repeat or review these consequences here. But what of the mental consequences, as experienced subjectively by the affected individual?**

Two reasons for inquiring into the subjective experience of language dysfunction may be offered. The first is basic curiosity about the nature and extent of an individual's disruption. For example, a neuropsychologist may attempt to draw inferences about a patient's subjective experience based on whatever evidence is available, often the fragmented language a patient can generate or the apparent emotional reaction displayed by the patient. Second, it is not uncommon to marshal additional evi-

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dence about a patient's cognitive status from the individual's apparent subjective state or emotional reaction; for example, Kertesz (1982) described the neologisms of a Wernicke's aphasic by adding "There is a rather curious cool and calm manner about her speech as if she did not realize her deficit . . . a very characteristic feature of this disturbance" (p. 42). However difficult it is to devise thorough assessments in such a case, the patient suffers a double disadvantage, being unable to communicate fluently or precisely and naive about the cognitive and linguistic processes that have been disrupted. Our inferences about preserved and disrupted functions, therefore, generally remain somewhat uncertain and tentative.

In this paper, I offer a detailed recollection of inner mental experience during an episode characterized by anomia or word-finding difficulty. Because my recollection is not subject to the typical double disadvantage, the analysis may shed some light on the nature of thought in the absence of fluent language ability. While I do not claim that my experience is to be taken as universally true for all such language disruptions, it is quite similar to at least one reported case (Kay & Ellis, 1987; see Part 3 below). As such, it may be useful in corroborating inferences drawn by these investigators and in devising assessments in future research.

For organizational purposes, I have divided this case history into three parts. The first part is background, which describes relevant demographic, setting, and diagnostic information. In the second part, I relate the several events that occurred during the 45-min episode, including my thoughts and reactions to those events. The two individuals I spoke with during the episode have corroborated the observable events and behaviors I describe in this account. My assistant and I independently wrote diary-like accounts of the episode, hers within 2 weeks, mine within a month. These agree with my current recollections, which can still be described as indelible. Finally, in the third part I attempt to identify general characteristics of the episode that may be of interest to the study of cognition and the neurosciences.

## PART 1—BACKGROUND

At the time of the seizure, 14 September, 1988, I was 38 years old, an Associate Professor of Psychology, with a 1975 Ph.D. in Experimental Psychology. My specialty is cognitive psychology, and my research is in the area of cognitive arithmetic. I had taught Cognitive Psychology for approximately 12 years, and Psychology of Language for 3 years. The only noteworthy exception to general good health was a single grand mal seizure at age 18, my sophomore year in college, diagnosed at the time as due to overwork and fatigue.

On the date of the episode, some 2 weeks before the beginning of Fall

term classes, my research assistant, Mabelle, and I had spent several hours at professional "housekeeping," selecting which printouts, many of which were at least 10 years old, to keep for archival purposes and which to discard. While my assistant continued this activity, I spent the last few hours of the day reading and doing paperwork, sitting at the desk in my office. The episode began at approximately 4:45 PM, and was over at 5:30 PM.

The episode was tentatively diagnosed by the attending emergency room physician that evening as a transient ischemic attack, with instructions to see my regular doctor the following day. Eight days later, angiography revealed an arterio-venous malformation (AVM) in the anterior left temporal lobe. Two neurosurgeons independently diagnosed the 45-min episode as a seizure caused by the "steal effect;" i.e., blood is "stolen" from brain tissue by the AVM, triggering a seizure. There was no evidence of prior hemorrhage in any diagnostic test. Some 10 weeks later, the AVM was surgically removed with no complications and no short- or long-term sequelae.

## PART 2—THE EPISODE

For clarity, I adopt the following notational conventions in Part 2. Explanatory information about the settings and activities surrounding the six events of the episode appears in normal typeface. My verbatim overt speech appears in double quotations. I note paraphrases of overt speech, mine as well as Mabelle's and my wife Mary's, in single quotations; not surprisingly, I cannot quote these two people verbatim, nor myself in the lengthy conversations of events 5 and 6.

