

## Formal Communication Disorder Sign Language in Deaf People with Schizophrenia

ALICE J. THACKER

**Background.** This study investigates whether anomalies in the sign language of prelingually deaf schizophrenics can be elicited and described systematically.

**Method.** Thirty schizophrenic and seven manic adults were recruited on the basis of a British Sign Language (BSL) version of the Present State Examination. Thirty-seven controls were matched for sex, age and ethnicity. Each participant became deaf before the age of two, and uses BSL as the primary means of communication.

**Results.** Analysis reveals: (a) anomalies which are similar to those occurring in the spoken language of hearing schizophrenics; and (b) another series which is closely related to the life experience of deaf subjects and to the visuo-spatial medium itself.

**Conclusions.** There is evidence that formal communication disorder does occur in sign language. This has implications for more efficient diagnosis and management of deaf persons presenting to psychiatric services, as well as for the mechanisms of schizophrenic symptomatology itself.

"Ooh, warm, soft. It's . . . one of them bed things."  
Schizophrenic, wringing out a live kitten.

"Too many cooks spoil the broth? They mean that too many in the place . . . what's under one another spoils the broth, and they're liable to understand around one another." Schizophrenic patient explaining proverbs.

Author, showing a picture of a family packing for a holiday: "What's this here?" Schizophrenic patient: "Nothing sits there. You don't see nothing on them once they're tied up."

One of the most intriguing realms of study has been that of 'formal thought disorder'. This term refers to a phenomenon, or perhaps a cluster of phenomena, described in schizophrenic speakers for more than a century. This article will use the term 'formal communication disorder' to refer to these behaviours, in recognition of the wide range of theories on their nature and aetiology.

It is this author's contention that the nature of schizophrenic symptoms can be elucidated by study of their incidence in a non-auditory-vocal medium. This paper will therefore seek to link two traditionally separate academic disciplines, neuropsychiatry and sign linguistics, by relating findings on linearly-organised spoken language to recent data on the three-dimensional spatially organised language of deaf signers. Although important research into the neurological substrate of sign has been carried out with brain-damaged subjects, the manual language of schizophrenia remains largely unexplored.

### Nature of formal communication disorder

Theories of the aetiology of disordered communication are as diverse as the descriptive parameters of the behaviours themselves. Communication disorder has been characterised, for example, as marked confusion and incoherent speech (Kraepelin, 1919), as "phonemic, morphemic, verbal . . . paraphasias and téléscopages . . . dyssyntaxia and glossolalia" (Lecours & Vanier-Clement, 1976), and as disorders of the stream and continuity of thinking as well as of certain features of language (Cutting, 1990). Frith (1992) proposed a primary deficit on the level of discourse in communication-disordered schizophrenics, such that errors at lower linguistic levels (syntactic, semantic, lexical and phonological) "can be explained as the consequence of higher level processing failure". Cutting (1990) also ascribes abnormal production on these levels to deficits in pragmatic usage. The concept of a characteristic communication deficit in psychiatric disorders has been operationalised by Andreasen (1979) in her Scale for the Assessment of Thought, Language and Communication. Other authors have developed assessment methods based on their understanding of the nature of formal deficits.

The character of formal communication disorder has been described in a number of ways, producing significantly contrasting viewpoints. Chaika (1982) uses the term 'speech disorder' specifically as opposed to 'thought disorder', pointing to the divergence of thought and many speech acts in normal social ritual and creativity; in post-CVA aphasic errors; and in schizophrenic production in which the

