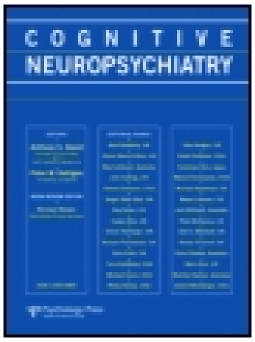

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Language abnormality in deaf people with schizophrenia: a problem with classifiers

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ABSTRACT

Introduction: Although there is evidence for language abnormality in schizophrenia, few studies have examined sign language in deaf patients with the disorder. This is of potential interest because a hallmark of sign languages is their use of classifiers (semantic or entity classifiers), a reference-tracking device with few if any parallels in spoken languages. This study aimed to examine classifier production and comprehension in deaf signing adults with schizophrenia.

Method: Fourteen profoundly deaf signing adults with schizophrenia and 35 age- and IQ-matched deaf healthy controls completed a battery of tests assessing classifier and noun comprehension and production.

Results: The patients showed poorer performance than the healthy controls on comprehension and production of both nouns and entity classifiers, with the deficit being most marked in the production of classifiers. Classifier production errors affected handshape rather than other parameters such as movement and location.

Conclusions: The findings suggest that schizophrenia affects language production in deaf patients with schizophrenia in a unique way not seen in hearing patients.

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Deafness; schizophrenia; sign language; classifiers; handshape

Introduction

Language is a topic of longstanding interest in schizophrenia. Following pioneering work by Chaika (1974), it is now widely accepted that linguistic abnormalities contribute to the symptom of formal thought disorder (FTD)—the incoherent speech seen in some, though probably a minority, of patients with the disorder (e.g., see Covington et al., 2005; Kuperberg, 2010; McKenna & Oh, 2005). These abnormalities include paraphasias and use of sentences that are otherwise semantically anomalous (Faber et al., 1983; Oh, McCarthy,

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& McKenna, 2002). Another well-replicated finding in thought-disordered schizophrenic speech is unclear reference when using personal pronouns such as he, she, they, etc., and demonstratives such as this and that, to refer listeners back to previous aspects of discourse (Barch & Berenbaum, 1996; Docherty, Cohen, Nienow, Dinzeo, & Dangelmaier, 2003; Rochester & Martin, 1979). Linguistic abnormality also occurs outside FTD: syntactic simplification and syntactic errors have been documented in unselected groups of patients with schizophrenia (Hoffman & Sledge, 1988; Morice & Ingram, 1982; Oh et al., 2002; Thomas, King, Fraser, & Kendell, 1990; Walenski, Weickert, Maloof, & Ullman, 2010) and in both those with and without FTD (Hoffman & Sledge, 1988; Morice & Ingram, 1982; Oh et al., 2002; Thomas et al., 1990).

Studying sign language (SL) in deaf patients has the potential to further inform research into language in schizophrenia. Among other reasons, this is because SL has features that differentiate it from spoken language (Brentari, Poizner, & Kegl, 1995; Emmorey, McCullough, Mehta, & Grabowski, 2014; Poizner, Klima, & Bellugi, 1987; Supalla, Hauser, & Bavelier, 2014). One such feature is semantic or entity classifiers (henceforward referred to for simplicity as classifiers). These are linguistic devices that "stand in" for nouns that have previously been in the same or a previous sentence. (More formally, they are complex reference-tracking mechanisms, which consist of a wide range but often fixed handshapes that usually iconically represent a certain type of entity, either animate or inanimate, which has already been introduced in the discourse.) In British Sign Language (BSL), for example, a flat hand with all fingers extended and together communicates the class of flat objects, such as a piece of paper or a book. Likewise, long and thin objects, including a pencil or a human being, are indicated by a hand in which the index finger is extended and the rest of the fingers are flexed. An example of the use of these two classifiers is shown in Figure 1. Communicating "The pen is on the paper" involves first producing signs for paper and pen, and then bringing the classifier for flat objects such as paper (a flat outstretched hand) into relation to the classifier for long, thin object like pens (an extended forefinger).

