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The production of discourse in four subjects affected with psychosis¹

Nadège Foudon Anne Reboul Paul Sabatier Marie-Christine Noël-Jorand

ABSTRACT

We analyze the production of free speeches of three subjects affected with schizophrenia and one affected with paranoïa. We present and discuss the results concerning their linguistic production and the factors most often described as establishing coherence in discourse, i.e. pragmatic connectives and referential expressions, as well as phatic expressions which are supposed to help maintain the relationship between speaker and hearer, facilitating communication. The results are not on the whole unexpected (i.e., on the whole they seem within the norm) and this raises the methodological questions of corpus recording, of the necessity of control corpora from a comparable but normal population and of how to treat those corpora.

1. INTRODUCTION

The goal of the analysis of discourses produced by patients affected with mental pathologies can only be to highlight the linguistic or discursive peculiarities of such discourses. Indeed, patients are usually diagnosed on the basis of their behavior and more specifically of their linguistic behavior. Though it is generally considered that schizophrenic patients do not have any specifically linguistic deficits, their discourse has nevertheless been recognized for a long time as anomalous and a few studies have hypothesized semantic or conceptual anomalies (e.g., Rossell *et al.* 1999) as well as syntactic poverty (e.g., Thomas *et al.* 1996). In other words, though schizophrenic patients do usually retain their linguistic abilities, these might be impaired in rather subtle and not easily perceivable ways. As far as discursive production is considered, it is generally said that discursive coherence is rather impaired. In other words, discourse of schizophrenic subjects would be immediately perceived as incoherent, though less obvious linguistic impairments might not be noted. Thus, it seems necessary to assess more precisely whether there is linguistic impairment (for instance, are vocabulary and syntax really impoverished in patients?) and what exactly accounts for the discourse incoherence often described. This is important because it is widely claimed in work (e.g. Frith 1992) that schizophrenia may be the result of deficits in self-consciousness and self-monitoring. If this is right, one would expect discourse incoherence, though not necessarily linguistic impairment.

Ideally, the analysis of corpora recorded among patients with diverse mental pathologies should be accompanied by the analysis of corpora recorded among normal subjects chosen on the basis of their similarities relative to gender, age and socio-

educational level with the patients. This, however, is less easy to do than might be thought. One of the major difficulties has to do with the fact that the necessary similarities should not be restrained to those between patients and control subjects: they should extend to the circumstances of the production and recording of the corpora. Often, the discourse of patients is recorded in circumstances which can only be incorrectly reproduced for the recording of controls: for instance, while patients are institutionalized and in the course of therapeutic sessions. Though one might imagine setting similar conditions for the production of control discourses, it is obvious that control subjects would not be institutionalized and that no authentic therapeutic sessions are taking place: in other words, the consequences of the sessions could not but be different from those for patients (e.g. such sessions may lead to an end to institutionalization for patients: no such consequences could arise for control). A second point is that, though a common task, necessarily involving linguistic communication, could be devised for the production and recording of both patients and control corpora, restoring similarity of circumstances, it would obviously detract from spontaneous discourse. Indeed, there seems to be a trade-off between having both normal and pathological corpora for purposes of comparison but losing spontaneous production and only having pathological corpora but preserving spontaneous production. As will be seen below, we will examine here only discourses produced by patients in situations of free speech. This means that though there will be comparison of the linguistic productions of different patients, there will be no comparison with controls.

As will be seen below, we have analyzed in a detailed way not only the linguistic production itself, but also the factors most often described as establishing coherence in discourse, i.e. pragmatic connectives and referential expressions, as well as phatic expressions which are supposed to help maintain the relationship between speaker and hearer, facilitating communication. Analyses were made in two stages. The first stage bore on all sessions by all four subjects and was done both automatically by means of INTEX software (Silberstein 1993) and by hand. During the second stage, we concentrated on two sessions for each subject and looked at referential expressions (using a protocol developed at the LEAPLE laboratory in Paris: see Salazar Orvig *et al.* 2003) and linguistic performance (using the Brief Syntactic Analysis: see Ghaziuddin *et al.* 2000, Thomas *et al.* 1996, King *et al.* 1987). These will be described in more details below.

Subjects

According to DSM-IV (APA 1994), subjects are three individuals with schizophrenia and one individual with delusional disorder (non bizarre delusion without any hallucination) of imaginative subtype:

- Miss B. is a 23-year-old woman with a 5-year history of schizophrenia of the paranoid type. She has a high school diploma and began nurse studies though she did not finish them. During her stay in the hospital (at the time when the sessions were recorded) she was contemplating going to the university to get a bachelor degree. She is from a middle class background (mother is a primary school teacher) and is a spinster. This was her third spell in hospital, following an episode of acute exacerbation of auditory hallucination and paranoid ideation. She underwent physiological examinations which all yielded normal results.
- Mr. H. is a 41-year-old man with a 20-year history of schizophrenia of the undifferentiated type. He has a high school diploma and obtained a first in the Conservatoire de musique (national musical academy). His stepfather (who adopted

him as a young child) is a successful decorator on the French Riviera. Mr. H. is married with two teenager children (a boy and a girl) and was without a job at the time the time of the study. He had had episodes of alcoholism and medicine abuse for suicide attempts.

- Mr. P. is a 53-year-old man with a 26-year history of schizophrenia of the disorganized type; he was raised by his mother, his father having left them very early, though he resumed contact with his father before the latter died. He left school at fifteen and had a low middle class origin. He was unable to keep a series of menial jobs. Previous to the spell in hospital when discourses were recorded, he had been admitted to hospital more than ten times.
- Mr. S, a 53-year-old man with a 18-year history of delusional disorder (non bizarre delusion without any hallucination) of imaginative subtype (formerly called paranoïac subject). He comes from a low middle class background and was educated at boarding schools from which he frequently ran away. He claims that he was prevented from pursuing his studies.

