Schizophrenia Through the Lens of Chinese Classifier: A Preliminary Study

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Abstract

Previous studies conducted within Western schizophrenic patients with formal thought disorder (FTD) have shown that abnormalities occur at different levels of linguistic structures. However, linguistic manifestation of FTD in Mandarin Chinese is rarely discussed in the literature. The principal question concerned in this preliminary study is to explore how people with Chinese FTD misuse classifiers (CL) and how the pattern of misuse could illuminate the linguistic dimensions of FTD. Unlike other Chinese-specific properties such as the absence of articles and the pervasive occurrence of phonetically null arguments, Chinese CLs are prominent features of the language and almost always overt. Further, since they have both a grammatical and a lexical dimension, Chinese CL could serve as a probe to test whether there is a linguistic etiology of FTD, and whether it is grammatical or lexical in nature.

1 Introduction

Ever since the early 20th century, Formal Thought Disorder (henceforth, FTD) of schizophrenia, or disorganized speech, is regarded primarily as a disorder of 'thought', rather than a 'linguistic' one (Bleuler 1911; Kraepelin 1913). However, language abnormalities are central in understanding schizophrenic symptoms and FTD in particular. FTD is an attempt to capture descriptively the observation that the speech of some patients with schizophrenia is difficult to follow, amounting in some cases to complete incomprehensibility.

As these problems happen, over the years there have been important attempts to account for the phenomenon in linguistic terms. One tradition has been that FTD is actually a form of fluent dysphasia. This view dates back to Kleist (1914). Kleist believed that the symptoms of psychosis were essentially similar to those produced by focal brain lesions, and could ultimately be understood as dysfunction of these regions. Since then, language abnormalities have been extensively studied. Although linguistic structures at various levels have been found to be problematic in FTD, including phonology, lexical-semantics, syntax, pragmatics (Chapman et al. 1964), discourse (Rochester & Martin, 1979) and grammar-based meaning in general (Hinzen & Rosselló, 2015), there is no consistent explanation on why it affects all levels of linguistic structures. Further, it is still not clear how linguistic problems of FTD are manifested in typologically different languages. By working on the Chinese manifestation of this symptom, this preliminary research will also discuss whether previous linguistic hypothesis of FTD has cross-linguistic validity or not.

In previous studies conducted by Hinzen and coworkers (Çokal et al. 2018, Sevilla et al. 2018), grammatically organized entity-referring tracking devices including pronouns or (in)definite nominal phrases (NP) are examined in Spanish and English people with FTD. However, these elements are mostly not phonetically overt or manifest in Mandarin Chinese in general as opposed to Standard Average European (SAE) languages. The absence of articles and the pervasive occurrence of phonetically null arguments/participants in Chinese made it necessary to explore other factors to reveal linguistic problems of FTD.

The Chinese CL system provides a unique opportunity in this regard. On the one hand, different from other grammatical markers, Chinese CLs are prominent features of the language and almost always overt. On the other hand, because the Chinese CL system constitutes a spectrum of

possibilities from grammatically to lexically governed ones, it can serve as an important probe to detect whether the linguistic nature of schizophrenic FTD is more grammatical or lexical in nature. This issue has been controversial in both clinical setting and academic research. The overarching goal of this preliminary study is to shed light on it through the lens of theoretical and clinical Chinese linguistics. In section 2, we will introduce clinical condition of FTD in Chinese and Chinese specific linguistic properties in general. In section 3, the theoretical background of Chinese CL system will be explained in detail. In section 4, we will present a task-based experiment which test whether and how FTD patients fail in Chinese CLs using tasks. The last section will provide possible interpretations of the results of experiments in section 4 and sketch out the conjectures for future studies.

