An investigation into the communicative abilities of aphasic subjects in task oriented dialogue

ANDREW JOHN MERRISON
Department of Linguistics, University of Edinburgh

ANNE H. ANDERSON AND GWYNETH DOHERTY-SNEDDON
Human Communication Research Centre, Department of Psychology, University of Glasgow

Abstract

This paper reports on research into three mild to moderate non-fluent Broca-type aphasics engaged with a non-aphasic partner in task oriented dialogue. The research aimed to address the relationship between linguistic and communicative skills of aphasic subjects, in particular, how it is that they can sometimes communicate better than their linguistic abilities would initially suggest. The results indicate that at least some aphasic individuals can compensate for their linguistic deficits (a) by effective and sensitive use of non-verbal gesture (producing on average up to eighteen times as much information carrying gesture than do non-aphasics engaged in the same task) and (b) by relying on the communicative expertise of their non-impaired partner.

1.0 Introduction

Traditionally, assessment of aphasic patients has focused on testing their linguistic abilities by using “metalinguistic tasks whose aim is to elicit expected standard responses, not to test creative uses of communication”, Feyereisen (1991:323). For example, the Boston Diagnostic Aphasia Examination (BDAE) (Goodglass and Kaplan 1972) focuses on linguistic abilities in order to categorise aphasic patients into the neo-classical aphasia syndromes. Similarly, the Western Aphasia Battery (WAB) (Kertesz 1982) uses a series of tests for spontaneous speech, auditory comprehension, repetition, and naming for this categorisation procedure.

These traditional approaches to the assessment of aphasia are well established, yet it has long been known that some aphasic individuals demonstrate the ability “to communicate much better than they speak/understand” (Howard and Hatfield 1987:81). Although this proposition might seem somewhat paradoxical (as Feyereisen suggests (1991:323)), in recent years researchers have begun to explore how the apparent paradox might be resolved. (It should be noted that we will not be discussing the important role to be played by alternative communication systems. For discussion, see Velletri-Glass *et al.* 1973, Gardner *et al.* 1976, Weinrich *et al.* 1989 and Bertoni *et al.* 1991.)

In their study which investigated the efficiency and accuracy with which aphasic and non-aphasic individuals communicated the crucial information necessary for referent identification, Busch *et al.* (1988) concluded that aphasics are not significantly different from non-aphasics. But perhaps this result should not be too surprising, after all, one doesn’t need to utter many words to convey information efficiently – as long as the words uttered are relevant ones.

In a study of requesting, Prinz found that "aphasics, despite the etiology or extent of their linguistic impairment, are capable of communicating a broad range of intentions and employing pragmatic strategies [e.g. use of gesture] in making known their needs" (1980:70). Prior to this, in their study of contextually conveyed meaning, Wilcox *et al.* found that aphasics demonstrated "comprehension abilities with indirect requests that were superior to their receptive performance on a standard comprehension battery" due to utilising extralinguistic context (1978:376).

Holland (1982), in a study of communication in the home environment, found that the frequency of aphasic individuals' *successful* communicative acts was far greater than that of communicative failure (on average 86 successful versus 6 failed acts per hour), the reason for such success lying in the use of communication strategies. Such strategies included: non-verbal gesture; circumlocutions; self-cueing with high association words; spelling out loud; using pen and paper to write; imposing self-delay by pausing and signalling listeners to wait; consulting word lists; actively searching for objects; requesting help from listeners.

The use of non-verbal gesture has also been the subject of investigation. (For a review see Feyereisen and Seron 1982.) Unfortunately the results from such studies have been less than unanimous. For example, with regard to *amount* of non-verbal behaviour, some results indicate that, to varying degrees, aphasics do not gesture more than non-aphasics while other results have been cited that claim the opposite. We exemplify from both views in turn.

In face to face informal dyadic conversation, Glosser *et al.* (1986) found no differences in gesture rates between aphasic and non-aphasic controls. Cicone *et al.* (1979), on the other hand, claim that Wernicke's aphasics use more gesture than normals and normals use more gesture than Broca's.

In contrast, Feyereisen (1983) found that on the whole aphasics used more gesture than non-aphasics but that there were no great differences between Wernicke and Broca aphasics. Smith (1987) agrees (though she makes no distinction between aphasia types). Larkins and Webster (1981, cited by Le May *et al.* 1988) claim that aphasics tend to use more gesture than non-aphasic subjects and that this is especially true for Broca's. Similar findings are quoted by Le May *et al.* (1988), namely, that aphasic subjects perform considerably more non-verbal gesture than normal subjects with Broca's using more gesture than Wernicke's who in turn use more gesture than normals.

Disagreement on results is not the only problem associated with the existing literature on non-verbal gesture in aphasic populations as Le May *et al.* (1988) have pointed out. One such difficulty has been the fact that the amount and type of gesture occurring in an interaction is "dependent on the type of conversation taking place ... Any analysis of speech-related gesture should therefore ensure that the interactions studied are homogenous in terms of the topics discussed and the format of the interaction" (Le May *et al.* 1988:139).