Concerning the three individuals affected with schizophrenia, Miss B. exhibits prominent positive symptoms (thought intrusion, echoic thought, 3rd and 2nd person auditory hallucinations, influence, reference or persecution delusions) while Mr. H. and Mr. P. exhibit negative symptoms (affective indifference, poverty of language, discourse and thought, abulia, associability), according the distinction proposed by Andreasen (1977). Schizophrenic with prominent negative symptoms were formerly called hebephrenic in DSM-III.

Data

Collected by the same therapist, data consist in transcripts of 1-hour speeches performed by the four subjects during the study with their informed consent: Miss B, 13 x 1-h speeches covering a period of 3 months; Mr. H, 9 x 1-h speeches covering a period of 3 months; Mr. P, 11 x 1-h speeches covering a period of 3 months; and Mr. S, 11 x 1-h speeches covering a period of 12 months. All speeches are “free” in the sense that individuals choose what they want to speak about. sessions studied in the second stage were chosen either on medical advice bearing on the mental state of the patient (this is the case for Miss B., who was delirious in the second session but not in the ninth), on the affective content of the session (this was the case for Mr. H., who spoke during his sixth session of the death of his baby son following a fall for which he was responsible: his third session was chosen as the nearest in volume to his sixth), or merely on the basis of volume so that comparison between the two sessions would not be impeded by massive difference in length of discourse (this is the case for the sessions chosen for the two remaining subjects, Mr. S. and Mr. P., for whom, respectively, the eight and ninth, and the eight and tenth sessions were chosen). Details of dates and time intervals between sessions are given in the table below:

INSERT TABLE 1

Concerning all these data, previous studies have been done trying in particular to characterize the sense (or not) of identity of each subject inside his/her discourse (Noël-Jorand *et al.* 1997; 2001; 2004a; 2004b).

2. METHOD AND RESULTS

In analyzing the corpora, we have used varied methods, some automatic and some non-automatic. We have examined the following factors: loquacity, fluency and disfluency, vocabulary and themes, syntax, phatic expressions, pragmatic connectives, referring expressions. These will be developed below and the methods used and results obtained will be described.

The study was realised in two stages. During the first stage, we examined the whole corpus for each patient but applied only rough methods to judge loquacity and syntax. During the second stage, we only examined two sessions for each patient but went in much more details. We also used protocols independently developed, the Brief Syntactic Analysis protocol for syntax, complexity and fluency, and the LEAPLE protocol for referring expressions, identification of themes and thematic transition. We were also able, from the data gathered through application of the LEAPLE protocol to have a more precise view of the use of phatic expressions by patients. Though technically the sessions were dialogues, the therapist's interventions were reduced to a minimum and merely aimed to restart the patient production when it failed. Thus we decided not to take them into account in the analysis. The sessions were recorded on a tape-recorder and patients' bodily behavior was not available for study.

First stage

Loquacity

Loquacity was measured by counting the number of words per 1h-speech for each subject. For each patient, we indicate the global loquacity consisting in the average number of words for 1-hour session and loquacity of two particular sessions consisting in the number of words of the given speech (see Table 2)

INSERT TABLE 2

The subject with delusional disorder, Mr. S., has the most important verbal production, which is not surprising. Regarding the three schizophrenic subjects, two things should be noted. First of all, there is a difference between the two patients with negative symptoms: Mr. P.'s verbal production (Mr. P. is a disorganized type) is about a third of that of Mr. H. (Mr. H. is an undifferentiated type). Finally, the verbal production of the schizophrenic subject with positive symptoms (Miss B.) is quite similar to that of Mr. H.

Vocabulary

Previous studies of schizophrenic discourses (e.g., Manschreck *et al.* 1984) have found a general tendency to use relatively few words that are often repeated, resulting in a poverty in the content of discourse. This is measured by the ratio "type/occurrence", in which the number of different words is divided by the total number of produced words. The results are indicated in table 3.

INSERT TABLE 3

The ratio is very uniform (and seems rather low indeed) among patients. The rather surprising result for Mr. P. (0.09) who has the highest rate is probably a statistic artifact of the short length of his corpus.

Syntax: well-formed and deviant sentences

On the whole patients' corpora, we have distinguished four types of sequences:

- Grammatical sequences corresponding to full sentences with a complete main clause;
- Incomplete sequences with no complete main clause, though the sequence is locally correct from a syntactic point of view;
- Dubious sequences, i.e., sequences which may be correct from a syntactic point of view but where there is semantic deviancy, triggering difficulties for interpretation; sequences with a failure of transcription (indicated by "<Unanalysable>" in the corpora) were also put in that category;
- Ungrammatical sequences, that is, sequences which neither correspond to full sentences nor to sequences with a local syntactic adequacy.

The results are shown in table 4, figure 1.

INSERT TABLE 4

As can be seen, results are rather similar for couples of patients as far as the percentage of grammatical sequences is concerned: Miss B. and Mr. S. have the lowest percentage with 78%, while Mr. P. and Mr. H. have the highest percentage with, respectively, 94% and 95%. These results should not be directly compared with those which are given below through the Brief Syntactic Analysis (BSA) for two reasons: first, the results were calculated in this first phase on the entirety of corpora, while they were examined on only two sessions per patient in the second phase; second, the categories used in the BSA are not exactly concordant with those used in the first phase and discussed in the present section.

Second stage

As said above, during the second stage, we used two protocols independently developed, the BSA and the LEAPLE protocol. These will be briefly described below, before we indicate and comment the results obtained using each of them. We begin by the BSA protocol.