2 Schizophrenic speech in Chinese and some cross-linguistic issues

Due to the lack of a systematic rating scale like Thought Language and Communication (TLC) scale, the linguistic problems of schizophrenic FTD have been largely neglected in clinical practice together with other mental illnesses with a linguistic import. Hence, Chinese clinical linguistics cannot currently inform neuropsychology and psychiatry. As Chen (2013) commented, due to heavy workloads or other reasons, doctors simply do not consider the linguistic form of what patients say and this does not affect the doctor's diagnosis and treatment of the patient. Doctors are only interested in knowing if the patient has the characteristic symptoms mentioned in the diagnostic manual. Hence, in clinical setting, very little work has been done to explore the language deficits in schizophrenic patients, let alone to use linguistic tools to detect mental problems. In contrast, in the clinical settings of SAE (Standard Average European) language speaking countries, linguistic properties have been used as probes to detect the nature of FTD.

Further, due to the pervasive nature of radical argument drop and/or ellipsis, entity-referring tracking devices, either pronouns or definite NPs are mostly not phonetically overt or manifest in Chinese in general as opposed to SAE languages. Phonetically null arguments in Chinese and other East Asian languages do not confound with the phonetically null subject found in most SAE languages. The former is called Radical Argument Drop languages and the latter Null Subject languages. Only in the latter is the subject recoverable through verbal inflection while in the former there is no morphological clue to identify either a phonetically null subject or a phonetically null object. The reference of these null arguments depends entirely on the (linguistic) context in Chinese.

Along with radically null arguments, Chinese differs from most western languages regarding articles, which Chinese lacks (Robertson, 2000). In Chinese, the indefinite-definite distinction is not grammatically/morphologically based. And the old/new information status of participants largely depend on demonstrative pronoun, discourse or context.

In normal conversational discourse the Chinese-specific properties are not problematic at all. However, when talking with a schizophrenic individual, the communication often fails, and there is a general uncertainty about what the message conveys. In this situation, although the mentally healthy interlocutor is likely trying to make as much sense as possible of what the patient says, shared interpretation is not guaranteed. This general problem in the communicative interaction with schizophrenic patients would be exacerbated when the interaction is in Chinese because of the mainly phonetically silent nature of the entity-referring grammatical dimension of this language. In this domain, paradoxically, this could lead to an unconscious repair by the mentally healthy interlocutor of the potentially malfunctioning reference tracking devices in the patient. Hence, we assume that (i) reference tracking mechanisms (definite NPs, pronouns) may lack cross-linguistic validity to detect (and probe) FTD and (ii) there may be other factors than those related to entity-referring devices that contribute significantly to the profile this symptom so that FTD is overt enough and salient to be diagnosed in Chinese speaking patients. In order to solve this problem, we target the Chinese CL system.

Hsu et al. (2013) shows that our suspicion is on the right track. The authors investigated the narrative ability of Mandarin-speaking patients. 22

patients and 20 normal controls were recruited for a storytelling task. Participates were required to narrate three picture-books and the results were evaluated by a Mandarin version of Narrative Assessment Profile (Tsou, Chang & Cheung, 2009). The results show that there was no significant difference between the group with schizophrenia and healthy control in referential skills. (Control = 3.33; Schizophrenia = 3.05 [t (40) = 1.87, p < .068]). The results presented in this study contrast to research conducted within SAE language speaking FTD patients, who show signs of referential problems (Docherty et al., 2003, Çokal et al. 2019). As we predicted, due to the aforementioned Chinese-specific linguistic properties, the linguistic correlates of FTD could potentially be overlooked. Before we present the task-based experiment, we will present theoretical background of Chinese CL in the next session.

3 Classifiers as a probe

In view of the problem of cross-linguistic validity, it is necessary to find the overt linguistic dimensions and features that hold the promise of being detected in Chinese. In this sense, Chinese CL system which could serve as a probe to detect the nature of FTD, since as said, Chinese CL system has both a grammatical and lexical dimension. If we can experimentally show that the dysfunction orients itself towards the lexical part, Chinese data will cohere with Rochester & Martin (1979)'s finding which established the relative overuse of lexical ties in discourse as the hallmark of FTD. If not, the grammatical view (Hinzen & Sheehan 2013) of FTD can be maintained.

