

Fluency and Aphasia: A pragmatic reconsideration

Claire Penn PhD (Witwatersrand)
Department of Speech Pathology and Audiology,
University of the Witwatersrand

ABSTRACT

The fluency behaviour of fourteen aphasic patients was investigated within a communicative framework. As part of an overall pragmatic analysis, judges were required to rate the subjects' fluency behaviour as to their appropriateness within the context of interactive discourse. Results indicated differences between subjects which related consistently neither to the classificatory type of aphasia nor to severity. Implications regarding the characterisation of fluency and its utility as a classificatory concept are discussed.

OPSOMMING

Vlotheid is by veertien afatiese pasiënte ondersoek binne 'n kommunikasie-raamwerk. As deel van 'n pragmatiese analiese is die pasiënte se vlotheid beoordeel volgens die toepaslikheid in die konteks van die gespreksituasie. Daar is gevind dat daar verskille tussen die proefpersone was, maar dat die verskille nie met beide die tipe- of graad van afasie verband gehou het nie. Implikasies aangaande die karakterisering van vlotheid en die nut hiervan vir klassifikasie word bespreek.

The relative disruption or preservation of fluency in aphasic expressive output is a feature which has been commented on frequently in the literature. In fact, it is this dimension of expressive output which has formed the basis of a large number of classificatory schemes in aphasia. Wagenaar et al.¹⁶ claim, for example, that at least 75% of the entire aphasic population can be distinguished along the fluency dimension. Essentially, a differentiation is made between the "nonfluent" (anterior, or agrammatic) patient, whose speech production is typically halting and effortful with poor prosody, pronunciation mistakes, short utterances, grammatical errors and omission of function words and the so-called "fluent" aphasic who presents with fluent, rapid speech with normal prosody, long effortless sentences and well-presented articulation and grammar.

It is clear from the above definitions that such classificatory schemes incorporate not only prosodic features but also articulation and syntax into their definitions of fluency. Traditional definitions of fluency are, however, less encompassing. Most, for example, emphasise the temporal and sequential aspects of speech and include factors such as pauses, hesitations, repetitions and interruptions.⁵ An alternative perspective is derived from the context of language usage and includes adherence to the rules of the language, the use of appropriate vocabulary and competence in discourse.

Clearly, in aphasia, we are concerned with both aspects of fluency, though traditionally, speech therapists have concerned themselves more with temporal and sequential aspects of fluency. Recently the effect of linguistic content and context on fluency behaviour has received attention. There is con-

siderable evidence to suggest for example, that normal speech is "a highly fragmented and discontinuous activity"⁸ and that the distribution, frequency and length of hesitations depends heavily on the semantic and cognitive content of the verbal message and on the nature of the situation and social interaction.

As such, it is clear that as Dalton and Hardcastle⁵ suggest, fluency is a very sensitive indicator of the overall potency of the communication system. The fluency disruption in aphasia should be perceived therefore as an indicator not only of the type and locus of brain damage, but within the broader context of communicative competence.

Limited evidence for the above statement comes from studies comparing aphasic and normal fluency disturbances and from an investigation of fluency disruption in language-impaired children. In a study by Yairi et al.¹⁸ comparing the spontaneous speech of Broca's aphasics with that of age-matched controls, though the frequency of dysfluencies in the aphasics' speech was three times greater than that of the control group, the nature of these dysfluencies strongly resembled normal patterns. The fact that only Broca's patients were used in this study and that the data base for analysis was elicited phrases rather than spontaneous speech, limits the conclusions which may be made with regard to the aphasic population as a whole. However, the implication of this study is that fluency of aphasics may be sensitive to components of the communicative event, not to brain damage alone. Similarly Brown and Cullinan² comment on the close relationship between dysfluent speech and word-finding difficulties in aphasia. An interesting distinction drawn by these researchers

is the concept of nonfluency as opposed to dysfluency, the former referring to a disruption in copiousness of verbal output, the latter to a disruption of speech flow. In discourse, the presence of fluency problems has been shown to interfere with overall cohesion. In a study investigating the spontaneous discourse of a group of language-impaired children, fluency (or lack thereof) was found to be a feature of discourse significantly differentiating their overall cohesion in relation to that of matched normals.¹

It thus seems pertinent for the language pathologist to examine fluency from a slightly different perspective than usual, i.e. as a feature of speech behaviour potentially capable of interfering with the basic communicative effectiveness of the message. In other words, it can be argued that fluency is a pragmatic phenomenon – one which is influenced by the context of the communicative event.