By investigating the use of non-verbal gesture within the confines of referential communication tasks, a number of researchers (Busch *et al.* 1988, Feyereisen *et al.* 1988, and Carlomagno *et al.* 1991) have attempted to eliminate this particular source of noise. Although minor differences exist in the precise nature of the tasks used, they all essentially involve an aphasic participant conveying information (often the sequential ordering) about a set of referents to a non-aphasic task partner.

Feyereisen *et al.* (1988) found that although not as efficient time-wise as their non-aphasic control subject, their aphasic subjects were generally successful in the task . This demonstration of task, and thus communicative success was in part due to the effective use of non-verbal gesture. Using a similar referential task, Carlomagno *et al.* (1991) showed that after a programme of P.A.C.E. therapy (Davis and Wilcox 1985) focusing on training patients to use residual non-verbal strategies more efficiently, the "time and the number of messages used to communicate 80 items significantly decreased" (Carlomagno *et al.* 1991:422). In other words, by concentrating on residual non-linguistic skills, it appears possible to improve communicative effectiveness in some aphasic clients.

This might explain why Larkins and Webster (1981), Feyereisen (1983), Smith (1987) and Le May *et al.* (1988) found that aphasic subjects perform considerably more non-verbal gesture than normal subjects and why Feyereisen *et al.* (1988) found that the more impaired the subject, the greater the preference for communicating via a gestural modality. Perhaps the aphasics involved in these studies were in the habit (trained or otherwise) of concentrating on residual non-linguistic skills, while those subjects of Cicone *et al.* (1979) and Glosser *et al.* (1986) were not.

Although referential tasks constrain the interactions in terms of the topics discussed and the format of the interaction, it must be pointed out that studies which attempt to demonstrate intact communicative abilities via referential tasks can find themselves open to the criticism that, to a certain extent at least, the information gap is not a genuine one: although the ordering of referents is not known, the actual set of possible referents available to both participants is the same. The problem here, then, is that without a genuine information gap, communication cannot be thought of as entirely genuine either. In addition to this, there is the contention that resulting dialogues can hardly be considered as examples of *extended* discourse.

In a move towards an analysis of the structure of extended conversational interaction, Ulatowska *et al.* (1992) investigated the preserved conversational skills of aphasic subjects engaged in role-playing activities. The results show that despite the linguistic deficits of their aphasic subjects, their conversational structure was found to be comparable to that of normal controls at several levels, namely: distribution of turns (both those which add new information to the conversation and those which act as conversation management), range of speech acts used, adjacency pair structure and script knowledge. The problem with role-playing activities, however, is the fact that extended discourse which is elicited is only semi-naturalistic, and consequently, as Ulatowska *et al.* themselves note, it is not certain that these results “would generalize to open-ended, unstructured conversation between normal and aphasic individuals” (1992:328).

From a conversation analysis (CA) point of departure, Milroy and Perkins (1992) suggest that although aphasics employ different mechanisms to repair breakdowns in conversation than those found in normal discourse, aphasics and normals both adhere to the principle of least collaborative effort (see Clark and Schaefer 1987, 1989): namely that dialogue partners attempt to minimise the total effort invested in a given contribution. The difference in aphasic/non-aphasic dialogues is the precise nature of collaboration involved. A problem with a CA type approach is that it is difficult to quantitatively assess communicative success.

In our study, which investigates communication between aphasic and non-aphasic individuals in task-oriented dialogue, we attempt to overcome the problems associated with previous studies in that the materials used:

(a) present a genuine information gap between participants;

(b) yield extended natural discourses which are comparable across different participants;

(c) allow for the possibility of using alternative (non-verbal) modalities of communication;

(d) allow communicative success to be objectively measured separately from the analysis of the language used; and

(e) restrict interactions in terms of topic and format of interaction and so that analysis of the dialogues is easier.

In addition, an extensive corpus of non-aphasic dialogues exists against which the results of the current study can be considered.

Several questions were under investigation: (a) how well can aphasics perform in a communication task (b) to what extent do aphasics use spontaneous non-verbal gesture in task-oriented dialogue, and is this related to linguistic competence; and (c) do non-aphasic interlocutors do more communicative work when in dialogue with an aphasic partner (as opposed to with another non-aphasic) and if so, what type of communicative work do they do and to what extent.

2.0 Methodology

2.1 *Subjects*

The observations that appear in this paper are based on dialogues from three stable male, mild to moderate, Broca-type aphasics (BA, MD and BS) engaged in task oriented dialogue – the Map Task (explained below) – with a non-aphasic female partner (SF).

BA, MD and BS were all part of an on-going programme of speech and language therapy at Queen Margaret College in Edinburgh. This programme aims to develop three main areas: (a) metacommunicative awareness; (b) overall communicative competence; and (c) individual non-verbal and verbal modalities. Prior to the day of recording, SF had never conversed with an aphasic patient before. She was, therefore, unfamiliar to all three subjects. Further details are given in Table 1.