Using Chinese classifiers for clinical tests is not new. The study of Chinese aphasia (Tzeng et al.1991) demonstrated that Broca's and Wernicke's aphasia showed different pattern of mistakes when using classifiers. For example, the noun *che* (Engl. car) should follow the CL *liang* , whereas Wernicke's aphasia patients were shown to use the CL *zhi*, which normally appears with animals rather than non-animate nouns. Patients with Broca's aphasia, on the other hand, tended to substitute the general classifier *ge* when encountering problems to produce a proper CL. In addition, Broca's aphasia patients showed higher rates of classifier omission.

Returning to FTD, it has been assumed that language problems of FTD, at least superficially, resemble that of Wernicke's aphasia, which presents paragrammatisms despite having fluent speech and often gives an overall impression of nonsensical jargon (Kuperberg & Caplan 2003: 446). However, these similarities are only based on the clinical impression and very few studies have provided a systematic comparison.

By resorting to Chinese classifiers, this study attempts to explore how schizophrenic FTD is manifested through the atypical use of classifiers. The pattern of mistakes in Chinese classifiers could provide an insight into the nature of FTD. In the next subsection, based on their grammatical/lexical features, we will introduce a theoretical subdivision of Chinese CLs.

3.1 General introduction of Chinese CL

Mandarin Chinese is treated as a typical CL language for basically three reasons. First, in a numeral compound,which is composed of three elements: a numeral, a CL, and a noun, it is obligatory to use a CL (very few exceptions include idiomatic expressions). Second, the word order in the numeral compound is fixed. CL always follows the numeral and proceeds the noun: 'numeral+CL+noun'. And no noun can combine with numeral directly. Third, no other functional elements can intervene within the three elements (Zhang, 2013: 1). The basic pattern is illustrated in the following two examples.

(1) a. yi ping shui.
one glass(CL) water
b. a glass of water
(2) san tiao yu.
Three CL fish
Three fish

Examples (1) and (2) represent two kinds of CL. Adopting Cheng & Sybesma (1999)'s term, the CL in (1) is called 'mass-CL' and the one in example (2) is called 'count-CL'. In example (1), since built-in semantic partitioning does not come naturally from water, 'Mass-CL' creates a unit to make a mass like water to be countable. Other languages also have 'Mass-CL', for instance (1b) shows the counter example in English. The CL in (2) is the target of the experiments presented this paper. 'Count-CL' represents the natural units

denoted by non-mass nouns and it does not appear with mass nouns.

Despite the fact that the pattern of numeral compound including CL is simple, the CL system is widely accepted as one of, if not, the most difficult grammatical dimension of the Chinese language. Even for a native speaker, CLs are one of the most challenging aspects of language acquisition. In addition to fulfilling the proposed grammatical functions (Chao (1948, 1968: 584), Ōta (2003: 146), Wiltschko (2005), Gerner (2010: 275) and Bowers (1991: 19) CLs must also satisfy semantic requirements related to sorting (Tai, 1994) and counting (Zhang, 2013). As Myers (2000: 104) noted 'learning how to choose classifiers is in principle as complex as the myriad cognitive factors that go into human categorization of entities in the real world' (see also Tai 1994).

The questions concerning whether CLs belong to functional category or belong to the lexical domain, what their functions are and how they are represented syntactically are still contentious issues. As Zhang (2013) noted, a classifier may belong to what Borer (2005: 100) calls 'twilight zone between the substantive and the functional'. On one hand, CLs are sensitive to the semantics of following nouns. As Cardinaletti & Giusti (2006) proposed, elements that are sensitive to lexical semantics should count as lexical themselves, rather than functional. On the other hand, CL has been proposed to have the properties of definite determiner (Cheng & Sybesma 1999), which is grammatical in nature.