Brief Syntactic Analysis

Based on earlier work by Morice and Ingram (1982), the Brief Syntactic Analysis (BSA) described in (Thomas *et al.* 1996) provides a set of variables for measuring syntactic complexity, error and dysfluency of speeches. These variables are:

Complexity

PWPM	Percentage of well-formed sentences (i.e. with clausal structure)
MLWA	Mean sentence length in words
PSIM	Percentage of simple sentences
PSEMB	Percentage of sentences containing embedded (subordinate) clauses
MEMB	Mean number of subordinate clauses in sentences with subordinate clauses
MDEMB	Mean maximum depth of embedding in sentences with subordinate clauses

Error

PDEV	Percentage of sentences with any deviancy
PSYN	Percentage of syntactically deviant sentences
PSEM	Percentage of semantically deviant sentences

POM	Percentage of errors of omission
<i>Disfluency</i>	
PPF	Number of pause fillers per 100 sentences
PRW	Number of repeated words per 100 sentences
PRWW	Number of multiple word repeats per 100 sentences
PFSR	Number of false starts retraced per 100 sentences

We have applied the BSA protocol to the selected discourses of the four subjects: B2, B9; H3, H6; P8, P1; S8, S9 (see Table 5).

INSERT TABLE 5

We will begin with deviancy. As can be seen in the above table, the percentage of deviant sentences between patients is rather different, though variation is below 10%. Percentage of deviant sentences between sessions for each patient is unstable for Miss B. and for Mr. P., though it is stable for the other two patients. This may be explained in Miss B.'s case by her mental state in her second session (9.99% deviancy), when she was still delirious, and by the stabilization of her mental state by her ninth session (2.32% deviancy). In Mr. P.'s case, the variation may be a statistical artifact of the limited size of his linguistic production. Miss B. has more semantic than syntactic deviancies, while Mr. P. has more syntactic than semantic deviancies. In the two other patients, semantic and syntactic deviancies are balanced. Regarding omission errors, Miss B. is notable by the high number of incomplete sentences which she produces (17.18% in her second session and 15.72% in her ninth session) compared to other patients. Between sessions comparison for each patient shows regularity on this point.

Let us pass to complexity. Complexity is examined on six factors: percentage of well-formed sentences; mean number of words/sentence; percentage of simple sentences; percentage of subordinate clauses; mean number of subordinate/sentence; mean level of embedding/sentence. Beginning with the percentage of well-formed sentences, the percentage is rather high for all patients, though Miss B. is the worst with around 80% well-formed sentences. Surprisingly, Mr. S. (who has a rather low level of education) is the best with a consistent 95% of well-formed sentences. Again, regarding mean number of words per sentence, Miss B. is the lowest (at between 7 and 8 per sentence) while Mr. S. comes out best with around 17 per sentence. Regarding the percentage of simple sentences, Miss B. consistently produces the highest number and Mr. S. the lowest number, the ratio being unsurprisingly inverted for the percentage of sentences with subordinate clauses. In mean number of subordinate clauses/sentence and mean level of embedding, Miss B. again comes out worst and Mr. S. best.

Fluency and disfluency concern phenomena directly linked to orality, i.e. false starts, repetitions of words or sequences of words, and pause fillers (both *bona fide* pauses and empty "words" such as *euh* – *hum*). Regarding pause fillers, Mr. P. has the highest percentage and Miss B. the lowest. In repeated words, excepting Mr. P.'s whose whole discourse may be too short for the result to be statistically significant, Miss B. and Mr. H. are rather similar at around 10% while Mr. S. is about 5% lower. For repeated sequences, Mr. S. comes out with the highest number (5.12%). For false starts, Miss B. has, again, the highest percentage (with around 10%) while Mr. S. is around 0.3%. Conclusions to be drawn from these results will be found in the discussion below.

Referring expressions: the LEAPLE protocol

Referring expressions are one of the linguistic items that are supposed to create or maintain coherence in discourse. Their role is two-fold: on the one hand, they establish what it is that the speaker is talking about, i.e. they have a role in the expression of the theme of a given discourse; on the other hand, the choice of the appropriate type of referring expression (pronoun, definite description, indefinite description, etc.) is crucial in maintaining coherence, in as much as it will depend on an eventual previous mention of the same referent and on the distance between the current and the previous mention.

The analysis of referring expressions in the corpora was done in the second stage of the project. In other words, it was performed only on two sequences per patient, rather than on the whole corpora. The reason for that was, among other things, the extreme length of the process. To analyse the referential expressions in the patients corpora, we used a protocol developed by the LEAPLE laboratory to study young children discourse corpora, and more specifically their acquisition of referential expressions (see Salazar *et al.* 2003). We of course adapted the protocol to adult discourse: some categories which make sense when applied to young children's discourses do not when applied to adult discourse; equally, adults have a greater range of possibilities, using for instance cleft object or subject which children do not in early language acquisition.

The LEAPLE protocol codifies for each referring expression the following data:

- number of the utterance in which the referring expression occurs²;
- utterance itself is reproduced in a second column;
- interpretability of the referring expression (or of the sequence if it is unanalyzable);
- discourse referent;
- nature of the discourse referent (entity, process or discourse);
- whether the discourse referent is explicitly or implicitly mentioned;
- syntactic category of the referring expression (proper noun, pronoun, noun, etc.);
- type of determiner (definite, indefinite, demonstrative, etc.);
- eventual presence of a second determiner (quantifier, or adjective such as *other*);
- syntactic function of the referring expression (subject, object, etc.);
- presence or absence of the referent;
- relation to the category (generic, specific, single);
- familiarity of the referent (known or unknown to either or to both participants);
- idem for attention;
- nature of reference and distance from a previous mention (first reference, coreference, coreference at a distance, coreference in a new thematic sequence);
- rank of reference (indicated by a number).

