Volume 1: 2008-2009 ISSN: 2041-6776

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The University of Nottingham
School of English Studies

Language and Development: Diagnosing Speech Pathologies

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This paper examines speech pathologies, specifically those of three aphasic patients, and diagnoses their form of aphasia by analysing transcripts of their speech. The approach I will follow is to consider the principle characteristics of three different forms of aphasia, and by analysing the patients oral deficits and difficulties decide which type of aphasia most resembles the symptoms they display. The three aphasias I will be focusing on are Wernicke's, Broca's and anomic aphasia.

Elizabeth Ahlsen defines aphasia as "a language disorder caused by acquired brain damage" (2006: 101), and the effect of the brain lesion is that "comprehension and/or production of language is changed" (2006: 6). There appears to be no agreed number of forms of aphasia, though they tend to be divided into two groups: fluent and nonfluent aphasics. Different views as to how the brain processes language have led to various theories as to what determines the type of aphasia. For example, the holistic approach, supported by Pierre Marie, amongst others, proposes that the brain functions as a single unit, and there is a single basic form of aphasia: sensory aphasia (Triarhou, Tsapkini and Vivas, 2008). From an holistic perspective aphasia is part of a general cognitive loss rather than a specific language deficit related to a particular area of the brain (Ahlsen, 2006). This bears a similarity to the idea of equipotentiaility, which suggests all parts of the cortex are capable of the same functions and that "the size of the brain lesion determines the extent of the aphasia" (Ahlsen, 2006: 11), rather than taking into account where the lesion is. This contrasts with the localist-associasionist model, a theory supported more recently by Norman Geschwind (Farah and Feinberg, 2000), in which different parts of the brain are responsible for different aspects of language comprehension and processing; therefore the site is of the lesion is important, as well as its size, in determining the type of aphasia.

Wernicke's aphasia generally results from posterior lesions in the Wernicke's region of the left hemisphere. Kent suggests that Wernicke's aphasia "affects 15%-25% of all patients with aphasia" (2003: 252) and that it is most prevalent amongst older patients (Kent, 2003). It is a fluent form of aphasia with longer utterances of six words or more (Kent, 2003), though often lacking meaning. Friedemann Pulvermüller states that the main symptoms of Wernicke's aphasia are that patients "use words in inappropriate contexts; produce words incorrectly, with incorrect language sounds in them or language sounds omitted…" (2003: 36). Ahlsen has suggested that Wernicke's patients also omit certain kinds of words "with a relative lack of nouns in particular, but also adjectives and main verbs and with substitutions of grammatical morphemes" (2006: 68), which makes it harder to discern the meaning. Kent (2003) amongst others categorises Wernicke's aphasia as aggrammatic. However, this is contested by neurolinguists such as Kaplan (McCaffrey, 1998-2008), who suggests that Wernicke's patients are paragrammatic and produce the wrong grammatical categories but which are relatively syntactically complex in themselves. Others have suggested that it is not possible to distinguish between agrammatic and paragrammatic speakers from spontaneous speech and that patients may display traits of both (Miceli, 1999).

In contrast, with regards to Broca's aphasia, both Kent and Ahlsen agree that this form of aphasia should be classified as aggrammatic. It is anterior lesions in the Broca's region of the left hemisphere that tends to cause this specific aphasia. Broca's aphasia is nonfluent, and as Ahlsen comments, patients "tend to speak in very short, simple sentences or even shorter structures mainly containing nouns, main verbs and adjectives, but omitting most grammatical morphemes…and so-called function words" (Ahlsen: 68). Yet unlike Wernicke's aphasics who employ the incorrect words, Broca's aphasics tend to have slow, halting speech as they struggle to say the words they wish to use rather than replacing it with another incorrect utterance (Pulvermüller, 2003).

Anomic aphasia is the least severe of the three conditions. The main difficulty for anomic aphasics is finding content words, such as naming objects, which is a common symptom shared by all persons with aphasia. Both Kent (2003) and Pulvermüller (2003) comment that anomic aphasics display correct syntax and can produce more complex sentence structures. As Glezerman writes, the patient "with anomic aphasia has word-finding deficits in various forms of speech activity but especially in confrontation naming (when asked to name objects)" (1999: 64).

Previously I have suggested that lesions in the Broca's and Wernicke's regions of the brain frequently result in patients developing the related form of aphasia, this is not a certainty. Kent (2003) suggests that the parallel made between the site of the lesion and the associated aphasia syndrome is open to controversy, as patients with a lesion in the Broca's region do not always develop Broca's aphasia and on the other hand, patients with a lesion not in the Broca's region can show the symptoms of a Broca's aphasia. Charles Goodwin suggests, in relation to Wernicke's aphasia that, as well as symptoms associated with the region of the lesion, some of the symptoms may emerge as a result of "the kinds of choices made during repair sequences" (2003: 13), which develop through dialogue between the patient and the interlocutor over a period of time. Goodwin (2003) stresses the importance of an interlocutor in affecting both the rate and nature of a patients recovery. When searching for words, if an interlocutor is present they can be asked or offer assistance by suggesting words, whereas if the aphasic patient is left to struggle this can slow the pace of their improvement. The patient is forced to rely on existing knowledge (Goodwin, 2003), rather than an interlocutor giving positive reinforcement or creating new links and reforming old ones within the brain.