3.2 Classifier *ge*

To make the separation of the function clear, we first introduce the most frequently used CL *ge*. It can be used with animals, body parts of human beings, plants, electric devices, locations, numerals, characters, words, abstract concepts. For example:

(3) a. san ge laoshi.
three CL teacher
'three teachers'
b. yi ge dianao.
one CL computer
'one computer'

CL *ge* is special. In many situations, when it occurs, it can be replaced with another CL. However, it is not always possible. It is generally recognized that when the semantic property is close between the CL and the noun, it is less likely that the CL can be replaced by *ge* (Ahrens 1994; Myers 2000). And such closeness between the CL and noun is captured by the degree of grammaticalization. CL *ge* emerged quite late in the historical development of CL system (Wang 1989). The examples in (4) shows that certain CLs, for instance *zhang* and *dao* could alternate with *ge*.

(4) a. yi ge/zhang zhuozi.
yi CL/CL table
'one table'
b. si ge/dao cai.
four CL/CL dish
'four dishes'

As the grammaticalization proceeds, CL *ge* can occur with more and more nouns including 'abstract nouns, nouns denoting new concepts, and nouns denoting the results of certain acts' (Zhang, 2013:48). If a CL is at a low stage of grammaticalization, it cannot be replaced by CL *ge*. Thus, CL *ge* is proposed to have no semantic sorting function. Hence, it is also called the 'general' or 'default' CL (Myers & Tsay 2000) which seems to be free from the semantic selection requirement from the nouns.

3.3 Classifiers with semantic features

Different from the default CL *ge*, which does not classify the semantic types of nouns (Myers 2000, among others) there is another kind of CL which have semantic contents (Allan 1977: 285; Tai & Wang 1990). When this kind of CL is chosen, the size, shape, or function of the noun that the CL combined with functions as a partial guide. Due to the close relation between the CL and the noun, it is proposed that it is less likely that CL *ge* is available as a replacement (Ahrens 1994; Myers 2000). Examples in (5) show that this type of CLs have stricter semantic selectional restrictions than CL *ge*.

(5) a. san pi {ma/*zhu}
three CL horse/*pig
'three horses'

b. san sou {chuan/*feiji}
three CL ship/*plane
'three ships'

Zhang (2013: 163)

In example (5), CL *pi* can only be used with *ma* 'horse' and *sou* can occur with *chuan* 'ship'. These semantic correlations of CLs mark the discrete individuals which have non-arbitrary shape, size or boundaries (Zhang 2013: 65).

4 Task-based experiment

4.1 Subjects and materials

Nineteen patients, age 18 through 74 years (9 females and 10 males), who met DSM-IV (American Psychiatric Association,1994) diagnostic criteria for schizophrenia, were recruited from Tianjin Anding Hospital. Clinical diagnoses were made by trained psychiatrists via clinical interview. Since the TLC is not used in clinical settings in China, the distinction between schizophrenic patients with FTD (SZ+FTD) and schizophrenic patients without FTD (non-FTD) group was assessed by the P2 (conceptual disorganization) item of the PANSS (The Positive and Negative Syndrome Scale).

P2 is characterized by 'disruption of goal directed sequencing, e.g., circumstantiality, tangentiality, loose associations, non sequiturs, gross illogicality, or thought blocking' (Kay et al. 1987; 276). Ratings are based on the observations concerning cognitive-verbal processes during the interview. Items in the PANSS are rated from 1 ('absent') to 7 ('extreme'). Patients included in the SZ+FTD group had P2 scores of ≥ 5 , ie 'moderate severe, severe and extreme' (out of total 7), while the non-FTD group are diagnosed with the P2 ≤3, ie 'absent', 'minimal' or 'mild'. Both groups of patients were receiving antipsychotic treatment.

The patients with FTD and without FTD did not differ in medication treatment.Ten Chinese speaking healthy controls, age 31 through 67 are recruited from the general population. Exclusion criteria included evidence of learning disability, as assessed on the basis of schooling, history of alcohol or drug abuse, and history of head injury or disease that could affect brain function. All participants were native Chinese speakers. 5 healthy controls were recruited in Spain. Others lived in the city of Tianjin. The three subject groups were matched (see Table 1) for age, sex and years of education.