As can be seen, this can be the basis for a detailed analysis of referring expressions, thematic transitions, etc. We will begin with two factors: syntactic categories used by the patients in their referring expressions and deviant vs. standard use of referring expressions.

Concerning the first factor, results are shown in table 6 (where S8 indicates the percentage of referring expressions of a given syntactic type in the eighth session of Mr. S., S9 in his ninth session and so on for the other sessions and patients).

INSERT TABLE 6

Though there is a wide range of syntactic type for the referential expressions used by the patients, some are very little used compared to others. This seems however to be

rather uniform between sessions for the same patient as well as between patients. For instance, personal pronouns in all corpora are in a percentage relative to all referential expressions comprised between 44.73% (in Mr. S.' eighth session) and 59.09% (in Mr. H's third session). By contrast, the percentage of demonstrative pronouns is below 10% and (more surprisingly) the percentage of definite descriptions hovers around 10%. Other syntactic types of referential expressions are even lower. Thus there is a massive amount of personal pronouns in the corpora. This may probably be explained by the fact that quite a lot of them are first person pronouns, which is hardly surprising in such situations. Be that as it may, there does not seem to be anything peculiar about this distribution that, as said above, was very stable across both sessions and patients.

But our main interest in using the LEAPLE protocol was in assessing the number of standard as opposed to deviant uses of referential expressions. For example, it is clear that introducing a new object should be preferentially done using an indefinite expression or a proper noun when the object is not immediately perceptible. Introducing a new object through a demonstrative, a definite description or a pronoun is just not the standard procedure. Though less offensive, referring back to an object that was introduced before but has not been discussed for some time should not be done through a pronoun. Thus we hunted for specific combination of codes and looked for the following types of deviancies:

- personal pronouns (3rd person) for first reference;
- personal pronouns (3rd person) for reference at a distance;
- personal pronouns (3rd person) for reference in a new thematic sequence;
- definite descriptions for first reference;
- demonstrative descriptions for first reference;
- indefinite descriptions for coreference;
- indefinite descriptions for coreference at a distance;
- indefinite descriptions for coreference in a new thematic sequence.

Percentage of such deviancies were calculated in each case relative to the total number of referring expressions of the syntactic type considered, i.e. concerning the first category of deviancy described above, the percentage was calculated relative to the total number of third person pronouns used in the relevant session, etc. A general percentage of referential deviancy was finally calculated through the sum of all referential deviancies in a given session relative to the number of referring expressions occurring in that session. Results are shown in table 7 and it is rather clear that they are much less uniform than the results in table 6, though what accounts for the discrepancies is not entirely obvious.

INSERT TABLE 7

There are, nevertheless some regularities worth noting: for instance, the general percentage of deviant referring expressions relative to the sum of all referring expressions in a session is relatively low (less than 10% for all sessions and subjects). Another notable fact is the relative stability of errors: for instance, for all subjects, indefinite descriptions are the type of referring expression most often used deviantly and the most frequent deviancy is their use as coreferring expressions, though (surprisingly) they are much less frequently used for coreference at a distance or in a new sequence.

Equally, personal pronouns (3rd person) are the type of referring expressions less often used deviantly. The deviant use of definite and demonstrative expressions for first reference falls in between.

In the absence of control corpora, it is hard to say whether these results should be expected. However, the discrepancies between subjects may be worth discussing. Though on the whole, there is little difference among patients and sessions regarding the total number of deviant referring expressions, there are differences among patients regarding the type of referring expression most often used deviantly, as well as regarding consistency in deviant use of a given type of referring expression between sessions. For instance, though all patients are fairly stable (and remarkably similar) in their deviant use of personal pronouns, they are much less so regarding their deviant use of descriptions. This is true of all patients (excepting Mr. S.) for the deviant use of indefinite descriptions which may vary from one session to the next by as much as 20% or 30%. Strangely enough, the reverse is true for the deviant use of definite descriptions, where all patients, but Mr. S. (16.04% in his eighth session, 26.61% in his ninth session), are fairly stable.

Though these results seem rather noteworthy, they remain difficult to interpret. Why Mr. S. should be more stable than other patients in his deviant use of indefinite descriptions, and less stable than them in his deviant use of definite descriptions, is anything but obvious. We leave this point for the discussion.

Themes and thematic transitions

As said above, one of the deficits frequently noted relative to schizophrenic discourse is its incoherence. Discursive coherence is supposed by discourse analysis to depend on three main factors: the use (and choice) of referential expressions (see section above); the use and choice of pragmatic connectives (see below); the thematic organization of discourse. It should be clear that there are no very precise rules for thematic organization. The only principles to have been proposed have to do with maintaining the same theme while introducing new information and with introducing new themes. They seem either limited to common sense or over-normative. Hence, they are very difficult to apply in an objective way. What is more, such sessions may not be the most interesting type of corpora regarding discursive coherence, given that the very principle is free association.

Nevertheless, it seems a pity not to examine discursive coherence, as it appears to be the most frequently noted characteristic of schizophrenic discourse. We decided, however, not to do it for all patients, but to concentrate on Miss B.'s two sessions. This is because Miss B. was the only patient for whom we disposed of one session recorded while she was in a delirious state, for which she was being unsuccessfully treated by a given neuroleptic. We also had some sort of control through the fact that we also had for her a session when her mental state was stabilized (after a successful treatment with another neuroleptic). Thus, in this specific instance, we did have a control corpus. We have done two operations on these two sessions of Miss B.: we have first done a quick analysis of the main themes in both sequences using the discourse references and the relations between them, based respectively on the results given by the LEAPLE protocol and on our extensive knowledge of the corpora. We have then examined more extensively parts of both sessions to see more precisely how more detailed sub-themes succeed each other, in other words, how thematic transitions are or are not performed.