Classifiers are often considered to be a universal feature of SLs (Aronoff, Meir, Padden, & Sandler, 2003). The only exception that has been documented appears to be the Adamorobe SL studied by Nyst (2007), and even here there was evidence for the use of broadly similar linguistic devices (termed "semantically light units" by the author). Conversely,

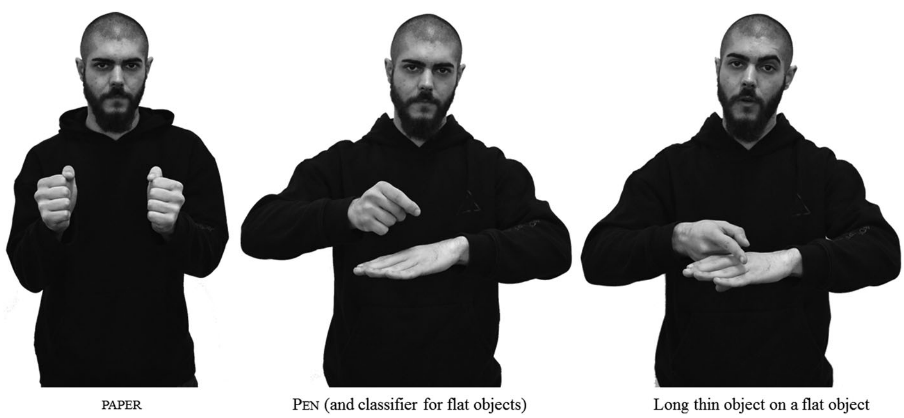

Figure 1. Example of use of classifiers in BSL in the sentence, "The pen is on the paper".

while some spoken languages use verbal affixes that convey information about the shape of the entities being referenced, attempts to demonstrate a thoroughgoing equivalent to SL classifiers have not been completely successful to date (Zwitserlood, 2012).

There have been very few studies of SL in schizophrenia. Thacker (1994) examined 30 prelingually deaf adults with schizophrenia and 7 with mania. Although the patients were not preselected for showing FTD, she found examples of abnormalities that were recognisable as SL equivalents of the symptom, including topic shift and paraphasias or neologisms. Perseveration, both at the sign word level and at the thematic level was also noted, and there was a phenomenon reminiscent of clanging, where associations seemed to be made on a phonological basis rather than on meaning. Two patients also made syntactic errors. In the only other study, Trumbetta, Bonvillian, Siedlecki, and Haskins (2001) noted the presence of something similar to neologisms in deaf adults with schizophrenia, in which well-formed parameters (in terms of location, movement, orientation and handshape) were combined in unique ways to create new signs meaningless to others. Neither Thacker (1994) nor Trumbetta et al. (2001) reported any abnormalities in classifier use in schizophrenia.

The aim of this study was to investigate whether classifiers are affected in deaf signers with schizophrenia. Both comprehension and production of classifiers were examined. Schizophrenia is associated with a general tendency to perform poorly on virtually all cognitive tests (Chapman & Chapman, 1973; Heinrichs & Zakzanis, 1998) including language. Hence, to guard against the possibility that any positive findings were simply due to this factor, we also contrasted classifier performance with that on tests in the comprehension and production of nouns.

Method

Participants

The patients were a convenience sample of 14 deaf in- and outpatients (9 m, 5f) meeting ICD-10 criteria for schizophrenia. All patients were under the care of one of the authors (MdF) (in the Midlands and Wales, and later in Northern Ireland). The diagnosis was based on a detailed clinical interview (using the Present State Examination, Wing, Cooper, & Sartorius, 1974 in some cases), carried out by MdF and PJM. All participants were (a) aged between 18 and 65 years old; (b) prelingually profoundly deaf, with deafness diagnosed no later than two years of age; and (c) used BSL as their preferred method of communication. Exclusion criteria were a history of learning disability, the presence of neurological disease (apart from any that might have originally caused deafness), head injury, or other disorder affecting brain function. The patients were not selected for presence of FTD.