The above points provided the rationale for the inclusion of the fluency dimension as part of an investigation of broader pragmatic capabilities in a group of aphasic patients.* The specific methodology and results of the fluency analysis will now be described.

METHOD

In an attempt to investigate the relative importance of fluency in the overall assessment of communicative appropriateness, a scale was devised to reflect pragmatic competence in fluency terms. The purpose of this analysis was to examine the nature of the relationship between results on the fluency scale and type and severity of aphasia as measured on a traditional struc-

tured measure of aphasia – the Boston Diagnostic Aphasia Examination (BDAE).⁹

SUBJECTS (Ss)

Fourteen English-speaking adult aphasic patients were selected for the study according to certain criteria. These included confirmed presence of aphasia, neurological stability and the absence of gross concomitant problems. Etiology of aphasia was not held constant in the group; neither were classification or severity of aphasia (as measured on the BDAE). Table 1 illustrates relevant case history information pertaining to the subjects.

TESTING

The data base for analysis was a twenty-minute videotaped language sample. The sample for each S was recorded in the context of a conversation with a familiar speech therapist. Each interactive language sample was divided into twenty one-minute 'chunks' which served as the units for analysis. Two trained judges (speech pathology graduates) were required to rate the fluency behaviours during each conversational unit for each patient, along the dimensions presented in Table 2.

The categories selected to describe the fluency behaviours of the Ss are those suggested by Yairi and Clifton¹⁷ who examined fluency breakdown in three groups of normal speakers. In addition, the categories of 'false start' and 'word-finding difficulty' were included, as both aspects were felt to be characteristic of aphasic language³ and both cause fluency disruption.

The judges were required to characterise the overall ap-

Table 1 Case history details pertaining to subjects used in the study

SUBJECT	AGE	SEX	BDAE CLASSIFICATION	BDAE SEVERITY RATING	BEHAVIOURAL CLASSIFICATION
1	53	F	Anomic	3-4	Fluent
2	59	F	Broca's	2	Nonfluent
3	50	M	Conduction	3	Fluent
4	63	F	Broca's	1	Nonfluent
5	58	M	Global – Broca's	1	Nonfluent
6	24	M	Global – Wernicke's	1	Mixed
7	61	M	? Broca's	2	Mixed
8	63	M	Wernicke's	2	Fluent
9	53	M	Aphemic	4	Mixed
10	59	M	? Broca's	3	Mixed
11	36	F	Broca's	2	Nonfluent
12	63	F	Wernicke's	3	Fluent
13	41	M	Anomic	4	Fluent
14	72	F	Wernicke's	2-3	Fluent

Table 2 Fluency Rating Scale

Explanation: This measure entails judging the appropriateness of the patient's fluency control within each Conversational Unit (C.U.) of one minute.

BEHAVIOURS CONSIDERED	EXPLANATION AND/OR EXAMPLES	EXAMPLES OF APPROPRIATE USE IN CONTEXT	EXAMPLES OF INAPPROPRIATE USE IN CONTEXT
Interjections Repetitions Revisions Incomplete phrases False Starts Pauses Word-finding difficulties	Items traditionally associated with a measurement of non-fluency, viz. aspects which break the normal flow of speech	Normal acceptable non-fluencies which do not interfere with listener's understanding of message	Non-fluencies which interfere with coherence, timing or sequence of the message. Inappropriate interference in transition smoothness between segments

* This paper is based on a section of the writer's PhD thesis, entitled "Syntactic and Pragmatic Aspects of Aphasic Language".

appropriateness of each subject's fluency behaviour in each conversational unit on a five-point rating scale with the following format:

The patient's control of fluency was not appropriate within this conversational unit	The patient's control of fluency was mostly inappropriate within this conversational unit	It is difficult to decide whether the patient's control of fluency was appropriate or not for this conversational unit	The patient's control of fluency was mostly appropriate within this conversational unit	The patient's control of fluency was appropriate within this conversational unit
--	---	--	---	--

This format was selected on the basis of the results of a pilot study. The key notion underlying the above scale is that of "appropriateness" – a term which has been used increasingly in the context of aphasic language. With a burgeoning focus on the aphasic's ability to communicate rather than speak – an idea reflected for instance in the recent work of Holland^{10, 11} – the judgment of a patient's behaviour as being appropriate (rather than correct) within the communicative context has considerable clinical attraction.