form of speech is normal, but the content is bizarre. In contrast, Lanin-Kettering & Harrow (1985) argue for "viewing verbal behaviour as the product of interrelated conceptual-linguistic activity." These authors present several lines of evidence, including the co-occurrence of strange speech and abnormal non-speech behaviours in schizophrenics. Lanin-Kettering & Harrow (1985) proposed a distinction between "conceptual-linguistic" activity, which they believe is more often affected, and "linguistic-speech" functions (word retrieval and sound production). The recent literature stresses apparent impairments in the schizophrenic's ability to relate immediate experience to stored knowledge. Gray *et al* (1991) proposed that "cognitive abnormalities might then be seen as related to a weakening of inhibitory processes crucial to conscious attention". They quote Frith (1979): "the basic cognitive defect is an awareness of automatic processes carried out below the level of consciousness"; and also Hemsley (1987): "a weakening of the influences of stored memories of previous input on current perception". Gray *et al* (1991) discuss possible deficiencies in "action plans, including those in the purely cognitive sphere, such as the selection of stimuli for attention, or the programming of streams of speech or thought." Frith (1992) also found action-planning a productive line of explanation; he stated that such deficits would account for reduced action (poverty of syntax, lexicon, and content), perseveration, and inappropriate action (incoherence and neologistic speech).

McKenna (1993) suggested that a primary factor in thought disorder and other schizophrenic symptoms may be a deficit in semantic memory. He defined this as "primarily memory for the use of language, a sort of mental thesaurus of organised knowledge about words and other verbal symbols, their meanings and referents and the relations among them". Poor scores in formal tests of semantic memory correlated highly with the presence of 'thought disorder' in McKenna's schizophrenic subjects. Overinclusion of entities into inappropriate categories was found to be particularly prominent in the acute phase of the illness (the experience of the kitten recounted above might serve as an example of this). Alverson & Rosenberg (1990) found no evidence of a deficit in linguistic competence *per se*, but describe a tendency to violate the rules of conversation in context, that is, deficiencies in discourse cohesion and the pragmatic use of language. While this is an interesting hypothesis regarding errors at the discourse level, it does not address pathologies at the lexical (e.g. rhyming word) and sublexical (e.g. neologistic) level (nor would Alverson & Rosenberg claim that it does). Frith

(1993) believed that many facets of schizophrenia may "arise . . . from impairments in . . . the 'theory of mind' such as the ability to represent the beliefs and intentions of another person." Such an individual would fail to take into account the differences in knowledge between himself and his interlocutor. This failure would correspond to a failure in 'pragmatics', in linguistic terminology.

Halliday & Hasan (1976) designed a frequently-cited formulation of discourse variables largely dependent on cohesion devices. Subsequent researchers have described schizophrenic speech data in terms of these 'cohesive ties', which link texts so as to produce coherent narrative. These include pronominal and comparative reference, nominal and verbal substitution, ellipsis, conjunction, and lexical devices such as the use of synonyms and superordinates.

### Comparing signed and spoken language

This paper presents very preliminary experimental findings which suggest that neuropsychological comparisons of both healthy prelingually deaf signers and schizophrenic and manic signers can illuminate the nature of the communication deficits in schizophrenia in general.

The discussion will centre first on how levels of sign correspond to levels of spoken language, and will then summarise the literature on the pathologies observed in signers who have experienced neurological insult.

### Sign language

The integrity of sign as an authentic language has been demonstrated in studies of neurolinguistic function in healthy deaf people. Recent research has provided evidence of the separability of syntactic, semantic, pragmatic and phonological aspects of spoken language (Cutting, 1990). Each of these levels can be delineated in sign language in terms of: the formal relations between signs (syntax); their meanings (semantics); their relation to context and to the requirements of coherent discourse (pragmatics); and to sublexical features described as hand configuration, place of articulation, direction of movement, and palm orientation (Brennan *et al*, 1984), which is the phonology, or, as many authors term it, the 'cherology' of sign. Woll (1983) systematised parameters of meaning in British Sign Language (BSL), as have researchers in other countries for their indigenous sign. Vocal prosody would correspond to intensity and duration of movement, and affective facial expression. This factor may have implications for the frequent finding in hearing schizophrenics of

difficulties in recognition and identification of emotion, as exhibited in facial expression, and affective vocal intonation (e.g. Morrison *et al*, 1988). Many sign linguists specify two functions of facial expression: one prosodic/affective, the other morphological. There is a complex hierarchy of non-manual behaviours (e.g. positioning of eyebrows) which define, for example, interrogatives and the actor of a sentence.

Discourse devices are observable in sign. Zimmer (1990) discussed how cohesion in sign discourse can be achieved through anticipatory assimilation of handshape in a sequence of signs and establishment of reference through pronominalisation (pointing or use of specific handshapes, called 'classifiers', standing for people, vehicles, and animals).