The controls were a convenience sample of 35 deaf healthy volunteers (17 m, 18f). Thirty were recruited from the Birmingham Institute for Deaf People, a charitable organisation that provides specialist support services to deaf people; and a further 5 from the Action on Hearing Loss—Northern Ireland, another charitable organisation that supports people who are deaf, hearing impaired or have tinnitus. Individuals from both organisations responded to participant appeals, recruitment presentations, and advertising material that appeared in communal areas. Members of the organisations also referred people to the study. Exclusion criteria were the same as for the patients.

The patients and controls were selected to be similar in terms of age and current IQ. Educational measures are widely agreed not to be a reliable guide to intellectual level in the deaf (Phillips, Wiley, Barnard, & Meinzen-Derr, 2014; Vernon, 2005; Zekveld, Deijen, Goverts, & Kramer, 2007), and proxy measures of IQ/premorbid IQ analogous to the National Adult Reading Test (Nelson & Wilson, 1991) do not exist. Current IQ was assessed using a non-verbal measure (the usual approach in studies with deaf individuals), the 12-item Raven's Progressive Matrices (Set A) (Warrington, 1984); this was administered by one of the investigators (GC). Additionally, because there is considerable variability among the deaf population in their language experience, the two groups were matched for BSL age of acquisition and BSL years of exposure.

The authors assert that all procedures contributing to this work comply with the ethical standards of the relevant national and institutional committees on human experimentation and with the Helsinki Declaration of 1975, as revised in 2013. The study was approved by the NHS Cambridgeshire Research Ethics Committee. Participants were provided with an information sheet printed in English, which was also communicated in BSL, and signed a written informed consent.

Procedure

The participants completed five SL tasks, three examining comprehension and production of entity classifiers and two examining comprehension and production of nouns. The tests are all existing tests for detecting SL abnormalities or SL development; they were developed and validated at the Deafness Cognition and Language Centre (DCAL) in the UK or the Learning Centre for the Deaf in the USA (in which case they were adapted for BSL signers), and they have been used in a number of published studies (e.g., Atkinson, Campbell, Marshall, Thacker, & Woll, 2004; Atkinson, Marshall, Woll, & Thacker, 2005; Henner, Caldwell-Harris, Novogrodsky, & Hoffmeister, 2016; Henner, Hoffmeister, & Reis, 2017; Higgins et al., 2016; Higgins, Famularo, Kurz, Reis, & Moers, 2017; Hoffmeister et al., 2014; Marshall, Atkinson, Smulovitch, Thacker, & Woll, 2004; Marshall, Atkinson, Woll, & Thacker, 2005; Tyrone, Atkinson, Marshall, & Woll, 2009).

The British tests were developed primarily for use with language disturbance after strokes; however, use of such tests is a widely used strategy for examining language in schizophrenia, even though the degree of language impairment in such (hearing) patients is generally accepted as being less marked than in neurological disorders (see McKenna & Oh, 2005).

The comprehension tasks were given before the production tasks. All experimental measures were administered in one testing session, which required between 45 and 60 min. Prior to testing, video clips were shown in which deaf adult native signers appeared on a computer screen and signed the standardised instructions for each task in BSL. Aware of the possible effects of fatigue during experimental testing, breaks were routinely offered after every task. However, no participant opted for breaks.

The Locative Sentence Comprehension Test (Atkinson et al., 2005): This is a test of BSL classifier comprehension using static objects that are specifically located in signing space. Short video clips presented on a computer screen show BSL native demonstrators producing 30 locative sentences. Participants are required to match the demonstrator's sentence to one of four pictures. For each correct answer, participants score 1 point.

The Locative Sentence Production Test (Atkinson et al., 2005): This test uses the same material as the Locative Sentence Comprehension Test, but assesses the ability to express BSL classifiers. Participants view 30 pictures and are required to produce the target sentence they illustrate. One point is scored for each correct answer. Because it is possible in BSL to produce the relevant sentences using either classifiers or lexicalised responses, two sub-scores were calculated. The first for the number of correct classifier responses and the second for the sentences using a (correct) lexicalised response (In Figure 1, for example, a correct lexicalised response would replace the classifier depicted in the third image with a sign for the preposition ON).