A complete description and list of objectives of this study were provided to all participants in both the patient and control groups and written consent to participate was obtained from all participants. All the procedures included in this study were approved by the local Ethical Committee numbered 2019-02) on human experimentation and complied with the principles of the Helsinki Declaration.

Table 1

Demographic characteristics of the groups

	FTD (N=9)	Non-FTD(N=10)	Healthy control (N=10)	Comparison
Age	57.75(±6.04)	52.6(±13.1)	58.63±(10.37)	F=1.376,p=0.266
Sex (m/f)	4/5	6/4	5/5	Chi^2=0.477, p=0.788.
Education	10.9±(3.4)	11.4±(3.9)	9.6±(1.3)	F=0.922,p=0.410

*Standard deviations are in parenthesis.

4.2 Methods

The experiment includes a classifier using task which is further subdivided into two tasks. In the first task, participants were presented with 30 phrases in the form of (*yi___he*) 'one___river' or (*yi___tuzi*) 'one___rabbit', in which a classifier is left empty. The patients were required to fill in the blanks orally with the proper classifiers. In the second task, the same set of classifier phrases were presented in the same form. In addition, in order to enhance the function of semantic memory in the linguistic task, participants were provided with corresponding visual stimuli, a picture including the content of the classifier compound. The results were coded for (1) provision of the proper classifiers, (2) substitution of the general classifier *ge* in Mandarin.

4.3 Results

SPSS22.0 was used to perform the statistical analyses. Differences between groups (SZ+FTD, non-FTD and HC) with respect to accuracy of using proper classifiers and using the general classifier *ge* were analyzed. Also, accuracy of

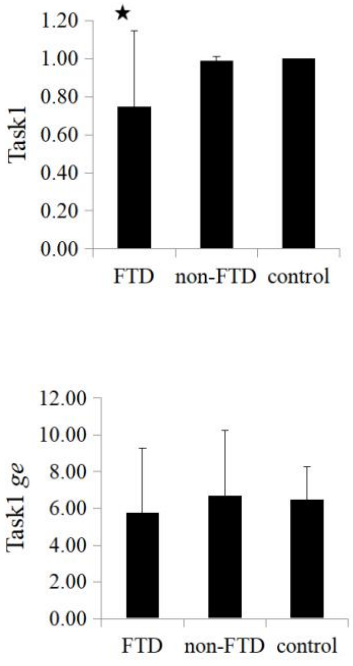
using the proper classifier and the general classifier *ge* were compared within each group between tasks 1 and 2 (within-subject design). The statistical significance level was set at $p<0.05$. Figure 1 summarize the mean accuracy rates in the both tasks.

A one-way ANOVA showed that only in task 1 significant differences between the three groups $F = 3.89$ ($p=0.03$). In detail, SZ+FTD accuracy were significantly lower than the non-FTD ($p=0.025$) and Control ($p=0.019$) groups. However, there was no significant difference between non-FTD and Control group ($p=0.897$). In task 2, there were no significant differences between the three groups ($F = 1.843$, $P = 0.178$) . As for the number of uses of the general classifier *ge*, no significant differences between the three groups in both task 1 ($F = 0.240$, $p = 0.788$) and task 2 ($F = 0.928$, $p = 0.408$) were identified.