### Pathology in sign

Further support for the comparability of signed and spoken language is provided by studies of pathologies in sign. Research has been carried out on users of American Sign Language (ASL). Poizner *et al* (1987) documented the effects of cerebrovascular accident (CVA) upon linguistic and nonlinguistic visual-spatial capacities, with significant implications for the functional hemispheric organisation of language. They developed a test battery which revealed compelling evidence "... for a specifically spatial-perceptual deficit, as opposed to a linguistic deficit, as the basis for the impaired performance of right [hemisphere]-lesioned signers." These patients showed deficits in the comprehension of spatialised syntax. Alternatively, left (dominant) hemisphere-lesioned signers exhibited frank aphasia in the form of sublexical errors, paragrammatisms, and agrammatism. Poizner *et al* (1987) concluded that "brain regions that subserve auditory processing in hearing subjects respond to visual stimulation in deaf subjects", but that "those anatomical structures within the left hemisphere that subserve visual-gestural language differ from those that subserve auditory-vocal language (i.e. Broca's and Wernicke's areas)." As evidence, they cite the severe sign comprehension deficits in a patient whose Broca's and Wernicke's areas were spared, but who had a discrete lesion in the inferior parietal lobule.

This interpretation might be contested by Paulesu *et al* (1993), who found evidence of a phonological store in hearing normals in that region of the parietal lobe. Damasio *et al* (1986) reported a single case of left-hemisphere amygdala injection followed by right hemisphere ablation in a hearing ASL/spoken English bilingual. They found that in the former condition, "sign paraphasias, perseverations, neologisms, and

grammatical errors occurred", while subsequent resection of the right hippocampus, parahippocampal gyrus, amygdala, and both polar and anterolateral right temporal neocortex resulted in no errors in spatially organised syntax. It is perhaps unfortunate that other aspects of spatial (linguistic and non-linguistic) processing were not tapped in this fascinating study. The above findings suggest that brain organisation for language in signers is similar to that of speaking individuals.

### Research findings in deaf schizophrenics

There is clinical evidence that communication disorders are manifest in the sign language of deaf psychiatric patients. Anecdotal data can be gleaned from cases treated by psychiatric services for the deaf, and the author has observed examples in her patients.

A major research project is in progress which investigates for the first time the nature of communication disorder in schizophrenic signers. Sign language samples have been elicited from 30 prelingually deaf adults diagnosed with schizophrenia, seven diagnosed with mania, and from a matched group of deaf controls. Patient diagnosis was established through administration of a BSL translation of the Present State Examination (PSE) (Wing *et al*, 1983), and clinical records.

### Preliminary analysis

Various types of disordered behaviour occur as listed below. Descriptive terms originate from several authors' paradigms, and in some cases are observations of behaviours not described in the literature on hearing patients. Signs are transcribed in upper case letters; fingerspelling in lower case.

(a) *Cross-linguistic (BSL-English) contamination.* These errors primarily take the form of a linking of a sign to the English homophone. Example:

Interviewer: YOU SAY WOMAN INSIDE YOU HAVE? MEAN WHICH, BODY OR SOUL?

Schizophrenic subject: SOUL (conventional sign) SOLE (pointing to bottom of foot) TWO FEET JUMP IN MY MOUTH.

(b) *Phonemic, or cheremic, paraphasias.* This descriptive category includes unusual, stereotyped handshapes for recognisable signs and phenomena not directly comparable to a spoken language:

(i) Reversals. One schizophrenic woman fingerspelled backwards when acutely ill; others made the movements of actual signs backwards. This

may not be as dysfunctional as speech articulated backwards would be, as reversing movement does not have such a serious effect on intelligibility.

(ii) Errors are frequently produced through substitution or omission of cherological features. This aspect was particularly striking in one acutely schizophrenic woman who routinely made signs in the wrong location; for example, she traced a circle around her face rather than over her palm to describe a JAR.