Real Object—dynamic task (Hoffmeister, 1994, 1999, 2000; Hoffmeister et al., 2014): The original version of this task is one of the measures of the American Sign Language Assessment Instrument (http://www.asleducation.org), but it has been adapted to BSL (Chatzidamianos, 2013). The task aims to assess classifiers, their spatial arrangement, and how they are used with verbs of motions and plurals. Participants view a series of pictures and short video clips depicting a series of objects such as oranges or cars in different arrangements on a computer screen. They have to sign the objects presented on the screen and then to express their arrangement in space or action, using the appropriate classifiers. Five practice trials preceded the experimental testing, during which those participants who provided lexicalised responses were encouraged to use a classifier instead. The test consisted of 30 items, made up of 16 picture and 14 video items. Test items requiring the manipulation of the same objects were not presented in sequence to avoid the use of exophoric reference (i.e., exploiting the pragmatic co-text between the experimenter and the participant and choosing not to name the same objects again prior to denoting their arrangements to avoid repetition) (Swisher, 1988). Where classifier responses were made, these were scored for correct handshape, orientation, location, movement, dominance and symmetry. Items, where all six parameters were correct, were scored 1.

Sign to Picture Noun Comprehension Task (Atkinson et al., 2005): This task assesses BSL noun comprehension. Participants watch a native BSL signer producing signs for a series of animals and objects on a computer screen. This sign then has to be matched to one of five pictures. No cues or feedback about the correctness of the responses is given. Participants score 1 point for each correct answer. In order to reduce the time required to perform the task, a subset of 30 randomly selected items was taken from the original 40-item version.

BSL Noun Production Task (BSL-NP) (Marshall et al., 2004): This task assesses the ability to produce BSL nouns. Participants view line drawings of objects on a page and produce the target sign (or a recognised regional variant). Each correct answer scored 1 point. To avoid ceiling effects, given the anticipated better performance of patients with schizophrenia than those with neurological disease (see above), we only used the 30 low-familiarity items, cues were not provided and we only administered the task once.

Results

Demographic variables

The two groups were similar in terms of age and estimated current IQ based on performance on Raven's Matrices (see Table 1). There were more males among the patients than

Table 1. Basic characteristics and comparisons between patients and controls.

	patients ($N = 14$) Mean (SD)	controls ($N = 35$) Mean (SD)	Statistical test	p-value
Age (years)	43.71 (10.15)	42.06 (10.82)	$t = -0.51$ (47)	0.62
Gender (m/f)	9/5	17/18	$x^2 = 0.99$	0.32
BSL AoA	4.07 (2.5)	4.14 (3.6)	$t = 0.08$	0.94
BSL YoE	39.64 (11.45)	37.34 (12.61)	$t = -0.62$	0.54
Raven's Matrices	8.21 (2.3)	8.43 (2.3)	$t = 0.3$	0.77

Note: BSL AoA – age of acquisition of BSL; BSL YoE – years of exposure to BSL.

the controls, but the difference did not reach significance. Mean age of BSL AoA and YoE in BSL use were similar in the two groups (AoA range controls: 0–9, patients: 0–7; YoE range controls: 15–66, patients: 22–63). Brief details of the patients' clinical presentations are available in supplementary material A; none of the patients showed FTD as a prominent feature. Information regarding the type of schooling of the patients is also given in this supplement. Information on the controls' type of schooling can be found in supplementary material B.

Performance on the classifier tests

The patients performed significantly more poorly than controls on the two tests of classifier production, the Locative Sentence Production Test [$M = 64.97$, $SD = 14.78$ vs. $M = 89.97$, $SD = 6.41$; $t(47) = -8.32$, $p < .001$] and on the Real object—dynamic test [$M = 57.64$, $SD = 17.4$ vs. $M = 80.34$, $SD = 11.01$; $t(47) = -5.48$, $p < .001$]. Examination of the two sub-scores of the Locative Sentence Production Test revealed that the two groups performed differently when producing sentences using classifiers [$M = 37.88$, $SD = 15.66$ vs. $M = 63$, $SD = 26.26$; $t(47) = 3.34$, $p = .002$], but not when they used lexicalised responses ($Mdn = 26.29$, $IQR = 14.17$ vs. $Mdn = 20$, $IQR = 26.66$, Mann–Whitney $U = 189.00$, $Z = -1.242$, $p = .21$).