Judges' ratings were supplemented for each subject by written justification for the decisions made. These qualitative comments were used in analysis of the data as a supplement to the main technique.

DATA ANALYSIS

The approach to data analysis was essentially taxonomic, utilising the method of hierarchical cluster analysis. This is a computerised mathematico-deductive procedure particularly suitable for the analysis of multivariate data. It enables the objective clustering of individuals on the basis of their similarities, while at the same time allowing for the deductive and interpretive element which is so necessary in linguistic research. Aside from the work of Kertesz and his co-workers,¹² the application of cluster analysis to aphasia has to date been limited. The benefits of this method in related areas of neuropsychology have however been well documented.¹⁴ The BMDP programme was selected for the purposes of this study.⁷ Once inter-rater reliability had been established for the judges (using Cohen's weighted Kappa formula,⁴) the means for each subject were used as the basis of the cluster analysis.

RESULTS

From the variety of techniques available for clustering sets of data, it was felt that the techniques which would be most suitable for the present investigation were the derivation of a linkage diagram, a dendrogram and its counterpart, the cluster field. Figures 1, 2 and 3 represent the linkage (tree) diagram, the dendrogram and the cluster field respectively for the analysis of fluency ratings. In the linkage diagram, the grouping of Ss is indicated by the means of the intersection of the line above a particular S and the diagonal line starting next to the S. The strength of the association is represented by numerical values in the tree. These values are scaled from 1 to 100 and represent correlations from 0,00 to 1,00. Thus, the

higher the association between Ss in terms of their fluency behaviour, the higher the value in the tree. From the computer-generated cluster tree, a dendrogram and cluster field may be derived, representing in a pictographic manner, the relationship between Ss. Those Ss most similar to each other are reported in terms of their adjacency on the dendrogram, and in the cluster field. Ss within smaller circles are judged most similar, with decreasing similarity represented by inclusion in larger circles.

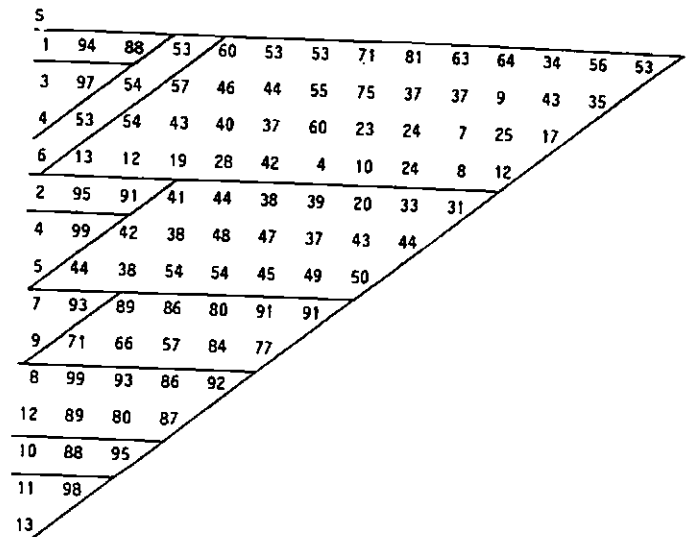


Figure 1 Linkage tree demonstrating degree of similarity between subjects on Fluency Scale

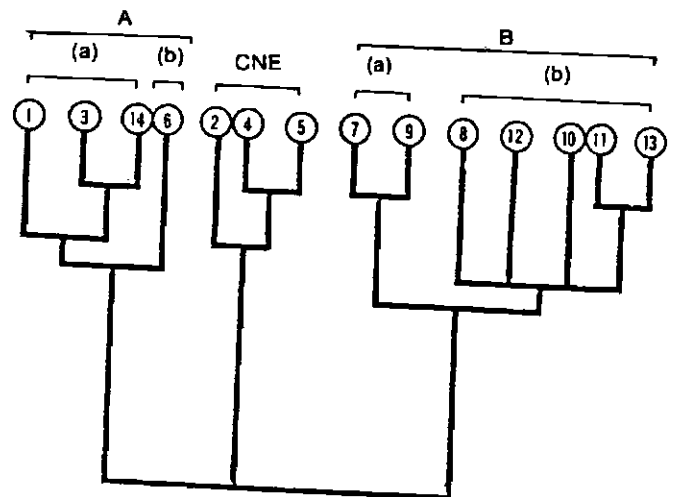


Figure 2 Dendrogram demonstrating degree of similarity between subjects on Fluency Scale