Insert Table 1 here

Table 1. Summary of characteristics of subjects

BA, MD and BS (all native speakers of English) were chosen for the following reasons:

- they were all classified (following WAB testing) as Broca-type aphasics
- the cause of aphasia for each of them was left hemisphere CVA
- they exhibited not only comparable educational levels within group but also with the non-aphasic participants from the existing corpus of dialogues that was used for comparison
- they were all able and willing to take part
- they were all experienced research volunteers
- they had all taken part in a pilot study and were therefore equally familiar with the task

2.2 *Materials*

The Map Task used in this study was originated by Brown *et al.* (1984) (see also Anderson *et al*. 1991) and has been widely used to support the study of spontaneous speech and communication. For example, it has been used to investigate the language and communication abilities of children (Anderson, Clark and Mullin 1991, 1992, in press, Doherty-Sneddon 1993) and normal adults (Anderson and Boyle 1994, Boyle *et al.* in press).

Two dialogue partners each have a schematic map. They sit opposite each other and to the side of a table specially constructed so that neither can see the other's map. In all recordings, the aphasic subject sits to the right of the table and the non-aphasic to the left with the table furthest away from camera. This positioning was arranged to allow maximum gestural use of the aphasics' non-paralysed side whilst minimising any difficulties caused by disturbances to the visual field.

In each dialogue the aphasic participant takes the role of the Information Giver (IG). It is his job to describe the route on his map to the non-aphasic participant (the Information Follower (IF)) who, although in possession of a map, is in possession of one which is lacking the route. The Information Giver's ultimate aim is to get the Information Follower to successfully draw the route on her map without resorting to showing her the actual route on his own map.

Although both Giver and Follower have copies of the basic map, there exist some differences between the two – more specifically the Giver's map has three landmarks which are absent from the Follower's map which in turn has two landmarks that are not on the map of the Giver. Thus, in total, there are five 'problem' points to be discovered *en route*. The reason for the existence of these landmark mismatches is to set up a genuine information gap between the participants. They were made aware that there may be discrepancies in order to foster collaborative, interactive and genuine communicative strategies.

In addition, the Follower (SF) was briefed to converse naturally but to avoid direct yes-no questions if possible. This was considered necessary because in some of the pilot recordings, excessive use of yes-no questions on the part of the Information Follower led to highly unnatural, one-sided dialogue. No time constraint was set, and the participants were asked to make it clear when they had finished the task.

Although the availability of data from normal subjects is vital for the study of communication in aphasic populations, it is often not to be found in the literature (as Ulatowska *et al.* note, 1992:328). In our study although normal control subjects were not tested contemporaneously, there *is* extensive data for normals across a wide age range, available for comparison.

A sample of 16 of the 128 dialogues between non-aphasic undergraduate students were drawn from the HCRC Map Task Corpus (Anderson *et al.* 1991) against which the results from the aphasic dialogues are considered. The sample was selected before any measures of task performance or dialogue analysis were performed. Both sets of task performance were scored by the same scorer, and both sets of dialogues were comprehensively coded by the same expert coder (GDS) for the communicative functions used by the dialogue participants.

This collaborative problem solving task, has different versions of different degrees of complexity. The undergraduates used versions which were somewhat more difficult than those used in the Aphasia study. Task scores for dialogues between normal children have also been used in comparisons, where the same maps were used for child and aphasic participants.

All testing was carried out in soundproofed clinic rooms in the Department of Speech and Language Sciences at Queen Margaret College, Edinburgh which was a familiar environment to all the aphasic subjects. Recordings were made both on video and audio tape.

In an attempt to standardised the ease or difficulty of the communicative context we used the same Instruction Follower in each dialogue (see Merrison 1991:9f, 62f). This necessitated using different maps for each pair to further ensure that there was a genuine information gap between the participants. Because the maps used for the three aphasic participants were designed to be comparably difficult, they could thus be randomly assigned to each of the Information Givers. (Comparable difficulty takes into account the number of mismatches of landmarks, and the labelling of features with common English nouns.) The maps used were drawn from a selection used in Anderson *et al*'s studies of the development of communication skills in children aged between 7 and 14.

As mentioned above, the existence of a genuine information gap between participants contrasts with some studies of communicative behaviour. It also contrasts with most standardised assessments of aphasia where a subject is presented with a stimulus and is asked a question about it, but one to which the therapist already knows the answer. Furthermore, many of these standardised tests require a 'correct' response. This is not the case with the Map Task however: interaction is not constrained. Interaction is restricted, however, in that all dialogues have a precise goal that is known to the investigator. This knowledge is totally independent of the participants' contributions. Furthermore, because the participants are not allowed to show each other their maps, the goal can only be successfully achieved through the participants' contributions. By assigning the aphasic participant the role of instruction giver, it is necessary that he takes a very active role in the communication as both partners are aware that the task can only be accomplished through his contributions.