Experiment 1	*F* value	p value
Task 1	3.893	0.033*
Task 1 *ge*	0.240	0.788
Task 2	1.843	0.178
Task 2 *ge*	0.928	0.408

p<0.05*

Table 2: Means of scores of two experiments



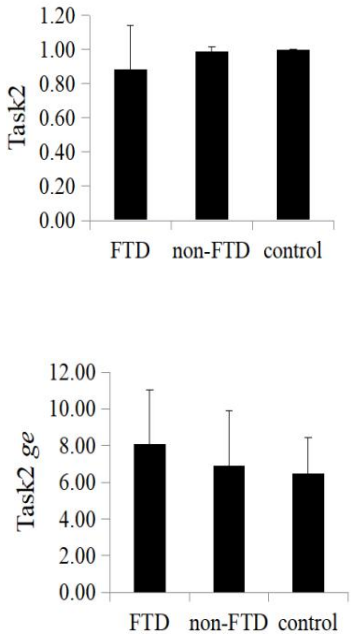


Figure 1: Performance of FTD and non-FTD schizophrenic patients and normal controls in two tasks.

5 Discussion

This preliminary study was designed to investigate whether the linguistic dimension of FTD is grammatical or lexical. As mentioned in the introduction, Mandarin CLs have both a grammatical and a lexical dimension. They might actually be represented as ranking along a spectrum spanning from a grammatical end to a lexical one. The ranking within such spectrum arises from the degree of grammaticalization. As Li (1924) and Lock (1997) noted, all classifiers are the result of the grammaticalization of substantive categories. The more semantic features that are shared between the CL and the noun, the less likely that the default CL *ge* can be used. (Ahrens,1994; Myers,2000). CL *ge* is the only one that is located at the very grammatical end, whereas and *zhi*, *pi*, among other CLs distribute differently towards the lexical end. Only the latter are sensitive to nominal selectional restrictions. In our experiments, we aimed to test whether CL *ge*, which is unequivocally grammatical, behaved differently from the rest in FTD, which could help clarify whether the disorder is mainly lexical or grammatical.

The results show that the ability to use proper classifiers that are sensitive to semantic content is able to distinguish the FTD group from the non-FTD group and healthy controls. However, this significantly different rate of mistakes cooccurred with an undistinguishable use of the classifier *ge* among these three groups. Putting both results together and taking into account that *ge* is the CL occupying the grammatical end of the classifier spectrum, the hypothesis that it is the lexicon rather than grammar that is impaired holds.

In task 2, as explained in the Methods section, the same fill-in the blank task was performed with the added presence of pictures. The results show that the pictures enhanced the performance of the FTD patients so that no significant differences among the three groups were obtained, though the non-FTD and healthy control group performed slightly better. As for the use of classifier *ge*, there was no differences across the three groups were identified. The preservation of the ability of using the default *ge* in task 2 coheres with its strong insensitivity to lexical nominal content. The disappearance of the significant result regarding the rate of wrong answers in CL with semantic content combined with the result in task 1 imply that the lexical impairment outweighs the grammatical one.

Going further into the details, one of the patients showed an extreme improvement when the picture was provided in task 2. Before the picture was provided, instead of using a classifier (6a) *ge*, he used an adjective to fill the blanks, as showed in (6b):

(6)a. yi ge nanhai
one CL boy
'one boy'
b. * yi hao nanhai
one good boy
'one good boy'

or, omitted the numeral when producing the CL phrase, which is showed in (7), even though the numeral is already presented in the task:

(7)*hao laoshi
good teacher
'good teacher'

Both of mistakes showed in (6) and (7) could be treated as the omission of the grammatical CL, the functional head of the CL compound. Hence, we cannot exclude the possibility that syntactic part is impaired in this participant. Instead of using a classifier, the patient used an adjective, which could be easier for the patient. According to Zhang (2013), different classifiers may have right-branching or left-branching syntactic structures. This variation may cause difficulties for the patients to choose which option is appropriate. Similar functional head omissions are also detected in Chaika & Alexander (1986), in which the authors found syntactic gaps in example (8) and (9). The patients produced the sentences as if nothing had been omitted (underlined parts). Example (8) and (9) are considered as 'a true break in syntactic ability and a genuine agrammatism' (Chaika & Alexander 1986: 322).