As Figures 1 and 2 suggest, two main groups of Ss were identified by the cluster analysis on the Fluency Scale. The first group (three Ss) was generally rated by the judges to show appropriately fluent behaviour whereas the second group was considered by the judges to have fluency behaviours often interfering with general communicative flow. Many subgroupings were recognised by the cluster analysis and several Ss (1, 6, 2, 8, 12 and 10) showed relatively distinct patterns. These distinctions will be considered under each broad group.

A. APPROPRIATE GROUP

All three Ss in this group (1, 3, 14 – Group A(a)) could be diagnosed as being 'fluent' in traditional terms. Nevertheless

instances of the nonfluent behaviours identified by Table 2 occurred predictably in all Ss. S14 showed considerably fewer of these behaviours than other Ss in this group. In fact, both judges commented on her behaviours as being 'too fluent'. In many conversational turns there were no examples of non-fluencies at the expected junctures. This could perhaps be tied to a self-monitoring defect, which will be discussed later. This is illustrated by:

S14 T: So you're doing a lot of work at home?

P: Well I must. It's the only way. First of all it's easier for me to learn things as I do. () *When they speak to me I ask them. It's a lovely feeling. It really is. It's difficult but it slowly slowly come right. Writing nicely. My writing's very well. It improved a lot I think so it makes a I feel so good then I start again then it's lovely.

S3 showed, by contrast to S14, instances of revision, repetition and hesitation which, though judged as largely appropriate, were sometimes seen as interfering with communicative flow. This aspect was also noted in S1's sample. Her frequent use of 'er' and occasional word-finding difficulty were felt to interfere with the flow of the message though overall fluency was maintained through the discourse. e.g.'s:

S3 T: You want to go and see the top man?

P: Right right. So um about um He'll give us a letter an answer you see. About a month later had a chat this fellow on the telephone. 'Look what do you think?' He says no I'm sorry we can't do it but I'll send us a letter. *He will send us a letter which is three months later.*

(Note revision or "high level amendment" to use Butterworth's³ term.)

S1 P: My son is in er Escom but er it's in Germiston and er he has to er by six o'clock he must er he goes by car but actually he goes afterwards by er train. it's easier you know because er er not so expensive to go by car.

S6 (A(b)) warrants special comment. His tie with the other Ss in this group was low (0,53). All aspects of nonfluency were observed by the judges to occur very frequently. This S's rapid rate of speech, however, provides the listener with an overall impression of fluency. Thus judgments of inappropriate were in part offset by this factor. e.g.:

S6 T: So you hit your hand?

P: Ja Ja Ja Ag you know Lovey. Um you see this one. This look now what ()

T: The drink

P: You see how look but if you () like this one I'll never you'll do the same lovey. I never said you know I promise you I had enough.

B. INAPPROPRIATE

The severely restricted output of Ss 2, 4 and 5 made judgments of fluency difficult in terms of the categories suggested on the fluency scale (Table 2). Thus these Ss are grouped together in the cluster analysis, the few possible opportunities for judgment indicating that repetitions, false starts and incomplete phrases hindered overall communicative flow. e.g.:

S2 T: Why did they have collars round their necks?

P: They had something ()

* Unintelligible utterance.

T: Oh so they had something done to them?

P: No one the man who the man who was ()

The manner of speaking in Ss 7 and 9 (B(a)) also seemed to account for judgments of their fluency being very similar. Both of these Ss have a particularly slow rate of speech resulting in lengthy unfilled pauses. Other aspects of nonfluency in these Ss (e.g. interjection and repetitions) were felt to be appropriate and not a hindrance to communicative flow. e.g.:

S7 T: Don't your grandchildren go to school?

P: No they - they a small. They too small yet. They er er the er oldest one he does to s - - kindergarten you know and er the other one he can't walk yet.

S9 T: Do you prefer some programmes to others on TV?

P: No. Er - - er - - Sport - I like and er - - um er progra and - - - er - - a few programmes a week.