In these respects, then, the Map Task is clearly a more promising candidate for eliciting communicative data compared to some other assessment tasks. Two additional important design features of the task are as follow (based on Anderson *et al*. 1992a:):

- Because there is a clearly defined solution to the task (a perfect replica of the IG's route), it is possible to quantitatively assess success by measuring the deviation of the IF's route from that of the IG. This is done by overlaying one route on top of the other and counting the area in square centimetres between the two. Low deviation scores thus represent high task success. It is an advantage that this is a non-linguistic measure of task success, derived independently from any considerations about the quality of the dialogue.

- Because the route and landmarks are set in advance, the entities that are referred to in the dialogues are also known to the investigator, thus helping to make the participant's intentions clear in cases of ambiguity. This is especially important when analysing the restricted output from some aphasic subjects.

3.0 Coding

All the dialogues were coded (a) for use of gesture, and (b) for goal-directed exchanges (called *Conversational Games*). We deal with each in turn.

3.1 *Gesture Coding*

For the purposes of this paper, the transcripts of the Map Task dialogues were coded for the following three types of spontaneous hand gesture:

- **Iconic**: 'Representational' gesture visible to the listener. Used for objects, directions, positions, distances, affirmation and negation (e.g. 'drawing' the route/landmarks in the air; pointing in the directions of the compass; showing estimated distances between thumb and forefinger; thumbs-up for affirmation).

- **Listener-Oriented**: Gestures directed at the listener that are not iconic (e.g. gesture used to gain attention; shrugs for uncertainty; open palms turned upward often used to indicate "Well OK, then!"; outstretched, upward-pointing, open palms to hold the floor).

- **Speaker-Oriented**: Gestures not visible to the listener because they are made below the easel of the table (e.g. pointing at and measuring distances on the map). For this reason they cannot be classified as Listener-Oriented.

Below we provide examples of the various types of gesture as they appear in the dialogues. All gestures are those of the aphasic participant. The following symbols are used in the transcript: ‘+’ approximately one second pause; ‘?’ rising intonation pattern; ‘//’ simultaneous utterances. A superscript followed by ‘<’ indicates the start of gesture. ‘>’ followed by a subscript indicates end of gesture.

Extract (I):

BS ^{1}<Forty-five degrees>$_{1}$ ^{2}<south east>$_{2}$

1 *Iconic*: Left hand, open palm facing upwards, fingers point north-west so that the base of the hand is pointing south-east. Moves hand right and downwards (i.e. to indicate south-easterly)

2 *Speaker-Oriented*: Left hand points to map and traces a south-easterly line

Extract (II):

SF ^{3}<//How far?

MD // Aah about +>$_{3}$ ^{4}<oh er

SF About two inches?>$_{4}$

MD ^{5}<Er + y-es about>$_{5}$

3 *Speaker-Oriented*: Measures vertical distance between thumb and index finger of left hand

4 *Iconic*: Shows SF this handshape to indicate the distance

5 *Speaker-Oriented*: Returns measuring handshape to map to check distance

Extract (III):

BS OK. ^{6}<That’s it.>$_{6}$

SF That’s the end?

BS Mmhmm

6 *Listener-Oriented*: Raises right hand off lap simultaneously raising left arm with left hand, open palm facing upwards, fingers pointing left and up as an ‘offer’ of the completion of the task. Then returns both hands to lap.

3.2 *Game Coding*

In order to analyse the communicative functions that speakers attempt to convey in their contributions we have adopted the method of analysing task-oriented dialogue based on goal-directed exchanges which has been developed by members of the Dialogue Group at the Human Communication Research Centres in Edinburgh and Glasgow. These exchanges are called *Conversational Games*.

Although the Conversational Game framework is based on the work of Power (1979) and Houghton (1986; Houghton and Isard 1987), the coding that is used was developed specifically for the Map Task. In essence, this analysis involves coding every utterance that is attempted for collaborative interaction in terms of initiation-response-feedback patterns rather than linguistic content. (For a full description, see Kowtko *et al.* 1992.)

The game coding operates at two levels: *Game types* and *Game moves*. This distinction is required because a complete Game consists of the moves “which are necessary to accomplish one conversational sub-goal” (Kowtko *et al.* 1992:3). For example, an INSTRUCT Game begins when an instruction is given and ends when the follower either accomplishes that instruction or indicates that it is well on the way to being accomplished. This may have taken several moves.

Moves are defined as “an utterance, a partial utterance, or a group of utterances which convey the same, specific intent” (Kowtko *et al.* 1992:3). A move may therefore involve several utterances spanning several turns, whilst only counting as one move. Furthermore, all moves are defined by their function rather than by their form. It is therefore possible for an instruct move to have an interrogative form, yet still be classified by its instructing function. Similarly, because questioning type moves are also classified by function, there are several distinct functional categories for interrogatives. Examples of Game types follow:

INSTRUCT
Communicates a direct or indirect request or instruction, to be done immediately or shortly.

CHECK
Checks self-understanding of a previous message or instruction by requesting confirmation directly or indirectly; makes sure that a complicated instruction is understood.