(8) What are <u>the</u> and uh there was a scene
(9) and asks if she can <u>have</u> then goes to the ice cream place

Further, in example (7), the patient omitted the numeral element altogether. This phenomenon is captured by the syntactic theory proposed in Zhang (2013). By using Feature (a technical term to define syntactic properties in generative grammar tradition), Zhang (2013) proposed that instead of noun in Chinese, it is the CL that has the [+Numeral] Feature and it is the CL that licenses the numeral, hence when CL fails, no element could take numeral in the phrase, which explains why the patient omit the numeral.

Returning to the issue that the patients performed significantly better in task 2, within which a visual support was presented, we propose that this enhancement in performance could be due to lexical features being made more easily accessible by the picture, which strengthen the semantic relation between the CL and the noun. If this is on the right track then the lexical view of FTD can be maintained. Similar view can be found in Rochester & Martin (1979). Though the authors focused on language abnormalities of FTD at discourse level, they found that FTD patients used preferred lexical items repetitively. This phenomenon was named as Perseveration in TLC. Perseveration is referred to as persistent repetition of words, ideas or subjects, so that once a patient

begins a particular subject or uses a particular word, he continually returns to it in the process of speaking (Andreasen, 1979). These phenomena could be explained by Levelt's (1989) language processing model. As briefly reviewed by Leivada (2015: 136), word retrieval process can be realized at two discrete stages (a) lemma selection and (b) lexeme retrieval. Lemma is abstract concept and lack of morphological specification, whereas lexeme is morphologically specified. This model successfully captured phenomenon when a patient failed in produce a target word. Instead the patient produce a conceptually similar whereas morphophonolically different one. Further, lexical access problems in FTD have been examined through semantic priming paradigm (Pomarol-Clotet et al. 2008) and they are assumed to be caused by malfunctioned semantic network where 'loose associations are caused by unrestrained associations-chain in semantic memory' (Lerner et al. 2012: 5). It is reasonable to propose that other FTD symptoms such reduced syntactic complexity could be cumulative results of the lexical problems. However, a clear mechanism of how lexical items are formed is still missing. Neither can this approach explain why there are still syntactic problems. It is Parsimonious to propose a unified syntactic theory to explain the problems arranged from lexicon to syntax. Though traditionally, syntax and lexicon are treated as two separate modules, studies showed that they are derived by the same syntactic engine. For example, Sigurðsson (2014: 14) noted that words are built in syntax at a deeper level. By drawing lessons from Distributed Morphology framework (Halle & Maranz 1993 and Marantz 1997), Fujita (2009, 2017) proposed anti-lexicalism which states that both words and sentences are outputs of syntactic computation. With this theoretical support, I would like to propose that it is the malfunctioned syntactic operation which gives rise to linguistic problems from lexical to syntactic and discourse level. This proposal echos the findings in Moro et al. (2015) and Oh et al. (2002) in which syntactic problems of schizophrenic patients are detected. From neurocognitive perspective, basal ganglia are found to be involved in both the process of word generation (Crosson et al. 2003 and Tao et al. 2020) and syntactic processing (Koz et al. 2009; Shi and Zhang 2020). Further, hippocampus is also assumed to contribute to both lexical and syntactic processing (Shi and Zhang, 2021a, 2021b). Since both of them are involved in symptoms of schizophrenia (Mamah et al. 2007, Heckers, 2001), the syntactic-oriented view proposed in this paper converges with neurological basis of FTD.

Limitations of this study include that sample size is limited, hence a replication with bigger sample size is necessary. Moreover, due to the clinical limitation, the hospital cooperated in this study is not equipped with IQ test. But based on the clinical impression, the clinicians selected patients who are willing to cooperate and don't show difficulties in communication. In summary, our finding update the knowledge that how Chinese-speaking schizophrenic patients failed in language task and provide probes on how the misuse of Chinese CLs can illuminate the linguistic dimension of FTD. From a theoretical point of view, we propose that the linguistic dysfunctions at both lexical and syntactic levels can be reduced to malfunctioned syntactic deficits.

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