(c) *Attention to cherological (or phonological) rather than semantic relationships.* This would seem to correspond to certain parameters of Chaika's (1974) description of a characteristic behaviour: "inappropriate noting of phonological features . . . and production of sentences according to phonological and semantic features of previously altered words rather than to a topic." They are reminiscent, too, of Andreasen's (1979) 'clang' category: "A pattern of speech in which sounds (or in this case, sublexical handshapes) rather than meaningful relationships appear to govern word choice." Both are indicative of deficits in pragmatics and failure to suppress formal language processes. Examples:

(i) Interviewer: PLEASE WRITE SENTENCE (using the patient's sign for 'sentence' which was a narrow horizontal rectangle made in the air in front of the signer. This request was in the context of a written picture description task. The client had been writing single words).

Schizophrenic patient: YES, SENTENCE (plucks sign out of air and ties it around her waist).

(ii) Interviewer: (showing a picture of a fish) THIS WHAT?

Schizophrenic patient who had been educated in Jamaican Sign Language, but had been exposed to BSL for 15 years: FISH (spoken, and signed as follows: Jamaican sign – one hand flat, projecting out from chin – appears to correct to BSL sign of flat hand wriggling away from body; adds the other hand to produce a gesture resembling fluttering wings; quickly performs BSL sign for BIRD, i.e. thumb and forefinger tapping next to mouth) "Bird" (spoken while pointing at fish).

(d) *Topic switching/derailment.* Interviewer: ALL POLICE WORLD DISAPPEAR . . . WHAT HAPPEN?

Subject: WHEN WORLD c.e.l.l. c.e.l.l. GROW SPREAD SPREAD LATER YOU KNOW d.o.n.o.s.a.u.r. WALK SIDEWAYS MONKEY

RISE UP SLOW . . . (interviewer indicates lack of comprehension, repeats question) SUPPOSE NAUGHTY STEAL FIGHT FIGHT NOSE BLEED . . . (The subject apparently was diverted by the thought of Godzilla and King Kong taking over an unpoliced planet).

(e) *Derailment based on a feature of the sign.* A schizophrenic subject was asked to produce signs using the handshape based on pointing the index finger: THINK (correct handshape at temple) BEFORE FALL OVER SCAR THERE TEN YEARS OLD BLOOD (none of the signs other than SCAR and THERE use the specified handshape).

(f) *Perseveration*

(i) Sign/word level:

Interviewer: EYE EAR SIMILAR HOW?

Subject: BEEF DEAF WRITE HOSPITAL

Interviewer: EGG SEED SAME HOW? Subject: b.e.e.f. THERE b.e.e.f. THERE.

(ii) Thematic perseveration:

Interviewer: YOU FAMILY COMMUNICATE HOW? Subject: MYSELF CLEVER MOUTH CLEVER SPEAK SIGN SPEAK MOUTH TEA FOOD h.e.l.e.n. SOME NURSE FOOD THERE BAD EAT HERE SAW c.h.e.s.t.n.u.t. NOT DIFFERENT ME SAY NO BAD BOY SAY DIFFERENT w.a.l.n.u.t.

Interviewer: TELL ME ANIMAL NAME LIST ANIMAL. Subject: l.o.i.n. t.a.r.g.e.r. TIGER LION f.l.a.c. f.l.a.k.e. CONE ICE CREAM CLAW . . .

(g) *Echopraxia.* Slavish imitation of the interviewer's signs.

(h) *Téléscopage*, described by Lecours & Vanier-Clement (1976) as corresponding "to a variety of phonemic paraphasia in which a deviant segment, used as a single word, borrows units from more than one conventional segment". Examples:

(i) Manic-depressive subject, looking at a picture of a boy throwing a tantrum: BAD-BOY (simultaneously producing sign for BOY with index finger while protruding little finger, the conventional marker for BAD).

(ii) Interviewer: TELL ME ANIMAL NAME LIST.

Schizophrenic: r.a.b.b.i.t., g.u.i.n.e.a. p.i.g., k.a.n.g.o.o. HOP h.a.m. [SORRY, AGAIN PLEASE, h...] DOG, h.a.m.d.o.g. DOG.