My thoughts during the 45-min episode are described in italics and set off in brackets [*as shown here*]. It is critical to this account that the following point be clear. My inner thoughts, stated in the present tense to convey the stream of consciousness, are described as if they consisted of straightforward, syntactically and semantically fluent sentences. They were not simply inner or subvocal speech, however. The most powerful realization I had during the episode, and the most intriguing aspect to me since then, was the dissociation between a thought and the word or phrase that expresses the thought. The subjective experience consisted of knowing with complete certainty the idea or concept that I was trying to express and being completely unable to find and utter the word that expressed the idea or concept. The thoughts can only be described in sentence-like form, because they were as complex, detailed, and lengthy as a typical sentence. They were not sentences, however. The experience was not one of merely being unable to articulate a word currently held in consciousness. Instead, it was one of being fully aware of the target *idea* yet totally unable to accomplish what normally feels like the single act of finding-and-saying-the-word.

*Event 1, 4:45 PM*

I was looking at a printout from a study on math anxiety, unable to tell if it was one of the old analyses, in which we analyzed three levels of anxiety, or a newer one, with four levels. It vaguely seemed like too much trouble to figure out which analysis I was examining, although looking at the degrees of freedom would have answered this question. Mabelle came into my office with a computer printout, put it in front of me on my desk, and said 'I don't know if you want to keep this one or not, or what label to put on it if you do want to keep it.'

*[This is the ANOVA printout from Ben's experiment, the study on 3rd, 4th, and 6th graders. We always call it DevCogArith.]*

I said "Oh, that's . . . uh . . ." After a few seconds, I tried again. "It's the . . ." *[That's sort of funny; I can't remember DevCogArith, or the words printout or experiment.]*

I recognized the printout immediately. The abbreviation stood for Developmental Cognitive Arithmetic, since it was the first developmental study on arithmetic that we had conducted, in school year 1978–1979 (Ashcraft & Fierman, 1982). Handwritten on the printout was G-3 4 6, indicating that the factor labeled G was for those three grades.

I chuckled audibly at my inability to label the printout, then said "We'll have to do this tomorrow." Mabelle returned to her office and I remained at my desk. Her written recollection 2 weeks later says: "He seemed distracted. He said something about not being able to find the words, laughed a little, and continued to stare at the printouts." She later explained that she assumed I had been engrossed in what I was doing and was unable or unwilling to shift to a different topic.

*Event 2, 4:55 PM*

Mabelle came into my office again. *[I've been sitting at my desk for about 10 min, staring at the desk lamp, with nothing on my mind; I'm not even daydreaming.]* Mabelle asked me another question about some printouts, and I was again unable to respond with anything more than sentence fragments. *[I know exactly what I'm trying to say, why won't the words come to me?]*

*Event 3, 4:56 PM*

As Mabelle left, I turned to the computer on the table opposite my desk. The message on the screen indicated that I was still logged onto the mainframe computer. *[It's late, I have to log off so I can go home.]* As I positioned my hands at the keyboard, I realized I could not remember the command to log off—the command, of course, is simply *logoff*, a command I issue with great regularity. I stared at the screen for a few

moments, still could not remember the command, and at that point realized that something unusual was happening.

*Event 4, 5:00 PM*

*[This is weird, something is wrong. I wonder if I'm ok. I'll test myself, I'll walk to the restroom and see if I'm weaving down the hall, or if my vision is distorted.]* I had no difficulties walking to the restroom and returned to my office satisfied that I was physically all right.

*Event 5, 5:10 PM*

Although it was not unusually late for me to be at the office, I decided to phone home anyway to say I'd be leaving shortly. I was sitting at the computer again, still unable to remember the logoff command. I reached for the phone next to the computer, pressed the line button for a dial tone, pressed 8 for an outside line, and dialed my home phone number with no difficulty or hesitation.