Beginning with a general comparison of themes in the second and ninth sessions of Miss B. (see table 8), the first striking thing is the disappearance in the ninth session of

eight themes of the thirteen present in the second session. By contrast, only one theme that was not present in the second session (*books*) is introduced in the ninth. Indeed, some themes occur in the second session due to the delirious state of Miss B. (*Germany*, *Delon*, *Romy Schneider*, and *travel*) and their disappearance in the ninth session is due to her better mental health. More precisely, the theme *Germany* is expressed through sequences on nazi concentration camps, one of which Miss B. visited in Hamburg. This visit triggered her first psychotic episode; the theme *Delon* appears in a few utterances in which Miss B. claims that the French actor Alain Delon is her father; similarly, she claims that Austrian actress Romy Schneider was her mother; finally, she speaks of future trips to central America. These themes have completely disappeared in the ninth session. Other relevant differences concern the theme *family*, about which she talks a lot during the second session (it corresponds to 27.22% of her discourse referents), while she speaks much less of it in the ninth session (2.86% of her discourse referents), whereas the reverse occurs for the theme *hospital* (32.64% of her discourse referents in her ninth session, compared to a much lower 6% in her second session). Other themes are introduced and discarded between the second and ninth sessions in what seems a more contingent ways, such as *politics* in the second session and *books* in the ninth. Overall, the main impression is that the difference in mental health, as far as choice of themes is concerned, corresponds to a better awareness of Miss B. to her immediate surroundings in the ninth session (as witnessed by her greater involvement and interest in the life of the hospital) by contrast with her absorption in her personal history and with her delusions in the second one (as witnessed by her absorption in family matters and by the presence of the *Schneider* and *Delon* themes). The great importance of the *ego* theme in both sessions is true of all patients and not specific to Miss B. and is probably due partly to the type of discourse examined (“free speech”) and partly to mental illness. The tendency of schizophrenic patients to bring all topics of discourse back to themselves has been noted by Andreasen (1979) in her pioneering study.

INSERT TABLE 8

The second analysis has to do with thematic transitions, that is, with the way in which a theme introduced in one utterance is taken again or changed in the next one for another theme, which may or not have any relation with the first. Here we have taken the first twenty utterances of each session (see tables 9 and 10) and examined referential expressions as to their discourse referent, thematic status (theme, rheme, change of theme), the relation between the successive themes and thematic transition. The last is the most relevant to the present inquiry and change of theme may be done smoothly through a relation between the last and new thematic discourse referent (e.g. from Miss B. to a member of her family, for instance her father or mother), through reference to a non-subject argument of the verb of the preceding utterance (rheme), or through a reference to a discourse referent which frequently occurred in the preceding rhemes. Thematic change can also be done through a break that may be apparent or real.

INSERT TABLES 9 AND 10

Comparison between Miss B.’s second and ninth sessions, restricted to the first twenty utterances, first reveals that the main theme in this passage of her second session is devoted to her main subject (outside herself), i.e. her family, while the passage in her ninth session is devoted to the hospital. Nevertheless, in the second session the two ancillary themes of *Schneider* and *Delon* occur as this is the part of the session where

she claims that she is their daughter. There are fifteen thematic changes out of twenty-nine themes in the second session, against seven thematic changes out of twenty in the ninth session. The second session is rather remarkable in that it has no thematic break, but only smooth transitions centering on relations to Miss B (mother, father, true mother — Schneider —, true father — Delon). What is rather notable is that Miss B. fairly frequently uses cleft subjects and objects (five times). By contrast, in the ninth session, there is two thematic breaks, the first occurring with the mention of the nurse in utterance 4, while the second occurs with the mention of the feast in utterance 17 and clefts are used only twice. It seems that Miss B. in her second session has a perfect mastery of thematic expression, maybe even better than in her ninth. This, however, may be due to the fact that, by coincidence, the first twenty utterances of Miss B.'s second session are unusually well organized from a thematic point of view. This is confirmed by examining twenty other utterances (from 196 to 216: see table 11), in which thematic continuity is much less in evidence. There are fourteen thematic changes out of twenty-four themes and one thematic break.

INSERT TABLE 11

Pragmatic connectives

Pragmatic connectives are function words whose role in discourse is to link sentences or clauses. Such connectives are called *pragmatic* because they cannot be reduced to logical relations such as those that are described, for instance, in propositional logic. It is often said that schizophrenic patients produce incoherent discourse. Discourse analysis has insisted on the role of pragmatic connectives in the establishment of coherence in discourse. If this is right, one should expect schizophrenic patients to produce either fewer connectives than do normal subjects or to use them inappropriately. Though again we cannot predict with any precision the percentage of connectives relative to non-connectives one should expect in a given discourse, we did try to ascertain whether connectives whenever they appeared were used appropriately.

The study of connectives in the corpora was made both on an automatic counting of the number of occurrences of a given connective in a session or in the whole corpus of a given patient and on a verification (by hand), instance after instance, of the appropriateness of each use of the connective. Regarding appropriateness of use, not a single inappropriate use was noted. The results of the count of connectives are given in table 12.