On the Locative Sentence Comprehension Test, the patients also performed significantly worse than the controls [$M = 82.38$, $SD = 7.55$ vs. $M = 90.84$, $SD = 6.77$; $t(47) = -3.82$, $p < .001$].

A repeated measures ANOVA between the two Locative Sentence tests (production and comprehension) revealed that classifier comprehension was better than production [$F(1, 47) = 33.51$, $p < .001$], and that the patients performed worse than the controls [$F(1, 47) = 62.66$, $p < .001$]. There was also a significant group x modality interaction [$F(1, 47) = 27.48$, $p < .001$] reflecting more impaired performance by the patients in the production of classifiers.

Performance on the noun tasks

The patients performed significantly worse than the controls on the BSL Noun Production Task ($M = 72.38$, $SD = 9.56$ vs. $M = 92.67$, $SD = 7.08$; $t(47) = -8.17$, $p < .001$) and on the Sign to Picture Noun Comprehension Task ($M = 80.95$, $SD = 7.78$ vs. $M = 94.76$, $SD = 5.56$; $t(47) = -6.98$, $p < .001$).

A repeated measures ANOVA revealed that noun comprehension was better than production for both groups [$F(1, 47) = 15.96$, $p < .001$] and that the patients performed worse than controls [$F(1, 47) = 89.38$, $p < .001$]. Once again there was also a significant group x modality interaction [$F(1, 47) = 5.883$, $p = .019$] due to differentially poor performance by the patients in the production of nouns.

Classifier vs noun performance

In order to examine the differences between comprehension and production of both nouns and classifiers, an omnibus repeated measures factorial ANOVA was carried out using the scores on the Locative Sentence Production Test, the Locative Sentence Comprehension Test and the two noun tests [between factor: group; within factors: linguistic level (noun vs classifier) and modality (comprehension vs production)]. This revealed that the patients performed significantly worse on production than comprehension [$F(1, 13) = 23.44$, $p < .001$], and similarly in nouns and classifiers [$F(1, 13) = .92$, $p = .35$]. However, the two-way interaction between modality and linguistic level was significant indicating that the patients performed the worst on classifier production [$F(1, 13) = 7.90$, $p = .01$].

Unlike the patients, the controls performed similarly on production and comprehension [$F(1, 34) = 2.218$, $p = .15$], and better on nouns than on classifiers [$F(1, 34) = 22.12$, $p < .001$]. However, the controls showed no significant interaction between production vs. comprehension x classifier vs. nouns [$F(1, 34) = .42$, $p = .52$]. Finally, there was a significant three-way interaction between group, linguistic level and modality [$F(1, 47) = 7.77$, $p = .008$]. This indicated that, compared to nouns, patients were differentially poor in classifier production. Interaction plots for the two groups are shown in Figure 2.

Analysis of handshape errors in classifier and noun production

Classifier production

Between them, the 14 patients produced 197 classifier errors on the Real Object—dynamic task (mean 14.1/participant). These errors were predominantly in handshape (71.1%), with location being the next most common (12.7%), followed by orientation (10.7%) and movement (5.0%). Errors were rare in symmetry (0.5%) and no patients made errors in dominance. The 35 controls made 234 errors overall (mean 6.7/participant).