Mary answered, and I said "I'm coming home." Mary was immediately aware that something was wrong, given that I was speaking quite hesitantly, and said "Are you all right—you sound funny." I responded "I guess I'm confused." "Confused about what?" Mary asked. *[Well, we were cleaning out the cabinets, going through printouts of old experiments, and I couldn't remember the words printout or experiment—but I still can't remember those words. I can't even remember the word cabinet. How can I explain what I'm confused about when I still can't think of the words to say it?]*

I attempted several times to start a sentence that explained my inability to remember these words, but each one trailed off after 'well, we were' and the like. Mary said, roughly, 'Stay there, I'm calling Steve to come get you.' I knew, however, that this colleague had already left for the day, having seen his darkened office during Event 4. I said "No, I'll just come home." Mary insisted "Something is wrong, and you have to go to the emergency room." I became very stubborn about driving myself home. *[I have to sound very calm and firm; I don't want to leave my car here overnight, so I have to persuade Mary I can drive home.]* Mary said "Stay there" and then hung up. The line was busy when I phoned again.

Machelle came into the office again, and I told her 'Mary is worried about me.' I do not recall mentioning the computer problems, but Machelle's written record indicates that I also mentioned that I could not remember how to logoff from the computer.

*Event 6, 5:20 PM*

I reached my wife by phone again and once again insisted that I drive myself home. I said 'I'm leaving for home now. If I'm not there in half

an hour, or if I have problems, I'll stop at a phone booth and call you.' [I just want to get home. And I don't want to leave my car here overnight.] Mary insisted that I not drive and then asked to speak to Machele, asking her to drive me to the hospital; I gave up on driving myself home. Machele hung up, said she was going to get her car and would be back in 5 minutes. She left the office.

At approximately 5:25, I looked at my computer again and with no difficulty at all remembered the logoff command; I typed the command, logged off successfully, and turned off the computer. As I waited for Machele, I remembered the words I had had difficulty with and said them out loud to myself; "printout, data, experiment, results." When Machele returned, I said 'I'm fine now. I can drive myself, but I'd like you to follow me just in case.' She agreed reluctantly, and we left the office. As we walked down the hall, I looked at my watch—it was 5:30—and I realized that whatever had happened was now over. I repeated this to Machele. I forced myself to concentrate on driving, not letting myself think about what had just happened.

### PART 3—ISSUES

There are several interesting facets of this experience that deserve mention. Given my involvement, however, I would offer only three; even now, these seem completely certain to me.

#### *(a) Emotional Reaction*

It seemed mildly amusing to me, to the point of chuckling, that I was unable to think of those words, for the most part my ordinary and routine "professional vocabulary" (but I was also unable to retrieve "cabinet," which is not plausibly described as part of "professional vocabulary"). The feeling was similar to a tip-of-the-tongue (TOT) experience, except that no synonyms, word initial letters or sounds, or alternate ways of expressing the idea came to me either. I responded to the retrieval difficulty by slowing my rate of speech, hesitating, and stopping when the next word was unavailable ("fumbling for words," in my wife's description). Stated differently, I did not substitute general words (e.g., "thing," "stuff"), i.e., did not invent the circumlocutions typical of more permanent anomia. Event 3, however, represented a memory failure that made me aware of a genuine disorder. In response, I tested myself by walking down the hall, careful to note physical balance, vision, and so forth.

There was never a sense of panic or desperation during the episode, which I attribute to the nature of the disruption. I imagine that sudden pain or physical inability might easily generate panic; see, for instance, Kolb's (1990) reaction upon discovering that his visual field defect was binocular, hence central rather than retinal. Furthermore, my reaction

would very likely have changed to concern or desperation if the episode had lasted substantially longer. But the largely mental nature of my disruption seems to have yielded a slightly bemused and puzzled reaction. Normally, we do not become overly concerned if we momentarily “block” on remembering a word, the name of a film, etc., and this is how the experience seemed to me at the time.

(b) *“Train of Thought”*

Event 4 is a clear demonstration, in my opinion, of how a relatively complex sequence of thought proceeded without disruption during the seizure. I realized that something was wrong, devised an assessment of my coordination and perception, collected data by self-observation, and then drew a conclusion from those data; the sequence seems quite similar to Kolb’s (1990) self-test of visual functioning. In my interpretation, this activity represents a straightforward instance of conscious (i.e., not automatic) cognitive processing and problem solving, which was conceived, devised, and accomplished during the seizure itself. (Note also that it was during Event 4 when I noticed that my colleague Steve had left for the day, a fact I then retrieved during Event 5.)