INSERT TABLE 12

Connectives counted were *alors* (then), *donc* (thus), *mais* (but), and *parce que* (because). As can be seen the total percentage of connectives used is rather stable across both sessions and patients. The less frequently used connective across both patients and sessions is *donc*. This may be due to the fact that *donc* marks the (more or less logical) conclusion of an argumentation, a form of discourse that may not be very frequent in such sessions. The connective most frequently used by both Miss B. and Mr. S. is *parce que*, though they both tend to use it not in its most standard causal usage, but in its less standard, so-called "enunciative" usage. The difference between these two uses can be informally illustrated from examples (1) (causal) and (2) (enunciative) below:

- (1) Jean est en colère parce qu'on lui a volé sa voiture.
John is angry because his car was stolen.

- (2) Jean s'est cassé le bras parce qu'il a un plâtre.

John broke his arm because he's in a cast.

In (1) the fact that John's car was stolen is presented as the cause of his anger, while in (2) the fact that John's arm is in a cast is clearly not the cause of his breaking his arm, but is rather the cause (or at least a justification) of the speaker's claim that John's arm is broken. In both Mr. S' and Miss B.'s discourse, the most frequent use of *parce que* is a form of enunciative *parce que* where *parce que* introduces an aside justifying something which was said in the previous utterance. Illustrations of this are given in (3) and (4) below for, respectively, Miss B. (second session) and Mr. S. (eighth session):

- (3) *parce que* hein il ne faut pas exagérer

because uh people shouldn't go too far

- (4) bien vous avez la foi / *parce que* moi j'ai posé la question au Dr. Scotto

well do you believe in God / because I asked Dr Scotto whether he did

(The backslash indicates a change of utterance). Mr. H. uses *mais* rather more than the other connectives, while Mr. P. uses *alors*, which may be seen (outside of its temporal use) as rather void semantically (similar to some uses of *so* in English), as shown by the following example (taken from his eighth session):

- (5) *alors* si elle me donne pas les sous je ne sais pas comment je ferai hein

so if she doesn't give me the money, I don't know how I will manage see

By contrast with the other patients, the connective most used by Mr. H., *mais*, is used in the standard way (indicating a contrast between either the two clauses connected or between the conclusions which might be drawn from them) as shown in (6) below, taken from his sixth session:

- (6) ah je ne suis pas tellement loquace aujourd'hui n'est-ce pas / *mais* je vous ai dit le principal

well I'm not very loquacious today am I / but I told you the main thing

This may reflect the higher educative level of Mr. H. compared to the other patients. However it should be noted that, though Mr. S's and Miss B.'s uses of *parce que* and Mr. P.'s use of *alors* may not be standard regarding the normative use in written use, they are nevertheless perfectly admissible (and understandable) in oral discourse. Thus, though they may detract from the norm of written texts, these uses of connectives can hardly be characterized as deviant.

Phatic expressions

Phatic expressions in a discourse do not convey any specific information but are rather used to maintain the relationship between speaker and hearer. More specifically, the speaker seems to ask the hearer's opinion, through pseudo-questions and the use of the second person pronoun (ex: *hein*; *eh* — *voyez, vous voyez*; *see* — *n'est-ce pas?*; *Isn't it?* — *vous*; *you*). It is difficult to say exactly what percentage of phatic expressions relative to other expressions one should expect in an oral discourse produced in the course of such a session, if only because these sessions are not authentic dialogues. We can only compare different subjects' discourse on that point.

Results are given in tables 13 and 14.

INSERT TABLES 13 AND 14

Table 13 was done in phase 1 and was based on the automatic recognition of sequences of signs. By contrast, table 14 was done in phase 2 and is based on the coding of referring expressions (including verb flexion) done with the LEAPLE protocol (see above), on two sessions per patient. There, all referring expressions directly referring to the hearer (appellatives such as “Docteur” (*doctor*), phatic questions or asides such as “vous voyez” (*see*), “vous y croyez, vous” (*do you believe that?*), etc.), which could not be automatically and exhaustively listed, have been recognised and hand-coded for two sessions per patient, giving additional information on their use of phatic sequences. As can be seen from table 13, the percentage of highly codified phatic expressions is relatively low for all patients, though it is interesting to see in table 14 that, in the two sessions examined, the percentage of less standardized phatic addresses is comparatively much higher (going from 1.61% in Mr. H.’s third session to 7.59% in Mr. P.’s eighth session). On the whole, between patients comparison over the percentage of total standardized phatic formulas calculated over the whole corpora given on table 3 does not give the impression of any major discrepancy: both Miss B. and Mr. P. lead with 2.37% of phatic expressions, while the other patients vary by less than 2%, hardly a significative percentage. Between sessions variation is for each patient rather low for standardized phatic formulas (table 13), though between sessions variation per patient is much higher for non-standardized phatic sequences, especially for Mr. P (table 14). This may, however, be a statistic artifact due to the reduced size of Mr. P.’s linguistic production compared to that of other patients.

3. DISCUSSION

The results indicated above are anything but easy to interpret. This comes from several factors. First of all, in the absence of control corpora, conclusions about “abnormalities” in schizophrenic or psychotic discourse are difficult to draw: some of the peculiarities might be due to orality rather than to psychosis. Then, none of the numbers indicated below are so strong as to suggest massive language impairment, something that, anyway, is not among the most commonly recorded consequences of psychosis. Finally, all the patients were taking more or less strong medications when the sessions were recorded: a possibility is that such peculiarities as those outlined above could be due to medication rather than to mental illness. The main conclusion, anyway, seems to be that the deviancies are rather mild and fairly subtle and may in fact be found in the spontaneous speech of normal subjects.