QUERY-yn, QUERY-w
Question (yes-no/open-ended) which asks for new or unknown detail about some part of the task; does not request clarification about instructions (that would be a CHECK).

EXPLAIN
Describes status quo or position in task with respect to the goal; freely offered, not elicited; provides new information.

ALIGN
Checks the other participant’s understanding or accomplishment of a goal; checks alignment of both participants’ plans or position in task with respect to goal; checks attention, agreement or readiness. The hypothetical dialogue below illustrates how game coding operates.

Extract (IV)

Instruct begin	Kim:	Could you close the windows? INSTRUCT
Check-embedded	Sam:	All of them? CHECK
Check-end	Kim:	Yes. REPLY-y
Instruct end	Sam:	Sure! (*Sam closes all the windows*) ACKNOWLEDGE

Kim wants all the windows to be shut and so instructs Sam to close them by uttering what formally appears to be a question, but is in fact an instruction (*Could you close the windows?*). Sam, who does not fully understand this request checks that Kim means *all* the windows and thus embeds a CHECK Game within Sam's INSTRUCT Game. When Sam gives a positive response (a REPLY-y move) to Kim's CHECK this closes the embedded CHECK Game. Sam then acknowledges the original instruct and closes all the windows. By doing this, Sam has carried out the instruction and thus terminates the INSTRUCT Game.

The reasons that Game analysis was used as a method of analysing the communicative functions of conversational contributions were three-fold:

(i) it is based on function not form (and therefore copes well with incomplete verbal or non-verbal contributions)

(ii) a substantial sample of normal undergraduate Map Task data was already coded and available for comparison

(iii) it has been demonstrated that this method of coding is robust, with interjudge reliability running at approximately 88% between expert and novice coders.

4.0 Linguistic Ability of Subjects

In order to fully appreciate the results we will first briefly describe the linguistic abilities of BA, MD and BS. We will profile linguistic ability into two broad categories: Aphasia Quotient (Kertesz 1982), and syntactic content, dealing with each in turn. (The current study does not concentrate on phonological output.)

4.1 *Aphasia Quotient*

The variability between subjects can, at a gross level, be seen from their differing Aphasia Quotients (based on scores for the Western Aphasia Battery (Kertesz 1982)). The Aphasia Quotients for our subjects are: MD 91.7% > BS 80.2% > BA 65%. According to Aphasia Quotients, then, MD is clearly the most linguistically able of the three subjects (a score above 93.8% is taken to indicate normal linguistic functioning (Kertesz 1982:6)) and BA the most linguistically impaired.

4.2 *Syntactic Content*

Below we give representative examples of each subject's speech output. In each case, the italicised text is from the transcripts; the text below this is a fully fleshed out 'translation' and below this we list the types of omitted lexical items. (A '+' represents a pause of approximately one second.)

BA typically omits verbs, prepositions, auxiliaries, dummy subjects and articles:

(1) *But volcano left*
But there is a volcano on the left
omitted: dummy, verb, preposition, article

(2) *One cactus left and one cactus right*
There is one cactus on the left and one cactus on the right
omitted: dummy, verb, preposition, article, preposition, article

(3) (lipsmack) *Difficult explain*
It's difficult to explain
omitted: dummy, verb, auxiliary

In addition to omitting lexical items, BA's transcript contains only one example of a contraction (*won't*). This is partly due to a lack of verbs to contract (only 2.34% of all BA's lexical tokens are verbs). But there are two examples where we might expect contracted forms. These are given below.

(4) *I think not*
I don't think so

(5) *I think not tree ...*
I don't think that tree is ...

Although we might expect contracted forms in examples (4) and (5), BA's non-contraction is actually a way of simplifying syntactic structure. Non-contraction in (4) avoids the use of *so* anaphora. Example (5) is particularly interesting because by using a simplified quasi-logical structure, namely, think'(¬[P(tree)])(BA), BA manages to signal a relative clause without the associated complicated syntactic structure.

Virtually all BS's speech consists of distances and directions. These are functionally (if not formally) imperatives:

(6) *Two inches south er west + and half an inch south +*
Go two inches south er west + and half an inch south +
omitted: imperative verb

Although this type of structure accounts for the majority of his speech, BS also has one syntactically marked question in (7) and, apart from missing a preposition and an article, a fully complete sentence in (8) – including an auxiliary.

(7) *The crashed airplane is where?*
The crashed airplane is where?

(8) *Now – you should be round about er end now*
Now – you should be round about at the end now
omitted: preposition, article

Apart from having a slow speech-rate, MD is clearly the least linguistically impaired with a large number of reasonably complex structures:

(9) *And then it's straight down until the crashed aeroplane*

(10) *And then turn back west*

(11) *Well you ought to!*

The above 11 examples should illustrate the fact that linguistically speaking, MD is better than BS, who, in turn, is better than BA, which is in accordance with their respective Aphasia Quotients.