(i) *Syntactic errors.* Two subjects produced errors in directional verbs. In both cases, actions originated from themselves (e.g. I HIT FATHER when clearly what was meant was FATHER HIT ME). Further analysis may reveal errors in the placement of proforms (the equivalent of pronouns) and in the grammatical use of facial expression.

(j) *Anomalous use of sign based on spatial factors.* This is perhaps not comparable with spoken language errors. A young woman experiencing her first episode of schizophrenia identified her right side with herself, and her left side with her brother. Having touched her left shoulder inadvertently, she afterwards used her left hand to carry on a dialogue with her right. Signs that would normally cross the midline were confined to the area of the character talking.

(k) *Sign errors in signers without psychiatric history or symptoms.* Mayberry (1992) has elicited semantic substitutions (e.g. FATHER for MOTHER) from healthy fluent signers who learned sign in early childhood; indeed, individuals with native competence substituted 10% of signs in a story-telling task. We also have observed this, most notably in a control subject who told us that she is SHY QUIET PERSON I ENCOURAGE CROWDS LIKE SIT ALONE READ. (Evidently WITHDRAW FROM was intended).

### Discussion

The possibility of mere 'slips of the hand' clearly must be taken into account in any attempt to verify the occurrence of true communication disorder in our signing subjects, as must the possibility that the subject is engaging in deliberate metaphor or lyricism. The present author has observed that the linguistic and cultural distinctions of the deaf community (e.g. the use of idiosyncratic signs to represent proper names) create a legitimate restricted code which may confuse the non-deaf interlocuter.

Certain observations point to the difficulty of applying psycho- and neurolinguistic theories directly from spoken language into visual-spatial languages. As Zimmer (1990) points out, for ASL, repeated segments become part of a formula in word meaning and reinforcing images. In addition, in BSL the interface between ideas or 'texts' may not be clearly marked from a hearing person's point of view. For example: Interviewer: PEOPLE BELIEVE GOD WHY? Control subject: SEE GOD WORLD CAN SEE GOOD BAD BLACK WHITE HARD SOFT HOT COLD.

A clinical justification for delineating communication disorder as opposed to normal usage in the deaf

patient's primary language was provided by Kitson & Fry (1991), who pointed out that the standard diagnosis of mental illness relies primarily on analysis of form and content of verbal behaviour, and that the delayed and deprived oral and written language acquisition of the prelingually deaf can be misinterpreted as thought disorder, abnormal belief, or hallucination.

### Conclusions

Although still at a preliminary stage of analysis, the data from deaf signers does appear to correspond to many of the descriptive parameters proposed by Andreasen (1979), Lecours & Vanier-Clement (1976), Cutting (1990), Chaika (1974), and others. Abnormalities are found at several linguistic levels, including those of discourse, syntax, and the analogue of phonology. Other errors appear to be uniquely related to the spatial medium and the life experience of deaf subjects. On this preliminary evidence, it appears that communication disorder does occur in some schizophrenics independently of the communication modality. This suggests that deficits in speech production are not the primary abnormality, but the most conspicuous medium through which the abnormality is expressed. That which has been called 'communication', 'thought' or 'speech disorder' may in fact involve a separate psychological function under which language is subsumed, and represent dysfunctions affecting, but possibly not restricted to, language areas. Further work with prelingually deaf subjects may clarify the nature of the deficit.

### Acknowledgements

This paper forms part of a PhD project at St George's Medical School, University of London. It has been made possible through grants from the Mental Health Foundation, the Royal National Institute for the Deaf, and the Locally Organised Research Scheme of the Southwest Thames Regional Health Authority. I would like to thank Dr Robin Jacobson for his invaluable supervision, and Dr N. Kitson, Dr K. Checinski, Dr Bencie Woll, Dr J. Marshall, Professor C. Frith, and Dr J. Cutting for their helpful advice and support.