Nonetheless, I cannot say how the undeniable stubbornness at Events 5 and 6 should be judged, a disruption of logical thought or an overriding (yet subdued) emotional reaction. I clearly felt competent to drive, wanted to be at home, and tried to be persuasive enough to win the argument. On the one hand, the motivation for this, not leaving my car in a downtown University parking lot, strikes me as understandable, and the ensuing ‘phone booth plan’ was rather complex. On the other hand, it also seems irrational; objectively, people should not drive during a seizure (but of course I did not self-diagnose the seizure). In some ways, there was no gross disruption of ongoing thought. Being unaware of the potential gravity of the episode, however, may be evidence of a greater disruption of thought than I suspect, or of the overruling of rational thought by emotional reaction.

Ironically, it did not occur to me to test any other mental capacities during the seizure; as the “subject” in an unplanned study of temporary brain dysfunction, I failed to act as an “experimenter” in testing other mental functioning. Awareness of the word-finding problem could have prompted me to determine if other nonprofessional words besides “cabinet” were also blocked. I could have tested my ability to do arithmetic or math problems, given my involvement in a project on acalculia among brain-damaged children. In retrospect, a major disappointment is that my assistant did not refer to the printouts by name; my guess is that I would have correctly recognized that word even though it was blocked from retrieval (see below).

I infer that sensory–motor processes, short-term memory, and a good

deal of long-term memory were unaffected by the seizure (e.g., vision, physical balance, etc. were intact; I maintained the topic in the conversations with my wife, I recognized the need to logoff in Event 3, and I retrieved my home phone number in Events 5 and 6). I conclude that attention/awareness, short-term memory, and problem solving processes requiring a sustained "train of thought" were relatively unaffected by the seizure. Based on preserved functions, the language retrieval deficit that was apparent, and the location of the AVM, I assume that the seizure was restricted largely to the left temporal lobe and those nearby regions that could have been affected by the steal effect. If this assumption is correct, then the preserved cognitive functions apparently do not depend in any major way on these left temporal regions, or, alternatively, they can be accomplished by other regions if need be. In either case, and regardless of the localization of the seizure, the preserved cognitive processes and functions do not seem to depend on fluent and undisrupted word retrieval.

(c) *Thought and Language*

I reiterate the conclusion—problem solving and cognition accomplished during the seizure—with one addition; the problem solving and cognition were *thoughts without language*. I was not saying sentences to myself mentally as I planned to assess my coordination and perception, or as I attempted to converse with my wife. The idea, expressed in Event 4 as [*I'll test myself; I'll walk to the restroom . . .*] was as complete and full as any idea one might have normally, but was not an unspoken mental sentence.

James (1890, p. 651) described the experience of recalling a memory as occurring "in one integral pulse of consciousness." I understand this to refer to an immediacy of awareness, the sense that an idea comes into awareness *right now*, as it were. Such a description is a completely apt expression of my experience during the seizure, in terms of accessing concepts and ideas. It is also an introspectively appealing description of the normal operation of memory and recall. When a student asks a question during my lecture, I know—in a seeming instant—what idea to express in answering the question. I then proceed to verbalize my answer, occasionally laboring over a word or phrase, but more usually generating the sentence quite automatically. It was the unusual "gap" in this usually seamless process, a process taken completely for granted in normal circumstances, that amazes me and requires expression here.

Throughout the seizure, I was completely aware of the concepts and meanings I wished to express. This was not merely awareness of a general meaning or some vague approximate idea. It was, to use standard terminology, complete and successful semantic access to (retrieval of) the



precise target concept. In several cases (e.g., the specific experiment in Event 1), there was also successful retrieval of exact episodic concepts or memories. But for those "professional" words, *no words or labels accompanied the retrieval.*

I think of the events that occurred in terms of three sequential steps, with a disruption in the second step of the normal sequence; see the Post Script below, where a strikingly similar explanation by Kay and Ellis (1987) is described. Step 1 is semantic retrieval, which yields access to and awareness of the idea to be expressed. Step 2 is the process of accessing the word or phrase that names this retrieved idea, essentially lexical access. Finally, the fluent articulation of the retrieved word name is Step 3. Typically, the three steps occur quite rapidly and automatically, as in James' "integral pulse." And needless to say, we are not introspectively aware of the three-part separation. During my seizure, however, the seamless operation of the sequence broke down, because of a disruption in Step 2.