5.0 Results

5.1 *Analysis of Communicative Success*

The central finding on which this paper is based is the fact that these aphasic subjects perform surprisingly well with an average map deviation score of 97 cm^2. This performance level compares with average deviation scores of 182 cm^2, 145 cm^2 and 145 cm^2 for 7, 9 and 13 year old normal children attempting the same map tasks. The scores for undergraduate subjects averaged across the complete HCRC Corpus (see Boyle *et al.* in press) on slightly more difficult versions of the task, was 61 cm^2 with scores ranging from 7-204 cm^2. The scores for the subsample of gamecoded, unfamiliar undergraduate dialogues within the HCRC Corpus was 105 cm^2 These results are given in Figure 1.

Insert Figure 1 here

Figure 1. Map Deviation Scores

5.2 *Analysis of Use of Gesture*

A bar chart of mean percentage of turns in which gesture type is employed by aphasic and normal (undergraduate) Information Givers is given in Figure 2. (The fourth column combines Iconic and Listener-Oriented gestures as these are the types that carry semantic (or informational) content to the listener.)

Insert Figure 2 here

Figure 2. Percentage of turns employing gesture

This shows that these aphasic subjects are employing considerably more gestures than normal undergraduates in completing the task. .

5.3 *Analysis of Game Coding*

One question we can use the game coding analysis to answer is to what extent the communicative burden of the dialogues are being carried by each participant. In Figure 3, below, we show what percentage of Conversational Games is initiated by each participant within a given dialogue. (For the normal undergraduate dialogues, mean percentages are used.)

Insert Figure 3 here

Figure 3. Percentage of Conversational Games initiated by each dialogue partner

Here we see that in the normal/normal dialogues, the burden of communicative work is reasonably shared between participants with the Giver initiating slightly more Games (53%) than the Follower (47%). As the Giver is the only one who knows the actual details of the route, this result is not very surprising.

For the aphasic/non-aphasic dialogues, however, we see heavily skewed results from the normal/normal data. SF (the Follower) consistently initiates around about 75% of all Conversational Games even though she is not in possession of critical information (i.e. the route). These results would suggest, then, that non-aphasic interlocutors *do* take on more responsibility for communicative work when conversing with an aphasic partner.

In the next analysis we explore the kinds of communicative function the aphasic and non-aphasic partners initiate.

Insert Figure 4 here

Figure 4. Percentage of Conversational Games initiated by Information Followers

It seems that not only does SF initiate more Games than the average Information Follower in normal/normal dialogues, she does so in all categories. However differences seem particularly noticeable in CHECKS and QUERIES. These are the Games in which the Information Follower checks she has understood her partner and those that ask for new or unknown detail about some part of the task and it seems that the Follower used them to compensate for the partial output of the Information Giver.

In the example below, the Follower initiates four consecutive CHECK Games before she is satisfied that she knows how the Giver intended her to draw the route. This clearly illustrates this type of communicative compensation.

(The following symbols are used in the transcript: '+' approximately one second pause; '...' utterance trails off; '/' point where overlapped utterance starts; '.' falling intonation pattern; '?' rising intonation pattern; italics indicate emphasis.)

Extract (V)

	Follower	Where do I go after the /church?
		QUERY-w
	Giver	/Er it's church er er double back
		CLARIFY
C-em	Follower	Double back round to the other *side* of the church?
		CHECK
	Giver	Er
	Follower	Or ...
		CHECK
	Giver	Doul- double back er er er after the church
		CLARIFY
C-em	Follower	So I go past down down past the church?
		CHECK
	Giver	Yes
		REPLY-y
	Follower	And /then double back?
		CHECK
	Giver	/Aah

	Giver	Aah. Double back. And + and
		CLARIFY
C-em	Follower	When I double back do I double back between the church and the shoreline again?
		CHECK
	Giver	Er
	Follower	No
		CHECK
	Giver	N- er no er er away from the shoreline
		REPLY-n
		CLARIFY
	Follower	Away from the shoreline.
		ACKNOWLEDGE
C-em	Follower	So do I go right – do I go east?
		CHECK
	Giver	Er right yes
		REPLY-y
	Follower	Underneath the church?
		CHECK
	Giver	Under Underneath the church
		REPLY-y

What an analysis of Game coding shows us then, is that the aphasics' dialogue partner (SF) consistently does more work in initiating dialogue compared to her aphasic partners. It also indicates that the amount of collaborative interaction that she does with them is far beyond the work done by normal information follower in normal/normal dialogues. The fact that differences are particularly noticeable in CHECK and QUERY Games accords with the findings of Anderson *et al*. (1992b, 1994, in press), namely that increased questioning activity correlates with increased task success.

6.0 Discussion

6.1 *Communicative Success*

This study highlights the communicative abilities of Broca-type aphasics in a cognitively demanding task. It seems that *despite* their linguistic deficits, the aphasic subjects in this study perform the Map Task with considerable success, exceeding the average performance levels of unimpaired 13 year olds and achieving task scores within the range obtained by undergraduate subjects.