The relationship between schizophrenia and language has, unsurprisingly, been the object of much speculation. This may come from the fact that schizophrenia is usually diagnosed on the basis of positive symptoms such as, e.g., auditory hallucinations, which are essentially subjective and can only be known from the patient’s discourse. By contrast, negative symptoms, though some are linguistic (poverty of vocabulary or syntax for instance), are not only detectable from speech as they include poverty of affect, which can manifest itself through speech (i.e. prosody) but also from facial expression (lack of it) and social marginality, which are clearly not linguistic (Taylor *et al.* 1997). More precisely, positive symptoms which are characteristic of the first (or acute) stages of the illness and include hallucinations, thought disorder, and delusional ideas, are sensitive to psychotropic medicines, and patients do not seem to have

intellectual deterioration, while negative symptoms are more characteristic of chronic illness, are characterized by poverty of speech, affects and social marginality and are not sensitive to medicines, patients suffer from intellectual deterioration and there is an alteration of cerebral structures. In other words, all schizophrenic patients have been first diagnosed from an episode with positive symptoms though their positive symptoms may disappear with time leaving behind only negative symptoms.

Though alterations of cerebral structures are noted in relation to chronic illness, the ethiology of schizophrenia is still unclear. Though some recent papers have hypothesized a relation between cerebral asymmetry, leading to lateralization (as a result of an event of speciation related to language evolution in humankind), and schizophrenia, this remains speculative and it is unclear what such hypotheses may have to say about the relation between language and schizophrenia and, more specifically what predictions they make about the discourse of schizophrenic patients (See Crow (1997), Annett (1999), Klar (1999), Yeo *et al.* (1999), Saugstad (1999), Crow (1999)).³ Regarding the distinction between positive and negative symptoms, there are predictions which might be made, though some at least seem to have more to do with content than with linguistic structure.

It should be noted that this could be interpreted in several, not necessarily incompatible, ways. For instance, one might think, on Chomskyan lines, that the linguistic competence of schizophrenic subjects is intact, though their performance is impaired. In other words, the problem would be more a problem of executive function, self-monitoring, thought disorder or whatever than of linguistic deficit. Another way to look at it would be to say that the linguistic system itself is perturbed. However, more generally, one might expect the discourse of negative and positive symptoms schizophrenic patients to be different and, possibly, to differ from the discourse of non-schizophrenic but psychotic patients.

Regarding the four corpora examined above, we have three schizophrenic patients, two with negative symptoms, Mr. H. and Mr. P. and one with positive symptoms, Miss B. and one patient with delusional but non schizophrenic disorder, Mr S. Thus we might expect to find the two negative symptoms patients more similar to one another than either to the other two patients and we might expect the non-schizophrenic patient to stand in a group of his own.

Let us come back to the above results and see whether they justify those predictions. We will only examine the more detailed operations in the second stage. The predictions given above seem partly justified in as much as Miss B. seems to come worst for most if not all examined factors and Mr. S. seems to come best. This is the case, for instance, in the BSA counts. This comes partly from the fact that there are more frequent incomplete utterances in Miss B.'s discourse than in the other patients' discourses. However, the result of the LEAPLE protocol analysis regarding referential deviancy is interesting in as much as this is one case in which Miss B. does better than all other patients with an overall 3.71% of deviant referential expressions in her second (and more delirious) session compared to around 7% for other patients and for her second session. However, though Miss B. and Mr. S. seem to differ slightly from other patients, the prediction that negative symptoms patients should be similar does not seem borne out by the facts: for instance, regarding loquacity, Miss B. and Mr. H. are rather similar while Mr. P. has a much lower production and, though Mr. P.'s results are rather good on the whole, this may be an artifact due to the paucity of his output. On the whole, no two patients are similar overall throughout all the examined factors.

Turning to themes and thematic transitions and to discourse coherence, as said above, only Miss B.'s sessions were examined and, though her sessions do give an impression of greater incoherence than those of other patients, it is hard to pinpoint exactly where the trouble lies. On those indices which were examined for other patients, such as use of referential expressions, connectives and phatic expressions, her discourse does not stand out and the more detailed examination we did above of the three fragments of her 2nd session does not indicate much out of the ordinary as far as thematic transition are concerned. We tend to think that the overall impression of great incoherence is due to incomplete sequences, which are much more numerous than those for other patients (POM for her 2nd session is 17.18 and for her 9th session 15.52) and to the delusional content of her discourse.

This leads us to a few final remarks. First of all, though Miss B. is a positive symptoms patient, her discourse does not evidence all of the positive symptoms currently described in the literature, such as thought insertion or auditory hallucination. Her delusions seem (in her sessions: we are not claiming anything about what she might have said or done at other times) to be confined to her claims that actress Romy Schneider was her mother and actor Alain Delon was her father. These delusions, by contrast with thought insertion and auditory hallucinations, are not self-evidently false. Yet, the first twenty lines of her second session (see table 9) are a good example of why such claims appear false or, even worse, incoherent (and may explain the feeling of incoherence that is produced when one reads the transcripts of her sessions). More precisely, the relevant sequence is to be found in utterances 9 to 13. In line 9, Miss B. claims that Delon is her father and, in line 10, that she "does not give a damn" about Claude B. (her father). Yet, in line 11 to 13, the referent of "papa" (*daddy*) is clearly Claude B. and certainly not Delon as indicated by the content of line 13 which certainly does not refer to Delon. Thus in five utterances, Miss B. both claims something (Delon is my father) and clearly indicates that she does not truly believe that this is true. She may either believe that Delon is her father and believe too that Claude B. is her father, or she may not truly believe that Delon is her father (maybe she merely make-believes it). In either case, as will be seen below, her discourse is incoherent.

This is strongly reminiscent of a pragmatic puzzle, known as Moore's paradox⁴ in which someone says:

(7) It is raining and I don't believe it is raining.