Several different sources have suggested the possibility for aphasia to mutate from one form to another. As Andrew Kertesz comments this may be the development of a more serious type of aphasia, "[patients may initially have had a] fluent aphasia with anomia and then subsequently developed a nonfluent aphasia which is similar to verbal apraxia or Broca's aphasia" (2003: 150). Conversely patients may improve over time from initially having global aphasia with lesions in both the Broca's and Wernicke's regions of the brain, to a situation where "the condition evolves into other aphasia syndromes, including Broca's…anomic and Wernicke's aphasias" (2003: 244). Kent (2003) suggests that improvements over time lead to approximately 50% of patients moving from one aphasic condition to another.

In the following study I will examine three patients with aphasia, and through analysing the descriptions of the patients and their speech, diagnose the type of aphasia. This will be done by comparing my findings with the most prominent features associated with the different types of aphasia. Specifically I will answer the following two questions: what form of aphasia does each patient have, and what evidence is put forward for my diagnosis?

The Study

Data has been collected from three different patients. Each patient is a right-handed male displaying characteristics of a different form of aphasia. The extracts are transcripts of the three patients speech. The first subject is telling a story from pictures while the other two subjects are describing pictures. The age of the subjects is not specified, meaning that the possible correlation between the age and type of aphasia suggested by Kent cannot be investigated in these patients. The first two patients have an interlocutor present who talks to the patient within the dialogue whereas in the third extract there is no intervention from an interlocutor.

Patient 1 displays clear signs of Wernicke's aphasia. This can be discerned from both the description of the patient and his dialogue. He is described as having significant comprehension deficits of words and sentences, though he speaks at a regular speed, which are common characteristics of Wernicke's aphasics. The part of his brain that may be damaged is the posterior part of the left temporal planum, which performs the function of holding and processing lexical and semantic information.

The patient displays common traits of Wernicke's aphasia in his speech. The patient is telling a story ('Frog Story'), and while he produces a relatively fluent speech output, though somewhat halting, as signified by the '…' pauses within the extract, which suggests a difficulty in finding words. This patient seems to have a fairly severe form of Wernicke's aphasia as he displays less fluency and shorter sentence lengths than examples of patients with milder forms (*Diagnosing Speech Pathologies*: 4). The sigh near the start of the transcript is possibly a sign of frustration as the person knows what they want to say but is unable to recall or pronounce the word. The sentences are of a normal length, but they make little sense. The phonology is unclear on several occasions as the patient has difficulty with content words as he says 'a' then produces a neologism, which is signalled within the text such as [do] and [wu].

There is a frequent but limited use of function words, with persistent repetition of the indefinite article 'a' and the conjunction 'and,' especially at the start of phrases, though no use of pronouns as the noun is employed each time. The syntax is predominantly simple though certain phrases are more complex with the use of prepositions: 'over here' and 'up here'. A number of phrases are formed from the conjunction 'and' followed by the indefinite article 'a' and a noun. There is also evidence of the patient substituting the wrong word which is phonetically connected to the correct lexical choice such as 'And a…uh…buy, over here.' 'Buy' sounds similar to 'boy', though his exact intended meaning remains unclear.

The patient also appears to have an auditory comprehension deficit or may simply lack the lexical range to respond appropriately to the questions he is posed. When asked what happens next the patient continues to name the people or objects he perceives. This may be a failure to understand the question, though in the whole of his dialogue the patient scarcely uses verbs and this prevents him from saying what happened. In addition he misuses content words by adding words such as a baby, man and doctor, which are not present in the pictures, while seemingly not recognising or being unable to describe the actual objects in the pictures as he does not mention the frog (which is the story's theme) or the jar. The man also repeats function words such as 'right' frequently, though often inaccurately, within the context of the phrase to signify an objects position.

Patient two shows clear symptoms of Broca's aphasia. The Broca's region is situated in the inferior frontal gyrus and is concerned with speech planning and production using the information gathered in Wernicke's region, which reaffirms the idea of an interdependency between the two areas, a link which is scientifically suggested by fibres joining the two areas known as the *arcuate fasciculus* (Trask, 1998). This model supports the associationist rather than holistic view of the brain's system of functioning, although, the presence of Broca's

aphasia does not prove that the Broca's region is affected or that it is the only region affected, as research suggests the accumulation from different loci within the brain of symptoms that contribute to Broca's aphasia.