6.2 *Non-Verbal Behaviour*

The importance of gesture in aphasic communication has been documented by Holland (1982) (30 out of her 40 subjects (75%) had no failures in their attempts at communication in a non-verbal modality whereas only 4 out of 40 (10%) had no failures when attempting communication in a verbal medium). This importance is also demonstrated by Glosser *et al.* (1986) who observed considerable reductions (up to 50%) in gesture use in conditions of restricted visual access i.e. in situations where gestures *cannot* be used for effective communication.

However, no matter how important such a strategy might be, if it is to be effective, then it must be employed. As noted in the introduction, previous research provides mixed evidence on the role of non-verbal communication in aphasic communication. Our findings that Broca-type subjects perform considerably more non-verbal gesture than normal undergraduate subjects contradict the results of Cicone *et al.* (1979) and Glosser *et al.* (1986) who found no differences between aphasics and control subjects in amount of gesture use but support the findings of Smith (1987), Le May *et al.* (1988) and Feyereisen *et al.* (1988).

Our interpretation of the finding that the more impaired subjects use more information-carrying gesture (Iconic and Listener-Oriented) is that the aphasic subjects in our study use non-verbal gesture sensitively. This is consistent with results obtained by Behrmann and Penn (1984) who state: "In the non-fluent subgroup … the "substitution" and "yield additional information" classes also [i.e. in addition to the "support" class] played prominent roles, while the "interfere" function occurred less frequently than in fluent and mixed groups. This implies that the non-fluent aphasics are actively utilising their non-verbal behaviour in the transmission of the message" (1984:162)

Cicone *et al.* (1979) noted that if aphasic subjects with an anterior lesion actively compensate for their verbal deficits via a non-verbal modality, then one would expect them "to gesture *more* than the control subjects, substituting gestures for what would normally be spoken information" (1979:340, emphasis in the original). However, their finding that aphasic subjects of this type produced the same amount of gesturing as normals did offers no support for this view of active compensation.

When considering the divergent results from studies on gesture, it seems possible that the different discourse genres used in the studies have an effect on the use and usefulness of nonverbal communication. Brown and Yule (1983) describe a continuum of different discourse genres, from transactional discourses where the most important communicative function involved is the clear and accurate transfer of information, to interactional discourses where the communicative function is primarily about establishing and maintaining social relationships. They give examples of transactional discourses such as a policeman giving directions to a traveller, whilst a casual conversation about the weather between strangers at a bus stop, is an example of interactional discourse. Our map-task dialogues are examples of transactional discourse, where the communicative goal of transferring information accurately was very clear to both participants. We believe the nature of the communicative task and the aphasic subject's role as the information giver, strongly encouraged the aphasic participants to become very actively involved in communicating at their optimum level. The nature of the task was also one in which nonverbal communication could be used very effectively to assist in the communication process. It seems likely that both these factors encourage extensive and effective use of gesture from the aphasic participants as they attempt to compensate for their linguistic impairments.

In contrast, in more interactional discourse contexts such as informal conversation, as studied by Cicone *et al.* and Glosser *et al.*, the importance of accurately transferring information is much less salient. This may mean that the aphasic speaker feels they can 'get by' in the conversation with relatively imprecise verbal input, and so need to substitute gestures less frequently. Interestingly, Glosser *et al.* note that in their study the gestures which were used seemed to be mostly the less clear and less specific types. This again suggests that the aphasic speakers were producing the rather imprecise, informationly sparse gesture which we all tend to do in interactional discourses.

The communicative context in which the aphasics were placed in the Glosser *et al.* study might also have influenced the aphasic speakers' output in other ways. The non-aphasic interviewer attempted to limit her verbal participation and allowed the subjects to speak freely about any relevant aspect of their past experience, pertaining to their family, work, schooling or previous illness. All these conditions were no doubt intended to facilitate the speaking task for the aphasic, but are in fact quite pragmatically demanding. As researchers in Conversational Analysis have demonstrated (see for example, Goodwin and Heritage, 1990) in normal conversation the topic of interest is negotiated between speakers, and the level of detail provided is iteratively refined as the conversation progresses. Here in contrast the aphasic individual has to judge what they are expected to say, how detailed their account is expected to be, and how much or little the listener understands or is interested in, all on the basis of minimal input form the unimpaired partner. This is a demanding set of communication decisions, particularly when the aphasic subject is probably already a less than confident conversationalist because of an awareness of their linguistic impairment. The aphasic subject may well communicate at less than an optimum level in such circumstances and be unclear how using gestures might help in communicating, especially when it is hard to judge *what* has to be communicated.

Studies of conversation show that all speakers require input from their conversational partner, (see for example, Schegloff, 1981, 1984). Our data suggest that aphasic speakers, even when in the information giving role, communicate effectively because they make extensive use of their partner's contributions. As a result of the kind of conversational moves illustrated in Extract (V), the aphasic's contributions can be clarified by refining the verbal message or by complementing the verbal message with non-verbal gesture. The unimpaired partner's contributions are therefore likely to increase both the aphasic's use of gesture and communicative effectiveness.