The remaining five Ss (B(b)) were all judged to have many instances of inappropriate fluency behaviours in their samples (despite the fact that three of this group could be traditionally classified as 'fluent' Ss). All behaviours delineated by the Scale were noted in all Ss but the following were commonly felt to interfere specifically with communicative flow: interjections and repetitions (in four out of five Ss), pauses and word-finding difficulties (in all five Ss) and incomplete phrases and false starts (in three Ss). It appeared that the longer the conversational turn on the part of the S and the higher the frequency of non-fluent behaviours in such a turn, the more likely it was that the S would be judged as being inappropriate with regard to fluency. This was particularly noticeable for S12:

T: She lives here?

P: No in er near Durban. They've got a farm and er I feel there's something funny so I phoned her and er she said. Well she er I'm fine Honey am um I'm not so well but I'm fine but er did you get my letter? So I said No. Anyway um so I waited for the letter and er then the letter that worried me so much because she told me that um that I had flu.

Broca's patients, Ss 10 and 11 had relatively impaired syntactic output in relation to other Ss in this group and their nonfluencies e.g. repetitions, revisions and interjections were felt in part to be not altogether successful attempts to compensate for this, e.g.:

S10 T: How would you change a tyre?

P: Well I don't to I would put er a a jack and then I would - put a - wheel up a little bit and then I would get the bolts er in the not in the bolts and - put it in under the - See?

S11 T: What did you do?

P: Um Talk. Hospital Um Um Um. Two time a week.

T: You go there for therapy?

P: Yes Um um um yes - um my hand, my leg.

Word-finding behaviours seemed to affect fluency judgments of Ss 8 and 13. e.g.s:

S8 T: Could you tell me how to change a tyre?

P: Yes well I I I know what it is. Obviously and went on - - - but it's hard hard to get something.

T: What do you do?

P: You know it's difficult - - Um - you know I told all forever in () things like that. Beautiful well unfor-

tunately as it went down down and so I was getting useless. But how do I do it?

S13 P: It's a sort of thing you wind up and a thing you get to play records not records but it's a records record sounds like a records something.

T: A tape recorder?

P: No no no not a tape recorder. Um - -

T: Not a record player?

P: No no no not a record. Not strictly a record player. It's for infants of the age 2 to 6.

T: Is it one of those Fisher Price toys?

P: Fisher Price. Fisher Price. Yes. Fisher Price.

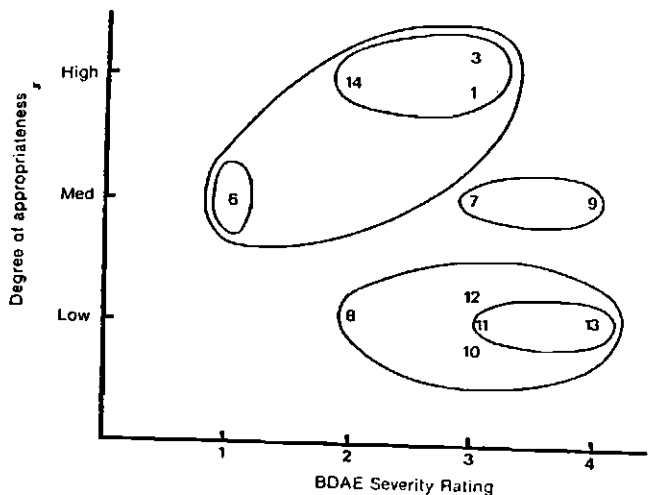


Figure 3 Clustering of the subjects on Fluency Scale in relation to Appropriateness and severity ratings

By way of a summary, in Figure 3 the main clusters of patients are plotted against overall degrees of appropriateness and the BDAE severity rating for fluency ratings. For reasons described above, Ss 2, 4 and 5 were not included in this analysis. Of the remaining subjects, three were judged to have overall high levels of appropriate fluency, one showed a somewhat equivocal pattern and three by virtue of their severe agrammatism could not be effectively judged. Seven Ss were rated as having instances of inappropriate fluency either related to manner of production, length of turn or word-finding difficulties. Clusters suggest more cases of inappropriate nonfluency in the group of Ss as a whole than appropriate nonfluency and further that aphasia type does not necessarily correlate with judgments of appropriateness. Clear-cut distinctions were not found on this scale either with regard to appropriateness or severity.