This sentence gives a strong impression of contradiction, though it most certainly is not a logical contradiction (this would read either *It is raining and it is not raining* or *I believe that it is raining and I don't believe that it is raining*) and is not reducible to one. The paradox resides in the contrast between the strong impression of contradiction and the incontrovertible fact that the sentence is not in and of itself contradictory. Solving the paradox implies being able to say why this sentence gives such a feeling when there is no semantic basis for it. One possible explanation (see Reboul in preparation) is that the feeling stems from a deep pragmatic infelicity, directly related to the failure of any explanation in terms of the intentional stance (see Dennett 1987). For instance, if the speaker does not believe it to be raining but wants to mislead his/her hearer (i.e. to lie), he/she should not say that he/she does not believe it is raining. If, on the other hand, he/she is sincere when he/she asserts that it rains, claiming on the next

clause that it is not raining seems to indicate a very unstable state of mind. This seems to be directly applicable to the fragment of Miss B.'s 2nd session discussed above.

Finally, there has been much controversy surrounding the question of what exactly explains the peculiarities of discourse of subjects with schizophrenia, whether it is due to thought disorder or is linguistic in nature (see, among quite a lot of other references, Goldberg & Weinberger (2000), Thomas & Fraser (1994), Rieber & Vetter (1994), Critchley (1994), Rossell *et al.* (1999), Wexler *et al.* (2002), Shedlack *et al.* (1997), Condray *et al.* (1996), Bagner *et al.* (2003), Bazin *et al.* (2000), Bacon *et al.* (2001), Vita *et al.* (1995)).

What is to be understood by a linguistic disorder is not always absolutely clear, but let us suppose that a disorder is linguistic when it cannot be explained by other factors (such as thought disorders). Note that the fact that a disorder is linguistic in the above sense does not mean that it cannot be accompanied by other and non-linguistic disorders (for instance thought disorders). This, of course, makes it even more difficult to pinpoint, in a given corpus, what may be due to a linguistic disorder and what to a non-linguistic disorder. The problem is further complicated by the fact that peculiarities that may appear to be linguistic (i.e. they seem confined to syntax for instance), may not be due to an alteration of linguistic capacities *per se* (i.e. competence may be intact), but may be due to performance difficulties unrelated to linguistic abilities, such as a deficit in short term memory for instance.

Regarding the corpora examined above, and concentrating on the one which seems the more deviant (though its deviancies still remain fairly low in percentage), i.e. Miss B.'s corpus, a case may be made for all the deviancies, including discursive incoherence, being due to non-linguistic disorders, such as thought disorders, executive system or short memory disorders. This seems consistent with Frith's analysis of schizophrenia as a disorder of self-consciousness (see Frith 1992).

CONCLUSION

In conclusion, we want to come back to the problem of collecting and analyzing corpora from psychotic patients. Though there is much to say in favor of spontaneous speech, such as that in the corpora analyzed in the present paper, the lack of control corpora does raise important problems, notably the impossibility of any comparison and thus any strong conclusion as to the peculiarities of patients' linguistic output. Though there are difficulties in establishing similar conditions for corpus recording in both patients and control subjects, these do not seem insoluble to us. We think that the design of simple tasks outside of the therapeutic environment implying communication and taking stock of common information might solve the problem and allow a more systematic, more controlled and, ultimately, more satisfying way of tackling the problem of discourse of subjects with psychosis.

NOTES

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² This was taken from the analysis of the corpora in the first stage, when a complete parsing of all sessions was done, allowing us to isolate utterances, and to distinguish between grammatical, ungrammatical, incomplete and unanalyzable sequences (see Reboul *et al.* 2001). The sequences were numbered and it is this number that appears in the column.

³ Insistence on the relation between evolution of language, lateralization and schizophrenia is mainly to be found in Crow's papers. However, all the papers mentioned note a link between lack of cerebral asymmetry, developmental delays (notably in language acquisition), dyslexia and psychoses such as schizophrenia, manic depression and autism and all propose genetic mechanisms underlying these pathologies.

⁴ Because it was originally described by G.E. Moore, an Oxonian philosopher of the beginning of the 20th century.

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Adresses of the authors

Nadège Foudon
 Institut des Sciences Cognitives, CNRS, UMR 5015
 67 bd Pinel, 69675 Bron Cedex France
 foudon@isc.cnrs.fr

Anne Reboul
 Institut des Sciences Cognitives, CNRS, UMR 5015
 67 bd Pinel, 69675 Bron Cedex France
 reboul@isc.cnrs.fr

Paul Sabatier
 Laboratoire d'informatique fondamentale, CNRS, UMR 6166
 163 avenue de Luminy, Case 901, 13288 Marseille Cedex 9 France
 Paul.Sabatier@lilil.univ-mrs.fr

Marie-Christine Noël-Jorand
 Laboratoire de Biomathématiques, Statistiques et Informatique
 Faculté de Médecine, 27 bd Jean-Moulin, 13385 Marseille Cedex 5 France
 Marie.Christine.Noel.Jorand@medecine.univ-mrs.fr

Biographical notes

Nadège Foudon is a master student in linguistics at the University Lumière-Lyon 2. Her contribution to this paper was made during her master course in the Pragmatics and Cognition team at the Institute for Cognitive Sciences

Anne Reboul is a research fellow at the CNRS, working at the Institute for Cognitive Sciences in pragmatics. Her main fields of research are the foundations of pragmatics, including discourse analysis, the linguistic expression of space and time, of causality and of subjectivity, as well as fiction.

Paul Sabatier is a research fellow at the CNRS. His domains of interest are syntax, semantics and computational linguistics.

Dr. Marie-Christine Noël-Jorand is Associate professor at the Medical school of the University of the Méditerranée (Marseilles) and is a researcher in the discourse analysis of subjects with or without mental deficit.