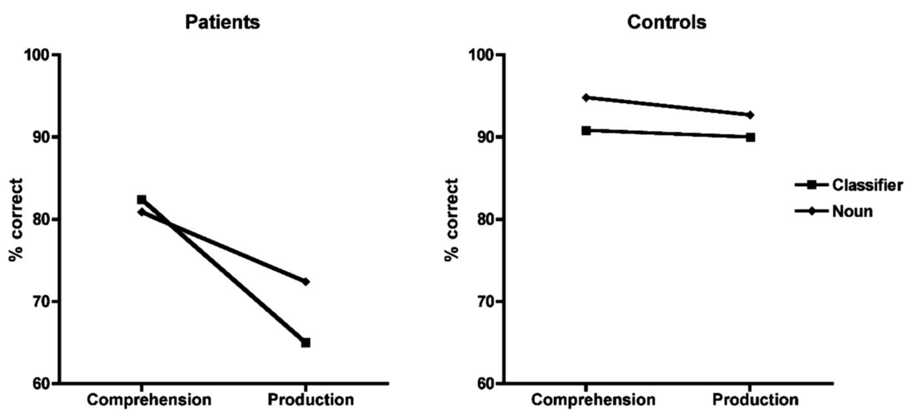

Figure 2. Interaction plots for classifier vs comprehension in the Deaf patients and the Deaf controls.

Table 2. Handshape error rates and between groups comparisons in the Real Object—dynamic task.

Error type	Group	Median	IQR	Z	p
Total	Patients	12.5	10.25–19	−3.11	.002
	Controls	6	3–8		
Handshape	Patients	8.5	7–13.5	−3.11	.002
	Controls	3	1–6		
Orientation	Patients	1	1–2	−1.26	.21
	Controls	1	0–2		
Movement	Patients	0	0–1	Fisher's Exact Test	.47
	Controls	0	0–0		
Location	Patients	1	0–1	Fisher's Exact Test	.50
	Controls	0	0–1		
Dominance	Patients	0	0–0		
	Controls	0	0–0		
Symmetry	Patients	0	0–0		
	Controls	0	0–0		

Note: IQR: Interquartile Range.

They again made most errors in handshape (58.9%) with orientation second (18.4%), followed by location (14.1%) and movement (7.3%). They made two errors in dominance (0.84%) and one in symmetry (0.43%).

Error rates in the two groups were compared using the Wilcoxon Signed-Ranks Test, or alternatively Fischer's exact test when there were many zeros (after simplifying to 1 for any errors and 0 for no errors). As shown in Table 2, the total number of errors differed significantly between the groups. Errors in handshape also differed significantly, but errors in orientation, movement and location did not. No analysis was performed for dominance and symmetry errors due to the low frequency of errors in both. Examples of handshape errors are shown in the supplementary material C.

Noun production

In total, the patients made 14 handshape errors for nouns (mean 1.00/participant) and the controls made 6 handshape errors (mean 0.17/participant). The difference between patients and controls was not significant after simplifying to 1 for errors or 0 for no errors and using Fisher's exact test ($p = .15$). Handshape errors in both groups were substitutions, i.e., participants substituted the target handshape with another recognised and appropriately formed handshape, but one that was wrong for the object's physical properties. Rates of errors in orientation, location, movement, dominance and symmetry were very low and hence no analysis was performed. We attempted to compare handshape errors in lexicalised responses between the two groups. This, however, was not possible, as no patient made handshape errors in the lexicalised responses, and there was only one such error in the controls (who in item 20 of the task (i.e., PEN BOOK ON) used *// instead of // or // to sign "book").

Discussion

This study found that deaf adults with schizophrenia who use SL as their principal means of communication showed impaired comprehension and production of classifiers. The impairment appeared to affect production more than comprehension, and it was disproportionately marked compared to the impairment seen in nouns. Before such a finding can be accepted, however, two alternative explanations need to be considered.

First, as noted in the Introduction, patients with schizophrenia as a group perform worse than healthy controls on virtually all cognitive tasks. Therefore, some degree of poor performance would be expected on classifier tasks by virtue of this fact alone. There are several reasons to doubt that this is a full explanation of the impairment found, however. One is that the patients were more impaired on the classifier than the noun tasks; such a differential deficit (Chapman & Chapman, 1973) would not be expected on the basis of generalised intellectual impairment. Also, the patients were matched with the controls on current IQ, rather than estimated premorbid IQ, a procedure that would tend to reduce the impact of general intellectual impairment on the findings. Finally, on the Locative Sentence Production Task, the patients showed impairment only on responses using classifier constructions and not on those where the response was lexicalised—it is difficult to see why the latter responses would be spared if the impairment was due to general intellectual impairment.