DISCUSSION

The results obtained confirm to a large extent recent published findings with regard to the fluency disorder in aphasia, viz:

- that aphasics show many instances of dysfluency and that these dysfluencies are greatly influenced by word position/grammatical function.
- that there is not always a correlation between clinical form of aphasia and type of fluency
- that the measurement and rating of fluency is not a simple matter
- that the examination of fluency in aphasic speech may offer some insight into the mechanisms of normal speech production^{3, 6}

With the exception of S 14, all the subjects in the present study demonstrated many instances of dysfluency in their expressive language samples. This confirms a large body of literature which discusses dysfluency phenomena in aphasia.^{2, 15, 18} The relative dearth of research into aphasia in relation to normal nonfluencies make such results difficult to interpret.

In spite of this, the present data tends to confirm suggestions of workers such as Butterworth³ that the type and locus of dysfluencies in aphasia are similar to those in normals. Though the frequency of such behaviours was not directly measured in the present study it was this aspect which appeared to influence judges' qualitative decisions.

With regard to type of dysfluency observed, judges noted instances of all behaviours delineated on the scale, viz: interjections, repetitions, revisions, incomplete phrases, false starts and word-finding difficulties. These occurred at predictable junctures in terms of the literature on normal dysfluency phenomena, e.g. at syntactic boundaries, before content words and after an error in production.⁸ The fact that most aphasic subjects by definition have greater difficulty in formulating verbal output would lend support to the idea that associated dysfluency would be higher. This is clearly not the case in S14 who conforms to the classic description of jargon aphasia offered by Kinsbourne and Warrington,¹³ viz: "the jargon aphasic speaks in a copious flow uninterrupted by hesitation and correction". Unlike the patient described by Butterworth,³ S14 showed no instances of hesitation prior to the production of neologisms, nor indeed at expected junctures. This provides some support for the 'disinhibition' explanation advanced for this type of aphasia. Essentially it refers to a lack of self-monitoring such subjects have over their own output. Acknowledging that an analysis of hesitations and associated non-fluencies may provide an indicator of how the speaker monitors his production, the nature of this type of aphasic deficit is thus apparent.

It became clear during the rating of this scale that the assessment of fluency, particularly with regard to appropriateness, is a very complex matter. Judges' verbal and written justifications were often not specifically related to the frequency, locus or type of dysfluency *per se* but on the overall impression gained. A measurement of fluency control *inter alia* involves aspects such as number of words, speaking time and speaking rate (which in themselves comprise variables such as phonation rate, number and duration of silent pauses).⁶ The present study did not include rate as part of the fluency scale (cf. Yairi et al.).¹⁸ Rather this was seen as a paralinguistic behaviour to be measured on another scale. Similarly, hesitation analysis was subsumed broadly under 'pauses'. In the sense that global rather than quantitative decisions were required in the present study, this somewhat restricted taxonomy of fluency aspects is acceptable. It does, however, suggest that ratings may have been made on the basis of behaviours other than those delineated by the scale.

Finally, and of particular relevance, the results on the Fluency Scale showed that there was not always a correlation between the clinical form of aphasia and type of fluency rating. This supports the findings of Deloche et al.⁶ who showed that when certain aspects of fluency are considered, no clearcut differentiations in terms of aphasic types suggest themselves.

The results of the present study suggest that some dysfluencies actually enhance the communicative process since they reflect underlying linguistic processing on the aphasic's part and apparently shadow normal strategies. In other words they appear to be an indication to the listener that the aphasic is attempting to retrieve the word, is self-monitoring and is employing (however inefficiently) search strategies which reflect communicative motivation. It is only when such behaviours occur with high frequency or at unexpected junctures that they are judged inappropriate. The fact that these behaviours occur in all but one of the subjects studied casts some doubt onto the question of the utility of the fluency/non-fluency dichotomy which has been used to differentiate aphasics. This point will now be expanded.

IMPLICATIONS

The writer would suggest on the basis of the above results that the dichotomy of "fluent" versus "nonfluent" aphasia is a potentially misleading one.

If this terminological distinction is used to separate patients on the basis of expressive output alone, and if the definitions involved are specified clearly and precisely, then it does have the advantage of reducing terminological confusion.¹⁶ However, as research on both normal and abnormal speakers suggests, fluency is a very complex phenomenon comprising a number of component parts and is hence difficult to measure. Deloche et al.⁶ point out that traditional aphasic classification schemes often incorporate different aspects into their definitions of fluency.