### References

- ALVERSON, H. & ROSENBERG, S. (1990) Discourse analysis of schizophrenic speech: a critique and proposal. *Applied Psycholinguistics*, 11, 167-184.
- ANDREASEN, N. (1979) Thought, language, and communication disorders, I and II. *Archives of General Psychiatry*, 36, 1315-1330.
- BRENNAN, M., COLVILLE, M. & LAWSON, L. (1984) *Words in Hand: A Structural Analysis of the Signs of British Sign Language*. Edinburgh: The British Sign Language Research Project, Moray House College of Education.
- CHAIKA, E. (1974) A linguist looks at 'schizophrenic' language. *Brain and Language*, 1, 257-276.
- (1982) Thought disorder or speech disorder in schizophrenia? *Schizophrenia Bulletin*, 8, 587-591.

- CUTTING, J. (1990) *The Right Cerebral Hemisphere and Psychiatric Disorders*. Oxford: Oxford University Press.
- DAMASIO, A., BELLUGI, U., DAMASIO, H., *et al* (1986) Sign language aphasia during left hemisphere amygdala injection. *Nature*, 322, 363-365.
- FRITH, C. D. (1979) Consciousness, information processing, and schizophrenia. *British Journal of Psychiatry*, 134, 225-235.
- (1992) *The Cognitive Neuropsychology of Schizophrenia*. Hove: Lawrence Erlbaum.
- (1993) Theory of mind in schizophrenia. In *Neuropsychology of Schizophrenia* (eds A. David & J. Cutting). Hove: Lawrence Erlbaum.
- GRAY, J. A., FELDON, J., RAWLINS, J. N. P., *et al* (1991) The neuropsychology of schizophrenia. *Behavioral and Brain Sciences*, 14, 1-84.
- HALLIDAY, M. & HASAN, R. (1976) *Cohesion in English*. London: Longmans.
- HEMSLEY, D. R. (1987) An experimental psychological model for schizophrenia. In *Search for the Causes of Schizophrenia* (eds H. Hafner, W. F. Gattaz & W. Janzavik). Heidelberg: Springer-Verlag.
- KITSON, N. & FRY, R. (1991) Prelingual deafness and psychiatry. *British Journal of Hospital Medicine*, 44, 353-356.
- KRAEPELIN, E. (1919) *Dementia Praecox and Paraphrenia* (trans. R. M. Barclay). Edinburgh: E. & S. Livingstone.
- LANIN-KETTERING, I. & HARROW, M. (1985) The thought behind the words: a view of schizophrenic speech and thinking disorders. *Schizophrenia Bulletin*, 11, 1-7.
- LECOURS, A. & VANIER-CLEMENT, M. (1976) Schizophasia and jargonaphasia. *Brain and Language*, 3, 516-565.
- MAYBERRY, R. (1992) Mental phonology in sign language. Paper presented at Fourth International Conference on Theoretical Issues in Sign Language Research, San Diego.
- McKENNA, P. (1993) Semantic memory in schizophrenia: a unifying neuropsychological dysfunction? In *Neuropsychology of Schizophrenia* (eds A. David & J. Cutting). Hove: Lawrence Erlbaum.
- MORRISON, R., BELLACK, A. & MUESER, K. (1988) Deficits in facial-affect recognition and schizophrenia. *Schizophrenia Bulletin*, 14, 67-83.
- PAULES, E., FRITH, C. D. & FRACKOWIAK, R. S. J. (1993) The neural correlates of the verbal components of working memory. *Nature*, 362, 342-345.
- POIZNER, H., KLIMA, E. & BELLUGI, U. (1987) *What the Hands Reveal about the Brain*. London: MIT Press.
- WING, J. K., COOPER, J. E. & SARTORIUS, N. (1983) *The Measurement and Classification of Psychiatric Symptoms*. Cambridge: Cambridge University Press.
- WOLL, B. (1983) The semantics of British Sign Language signs. In *Language in Sign* (eds J. Kyle & B. Woll), pp. 49-73. London: Croom Helm.
- ZIMMER, J. (1990) Rhythm and repetition in ASL and interpreted discourse. Paper presented at the Third International Conference on Theoretical Issues in Sign Language Research, 17-19 May, 1990, Boston.

Alice J. Thacker, MSc, Division of Adult Psychiatry, Department of Mental Health Sciences, St George's Hospital Medical School, Jenner Wing, Cranmer Terrace, London SW17 0RE

(First received 26 April 1993, final revision 7 March 1994, accepted 11 March 1994)