Our results clearly show that the aphasics are employing considerably more gesture in getting the task done than non-aphasic undergraduates. Furthermore, the use of Iconic and Listener-Oriented gesture compensated for an impaired linguistic modality in cases where there were particular word retrieval difficulties, where a non-verbal modality appeared to be more expressive (e.g. in route description), and in turn management (e.g. in allowing thinking time, preventing interruption). This does support the idea of active compensation.

But *more* gesture is not (*ipso facto*) *better*. The interesting point is that the subjects seem to be using their non-verbal output *sensitively*, with the more linguistically impaired employing more semantic carrying gesture (see Figure 5). This finding is in agreement with Feyereisen *et al.* (1988) who found that the more impaired the subject, the greater the preference for communicating via a gestural modality.

Insert Figure 5 here

Figure 5. Use of Information-bearing Gesture in relation to WAB Aphasia Quotient scores

6.3 *Collaborative Dialogue*

A second way that these dialogue partners appear to compensate for the aphasic participants' impairments is to draw on the communicative expertise of the non-aphasic interlocutor. That said, it must be stressed that by the very nature of the task, the Information Follower is in a subservient position – no matter how she might try, and no matter how much she might want to do so, she cannot take over and dominate because she is the participant lacking the critical information about the route. In other words it is a *collaborative* effort between the two dialogue partners which results in the level of success obtained.

That dialogue is a collaborative process is generally well accepted (Clark and Schaefer 1987, 1989, Milroy and Perkins 1992, Anderson *et al.* 1992b) with aphasics and normals adhering to Clark and Schaefer's (1987, 1989) principle of least collaborative effort: dialogue partners attempt to minimise the total effort invested in a given contribution.

Cicone *et al*. noted (1979:336) that in informally structured interview situations "over half (58%) of the anteriors' conversational segments were "assents" or "denials," as compared with 3 and 5% for posteriors and controls. Anteriors also exhibited a much higher percentage of inferred propositions [e.g. those utilising ellipsis] (26%) vs. 3 and 7% for posteriors and controls. These results reflect the greater dependence of the anteriors on the interviewer taking the lead in conversation." This demonstrates the principle of least collaborative effort in action.

What our research has shown is that in extended discourse between aphasic and non-aphasic individuals the partners do indeed distribute communicative burden (as indicated by the 75%-25% split of Conversational Game initiation) with the non-impaired interlocutor becoming more responsible for questioning type activities. Furthermore, this collaborative process is an iterative process of working together and refining, because the participants do not give up when facing a communicative difficulty (unlike some of the children studied by Anderson *et al*, in press). The persistence of the aphasic dialogues is illustrated by the occurrence of extensive sequences of CHECK games as shown in extract (V). In other words, we have shown that although brain damage might damage language it is not necessarily the case that it also damages the ability to appreciate the collaborative nature of dialogue.

7.0 Conclusion

By employing a method of eliciting spontaneous yet comparable extended dialogues, we have shown that the Broca-type aphasic subjects involved in this study demonstrate high levels of task and communicative success.

In addition, the results obtained confirm our original hypothesis, namely that some aphasic individuals are able to, and *do* use a range of strategies to improve their communicative performance, whether it be use of non-verbal gesture or reliance on the communicative expertise of their non-impaired partner. Whether this is a consequence of the emphasis on 'total communication' in the therapy programme at Queen Margaret College is not for us to say, if only because the research was not designed to test this hypothesis. What our results (in association with the profiles of linguistic ability) do show, however, is that communication does not equate with language.

So what started as an apparent paradox becomes less paradoxical when we take into account the fact that ordinarily, face to face communication does not take place within a contextual vacuum – extralinguistic cues of some kind are almost always available (e.g. use of the environment, intonation, non-verbal gesture). In addition, unlike standardised assessment tests, real face to face communication is a collaborative achievement. The proposition that aphasics tend to communicate much better than they speak/understand should perhaps be less surprising than might at first appear.

As none of the authors is a clinician, we do not presume to make recommendations for intervention. We only want to stress that language is not the same as communication and that if communication is what is at issue, then there is no point in trying to evaluate it with standardised linguistic tests that are not designed for that purpose.

The results in this paper only reflect the behaviour of one particular non-aphasic Information Follower (SF) and should clearly be treated with some caution. However, there are no reasons to suspect that SF is radically different from any of the normal undergraduates: she had no special task training and she is not a speech and language therapist. We therefore suspect that the skewed burden of communicative collaboration is in fact due to the interaction being with an aphasic dialogue partner. With more subjects (including a broader spread of communicative and linguistic abilities) we expect to be able to carry out a more detailed analysis of the extent to which these results hold over larger populations.

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Address correspondence to Andrew John Merrison, Department of Linguistics, University of Edinburgh, Adam Ferguson Building, George Square, Edinburgh, EH8 9LL, Scotland, U.K.