The other explanation that needs to be considered is that the patients may have acquired less knowledge about classifiers than the controls before they became ill, either due to greater social disadvantage or as a result of premorbid intellectual disadvantage, both of which are well recognised in individuals who go on to develop schizophrenia (Goldberg & Morrison, 1963; Khandaker, Barnett, White, & Jones, 2011; Palmer, Dawes, & Heaton, 2009). Against this, however, is the fact that there was no obvious evidence of a later age of BSL acquisition or fewer years of exposure to BSL in the patients than in the controls; the two groups had closely similar means on both these variables. In addition, if the patients were relatively less familiar with the use of classifiers, they might have been expected to produce significantly more lexicalised responses than the controls; however, this was not the case.

The impairment in classifier production we found appeared to affect handshape particularly. Errors in handshape were commoner than errors in location, movement, orientation, dominance and symmetry, and handshape errors were not seen during noun production. As far as we are aware, handshape errors have not previously been documented in deaf adults with schizophrenia—Trumbetta et al. (2001) did not make any reference to them and Thacker (1994) talked only about location being impaired. In contrast, handshape errors are well documented in deaf patients with aphasia. For example, Poizner et al. (1987) described a deaf patient who showed fluent expressive sign aphasia that was characterised by the incorrect use of handshapes in classifiers.

If the classifier abnormality we found is a genuine finding in deaf adults with schizophrenia, the question arises of what this might mean. One possibility is that it simply reflects the fact that there is linguistic abnormality in schizophrenia, and in deaf patients this affects classifiers because this element of language is only seen in SL. This proposal is not completely satisfying, however, because it presupposes that the expressive language abnormality in schizophrenia is indiscriminate. In fact, as noted in the Introduction, the pattern of linguistic abnormalities in hearing schizophrenia is quite circumscribed, consisting of paraphasias and other semantic errors in expressed speech in patients with FTD, plus syntactic errors and simplification in unselected patients and those without FTD.

Alternatively, it could be that classifier abnormality is a uniquely deaf manifestation of another language abnormality that has been found in hearing schizophrenia, unclear reference. There is no doubt that classifiers (specifically semantic/entity classifiers) function as a reference-tracking mechanism in discourse (Morgan & Woll, 2007; Perniss & Özyürek, 2015). The problem with this proposal, however, is that there is a consensus from the literature with hearing individuals with schizophrenia that unclear reference is seen largely or exclusively in patients with FTD (e.g., see McKenna & Oh, 2005), whereas our patients were unselected for showing FTD.

A third possibility is that the classifier abnormality we found is the result of dysfunction in a system that may not be linguistic or not purely linguistic. This possibility can draw support from the work of Schembri, Jones, and Burnham (2005) who have argued that classifiers should be regarded as sharing at least some properties with gesture (see also Kendon, 2004; McNeill, 1992; Okrent, 2002), something that, among other things, helps to account for their iconic properties (Woll, 1990). Such a proposal would have the advantage that it avoids having to try to reconcile classifier abnormality with the linguistic abnormalities recognised in hearing schizophrenia, which the preceding two paragraphs indicate is not particularly easy to do. The disadvantage is that it invokes dysfunction in a gestural system in schizophrenia, something that does not have a strong theoretical basis, although reduced use of both expressive and symbolic gesture is a recognised part of the negative syndrome.

In conclusion, this study finds evidence that profoundly deaf signers with schizophrenia show impaired production, and to a lesser extent comprehension, of classifiers (specifically semantic/entity classifiers). Why such an abnormality should be present in this group of patients is unclear, but potential explanations might be in terms of unclear reference or the fact that semantic/entity classifiers fuse both meaning and gesture. Some limitations need to be acknowledged. At 14, the overall sample size was too small to thoroughly explore the relationship between classifier abnormality and FTD. The testing session was relatively long and any consequent fatigue might have impacted disproportionately on the patients (although none took any of the periodic breaks that were offered). Tests were given in the same sequence for all participants, rather than this being randomised, raising the possibility of order effects.

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