Note three points about the proposed Step 2. First, it was not tied uniquely to articulation; beyond the inaccessible words "printout," "experiment," "cabinet," etc., I could not access the logoff command to be typed at the computer keyboard. Second, word retrieval was not totally disrupted, in that retrieval and articulation of "confused" and "phone booth," along with more common, everyday words, was successful. It is tempting to cast my distinction between "professional" and everyday vocabulary in other terms, for instance the abstract/concrete dimension, or in terms of word frequency (e.g., Ellis, 1985), and to claim that the mental lexicon or the process that accesses the lexicon is sensitive to that dimension. On the other hand, my claim about "professional" words may simply be the result of not having attempted to converse about other substantive topics.

Third, the specific retrieval failures in Step 2, although possibly not surprising in anomia, are peculiar from the perspective of memory and cognition. There is a wealth of information concerning retrieval cues, context, and the effects of encoding specificity (e.g., Schacter, 1989; Tulving, 1983, chap. 9). As a rule, the more similar a retrieval attempt is to original encoding of information, the more successful retrieval will be. As such, it is odd that those particular words were inaccessible in the very location where they are normally most common, my office.

#### *Post Script*

Since drafting this paper, I have discovered a fascinating report by Kay and Ellis (1987), discussing patient EST's permanent anomia. In most respects, and with the obvious exception of the permanence of the anomia, the cases seem quite similar, even down to EST's awareness of his

deficit, apparent in several of his verbatim remarks (e.g., "I should know this," "I jumped at the wrong thing"). I comment here on two points raised in that paper.

First, EST's performance led Kay and Ellis to conclude that EST suffered little or no semantic impairment, but instead that he suffered a phonologically based anomia. In particular, their explanation of EST's anomia suggests a partial disconnection between the semantic system and the phonological lexicon, realized as "weak or fluctuating levels of activation between corresponding representations" in the two systems. If my failure to retrieve the logoff command for *motor* output can be attributed to the same phonological lexicon that failed for "printout," "data," and so forth, then the explanation fits my anomia extremely well. Alternatively, the lexicon may be described as phonological merely because its output is normally in spoken form, as is output in our typical assessments.

Second, Kay and Ellis discuss the observation that "anomic patients, in some sense, 'know' the word that they are trying to find" (p. 614), i.e., that semantic access may be preserved in some anomias. Two citations they provide, however, have apparently argued against this TOT view (Geschwind, 1967; Goodglass, Kaplan, Weintraub, & Ackerman, 1976). In those reports, patients did not show the classic TOT pattern to pictures they were unable to name to confrontation, i.e., they were unable to demonstrate even partial access to phonological and morphological information about the lexical target (respectively, word initial sounds and number of syllables). My experience suggests that classic, partial access to the target may be only a coincidental part of the TOT experience. If the typical TOT state can be described as *informed* by partial access, then my anomic TOT state was *uninformed*. I had no sense at all of knowing word length or initial sounds, nor did I retrieve similar sounding words. Yet I "knew" the words I was looking for at the time and said them aloud after the seizure was over. I am confident that I would have recognized "printout" as the target word in Event 1 if my assistant had said "printout" instead of "this one" and "it," just as patient EST correctly recognized picture names with 94% accuracy (Kay & Ellis, 1987).

An outside investigator might have mistaken my word finding problems, and my lack of knowledge for word length and initial sounds, as evidence for a semantic based anomia. Instead, I argue that the pattern described by Kay and Ellis, complete semantic retrieval *and* partial, word-specific blocking of lexical access, is indeed possible in anomia. The feeling is difficult even for me to describe and is no doubt more difficult for someone to imagine without having experienced it. The description that anomics "in some sense, 'know' the word" may be to blame. I did not "know" the word, at least in its articulation or output

sense. I did 'know' the word in its semantic, "idea" or "concept" sense, without a hint as to the verbal name for the idea.

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