The patient displays symptoms of severe Broca's aphasia as his speech is nonfluent and halting, with mainly single word utterances with the occasional fixed phrase such as 'I don't know.' In between words, rather than silence, the patient uses the filler 'uh' while he attempts to find the next word. The speech is clearly aggrammatic with no syntax present. The words he speaks are content words: 'kite,' 'skunk.' They are predominantly nouns without grammatical morphemes and the occasional auxiliary verb though without the main verb. Even when prompted by the interlocutor who says the definite article 'the,' the patient is unable to repeat this phrase formula himself.

The description of the patient notes that all the content words mentioned are present and this fits with a feature of Broca's aphasia; that the patient has great difficulty pronouncing the words he wants rather than using incorrect words or neologisms. This is clear in the letter clusters within the brackets, which phonologically resemble the word that follows when it is actually said by the patient, for example [rey] and radio, but it takes him a couple attempts to articulate it audibly. The slowness of the speech and the effort described are signs of the difficulty the patient has in reproducing in an oral form the processed lexical information. Again this fits with the diagnosis of Broca's aphasia as it is the Broca region that concentrates on speech production. The patient appears to have a degree of auditory comprehension intact, as when asked if he can say any other sentences, he does change the subject noun from boy to girl in an attempt to say something about a different character.

The symptoms of the third patient suggest that he has anomic aphasia. Research suggests that there is no one particular region of the brain associated with anomic aphasia as it is a feature of all aphasia forms, and the lesion may therefore be in number of different places, either posterior or anterior. His speech is intermittent and disrupted by the inability to find the desired word, which is symptomatic of anomic aphasics. In this case the patient has difficulty in finding the specific lexical domain of verbs, as either he says the auxiliary verb 'is' but then pauses, or substitutes the main verb with a noun, such as 'the girl is flower.' In the one instance he says the main verb, , 'is going,' this is syntactically correct, but does not have any meaning in the given context. However, as in the picture being described the girl is giving flowers to the teacher, phonetically there is a similarity between going and giving, and so the patient may be substituting the intended verb with a similar sounding, though incorrect verb, 'the girl is…is going to flowers.' Similarly he seems to recall the correct noun, 'roses,' which are flowers so would make sense in the phrase, but then repeats the sentence and inserts a noun that is phonetically linked to the target word though incorrect in the context, as he says 'the girl is…is roses. The girl is rosin.' As he speaks very slowly and with great effort this indicates how he has to struggle to find the words he wishes to use. Nevertheless, as the words he does say are all in the text, this suggests that he is able to make the correct mental lexical choices and so comprehends the objects in the pictures he is viewing, without being able to accurately articulate it.

There is no interlocutor present in the third transcript and therefore the patient frequently repeats the start of the phrase 'the girl is' several times, as he searches for the verb. However, given that no outside intervention is forthcoming, he is forced to rely on his own resources in searching for the correct lexical choice.

Discussion and Conclusion

Certainly each patient appears to fulfil the basic definition of aphasia, as they all have difficulty comprehending or producing language or both. Although, as Kent (2003) points out one needs to be careful before diagnosing aphasia with certainty, as, for example, patients

with other cognitive based syndromes resulting in speech pathologies such as schizophrenia and dementia may also display symptoms similar to those of Wernicke's aphasics. Equally as Trask (1998) argues aphasia must be differentiated from speech defects caused by nerve or muscle damage.

Generally the data supports the introductory comments on the prevalent features of each of the three aphasias. In the examples I studied, the patient with Wernicke's aphasia is the most fluent in terms of sentence length and the speed of his speech, while the Broca's aphasic the least in both cases. There are certain common traits across the different forms of aphasia. Both the Broca's and Wernicke's aphasics make phonological errors. A noticeable feature in all three patients is the absence of verbs from their speech, whereas nouns dominate. Repetition of words and pausing within phrases are also present in each case. The Broca's aphasic is the most aggrammatic, as was suggested in my initial comments, displaying the least syntax of the three patients.

The most significant discrepancy between my original comments and the verbal data concerns the anomic aphasic, although as a single example the patient cannot be taken as representative of the condition. Despite being the least severe form of aphasia, the patient is unable to complete his initial phrase. He speaks in a nonfluent manner though Kent (2003) amongst others suggested that anomic aphasia was a fluent form, as his inability to find the correct main verb prevents the patient from completing the sentence. Perhaps if an interlocutor was present to assist him by providing particular verbs he would be able to speak more fluently and with greater syntactic complexity than is present in this short extract.

There appears to be no conclusive answer from the data to two important questions: (1) the directness of the link between the site of the lesion and the type of aphasia, and (2) the degree to which other parts of the brain, both left and right hemispheres, can compensate for damage to a particular region. These areas of study require further investigation.

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Diagnosing Speech Pathologies. *Class Handout, Language Development.*