Even on the fluency scale in this study which incorporates components traditionally associated with an analysis of fluency, clear-cut distinctions in terms of appropriateness could not be consistently made between nonfluent and fluent Ss. Thus many of the so-called 'fluent' Ss were judged to be inappropriate along these dimensions. A problem of definition arises here. The components of the fluency scale are certainly more conventional than the broad definitions applied by aphasiologists and hence may well have been too restricted to derive differences among patients.

Notwithstanding this, the writer would suggest that the terms nonfluent/fluent have many potential pitfalls in terms of definition and specification and that possibly a distinction should be drawn between 'fluency' as characterised in traditional terms and incorporating prosodic features such as rate, hesitations and repetitions, and between fluency in grammatical, lexical and semantic terms. If indeed there is a correlation between clinical forms of aphasia and these separate types of fluency, then the distinction is possibly worth retaining. But as the results of the present study suggest, from both terminological and conceptual viewpoints, the use of a fluent/nonfluent dichotomy in the characterisation of aphasic language probably warrants reconsideration.

ACKNOWLEDGEMENTS

The writer gratefully acknowledges the help and guidance of her supervisor, Prof. M. L. Aron, Head, Dept. of Speech

Pathology and Audiology, University of the Witwatersrand. For financial assistance, the writer is indebted to the Human Sciences Research Council and to the Senate and Council Research Committees of the University of the Witwatersrand.

REFERENCES

- Berger, H. & Sinoff, A. Aspects of cohesion, tense and pronoun usage in the discourse of the older language-impaired child. *S.A.J. Comm. Dis.*, 1978, 25, 3-16.
- Brown, C. S. & Cullinan, W. L. Word-retrieval difficulty and disfluent speech in adult anomic speakers. *J. Speech Hear. Res.*, 1981, 24, 358-365.
- Butterworth, B. Hesitation and the production of verbal paraphasias and neologisms in jargon aphasia. *Brain Lang.*, 1979, 8, 133-161.
- Cohen, J. Weighted Kappa: Nominal scale agreement with provision for scaled disagreement or partial credit. *Psychol. Bull.*, 1968, 70, 213-220.
- Dalton, P. & Hardcastle, W. J. *Disorders of Fluency*. London: Edward Arnold, 1977.
- Deloche, G., Jean-Louis, J. & Seron, X. Study of the temporal variables in the spontaneous speech of five aphasic patients in two situations, interview and description. *Brain Lang.*, 1979, 8, 241-250.
- Dixon, W. J. & Brown, M. B. *MBDP*. - 79 Los Angeles: U California Press, 1979.
- Goldman-Eisler, F. *Psycholinguistics*. London and New York: Academic Press, 1968.
- Goodglass, H. & Kaplan, E. *The Assessment of Aphasia and Related Disorders*. Philadelphia: Lea and Febiger, 1972.
- Holland, A. L. *Communicative abilities in daily living*. Baltimore: University Park Press, 1980.
- Holland, A. L. Observing functional communication of aphasic adults. *J. Speech Hear. Dis.*, 1982, 47, 50-56.
- Kertesz, A. *Aphasia and Associated Disorders*. New York: Grune & Stratton, 1979.
- Kinsbourne, M. & Warrington, E. U. Jargon Aphasia. *Neuropsychologia*, 1963, 1, 27-37.
- Morris, R., Blashfield, R. & Satz, P. Neuropsychology and cluster analysis: Potentials and problems. *J. Clinical Neuropsychology*, 1981, 3, 79-99.
- Quinting, G. *Hesitation phenomena in adult aphasic and normal speech*. The Hague: Mouton, 1971.
- Wagenaar, R., Snow, C. & Prins, R. Spontaneous speech of aphasic patients: A psycholinguistic analysis. *Brain Lang.*, 1975, 2, 281-303.
- Yairi, E. & Clifton, N. F. Disfluent speech behaviour of preschool children, high school senior and geriatric persons. *J. Speech Hear. Res.*, 1972, 15, 714-719.
- Yairi, E., Gintavitas, J. & Avent, J. R. Disfluent speech associated with brain damage. *Brain Lang.*, 1981, 14, 49-56.

Philips Hearing Aid Services

A Division of S.A. Philips (Pty) Ltd.

hearing aids
Amplaid
audiometers
earmark F.M.
systems

PHILIPS

HEARING AID SERVICES

Head Office 1005 Cavendish Chambers, 183
Jeppe Street, P.O. Box 3069, JOHANNESBURG.

