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Original Paper

A Study of Syntactic Complexity in Language Production by Chinese-Speaking Older Adults

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Abstract

The syntactic complexity of language production changes as a result of ageing. In this study, we made a comparison between Chinese-speaking older and younger adults in terms of the syntactic complexity in spoken language production. To assess the level of syntactic complexity of language production, we applied the traditional measures of syntactic complexity such as sentence length, verbal fluency and the distribution of subordinate clauses. Results indicated that older adults showed a decline in the mean number of clauses, the proportion of right-branching clauses and verbal fluency. These findings indicate that there was a decline in syntactic complexity in spoken language production among Chinese-speaking older adults.

Keywords

syntactic complexity, language production, ageing, Chinese

1. Introduction

Syntactic complexity is an essential property for measuring individuals' ability to produce or comprehend languages. The complexity of written or oral narratives is associated with the ability to combine sentence components, mostly embedded clauses. This ability can become less efficient as a sign of ageing in the brain. Many previous studies found that older adults have greater difficulty with the production and comprehension of complex syntactic structures (Emery, 1985; Kemper, 1986, 1987a, 1987b, 1989; Kynette & Kemper, 1986). Kemper et al. (1989) collected the oral and written statements from younger and older adults and compared the two groups in terms of the length, clausal structure

and fluency of their language production. The authors discovered a significant decline in syntactic complexity in older adults, which was attributable to a loss of left-branching clauses in all language samples. The study provided the evidence for the age-related decline in syntactic complexity. However, so far most studies of the life-span changes in language were conducted among older adults in English-speaking countries and there is a lack of research addressing syntactic complexity in language production by Mandarin-speaking older adults. As Chinese is different from Indo-European languages in terms of syntactic structures, the studies of language production among Chinese-speaking adults can offer a cross-linguistic perspective on language in the ageing brain. The present study intended to investigate the syntactic maturity in spoken narratives produced by older adults with Chinese as their native language in order to expand our knowledge about language development in later life. The findings of this research can contribute to building a normative database which could potentially be utilized to assess language impairment in older adults.

2. Method

2.1 Participants

20 older adults and 20 younger adults participated in this study. All participants were native speakers of Chinese. The younger adults were between 18 and 26 years old (M=20.2, SD=0.56) and older adults were between 60 and 75 years old (M=64.9, SD=0.97). None of them has reported the history of psychological or neurological impairments. The two groups did not differ in gender ratio or years of education (*p*s>.05).

2.2 Materials and Procedure

Participants were tested individually in a quiet room. The examiner first explained the task requirements for the participants and then administered two speaking tasks. First, the participants were presented with the Cookie Theft picture from the Boston Diagnostic Aphasia Examination (Goodglass & Kaplan, 1983) and were required to describe the picture. Second, the examiner interviewed the participant using conversations to elicit spontaneous production. Both the picture description task and the interview were transcribed for analysis. The Cookie Theft picture was chosen as the instrument for collecting discourse samples because it is a standardized test used in many studies. The task can provide a prominent pictorial focus and therefore reduce ambiguity about the semantic contents and enable the older adults with declined memory to stay on track. As the task elicited the basic vocabulary acquired early in life, the nominal aspects of the task are easier for the older adults with potential difficulty in lexical retrieval.

2.3 Measures

To assess syntactic complexity, we computed two measures of sentence length (MLU, MCU), four measures of clause structure (LEFT, RIGHT, OTHERS, MAIN) and two measures of fluency (FRAGMENT, COMPLETE). Sentence length was measured in terms of the mean number of words

per utterance (MLU) and the mean number of clauses per utterance (MCU). The measures of clause structure included the percentage of right-branching subordinate clauses (RIGHT), the percentage of left-branching subordinate clauses (LEFT), the percentage of main clauses (MAIN) as well as the percentage of other clauses (OTHER). The two measures of fluency included the percent of fragments relative to the total number of utterances (FRAGMENT), the percentage of complete sentences (COMPLETE) and the percentage of lexical fillers (FILLER).

To obtain these data, we segmented the discourse samples into utterances by marking the sentence boundaries. Utterances included complete sentences, sentence fragments and the additions to the previous utterances after the pauses. Clauses were identified as either main clauses or subordinate clauses. Main clauses contained subjects and predicates. Subordinate clauses included the left-branching or right-branching clauses which might be linked with the main clause predicates with conjunctions such as *yinwei* ("because"). As incomplete utterances were common among older adults in speaking contexts, we included them to reflect the way how people communicated in everyday life.

3. Results

T test was performed to examine the group differences in all these variables. The results suggest that there was no significant difference between younger adults and older adults in the mean length of utterance, $t(38)=1.52$, $p=.137$. The difference between the two age groups in the mean number of clauses per utterance was marginally significant, $t(38)=1.96$, $p=.057$. The discourse samples of older adults contained fewer clauses per utterance than those of the younger group.

There was no significant difference in the percent of left-branching clauses or the percent of main clauses between the two groups ($p>.05$). The only significant difference was the percent of right-branching clauses. The discourse of younger adults included a higher percentage of right-branching clauses than that of older adults, $t(38)=2.64$, $p<.05$.

A significant effect of age was also found in the percent of fragments, $t(38)=1.52$, $p<.05$, and in the percent of complete sentences, $t(38)=1.52$, $p<.05$. In the younger group, the percentage of fragments was lower than that in older adults. The discourse of the younger group contained a higher percentage of complete sentences than the older group. The difference in the percent of lexical fillers was marginally significant, $t(38)=-1.92$, $p=.055$. The younger adults had a lower percentage of fillers than older adults. The findings suggest that younger adults showed a higher level of fluency than older adults.

4. Discussion

The study examined the age-related changes in syntactic complexity in speech production by Chinese-speaking older adults. Results found that there was an age-related decline in the average number of clauses per utterance, the percent of right-branching clauses and fluency. Therefore, the

number of clauses per utterance, the percentage of right-branching clauses and fluency measures were significant predictors of the decline in syntactic complexity in older adults speaking Chinese as their native language. The findings related to length measures were consistent with Kemper et al. (1989)'s study which also found that older adults had fewer clauses per utterance compared with younger adults. However, the findings related to the distribution of clauses were divergent. In our study, older adults had a lower proportion of right-branching clauses than younger adults, whereas in Kemper et al. (1989)'s study, the two groups differed significantly in the proportion of left-branching clauses rather than right-branching clauses. The differences might be attributed to the different structures between Chinese and English. English is a right-branching language while Chinese is a left-branching language. Left-branching clauses are the non-canonical structures in English whereas right-branching clauses are the non-canonical structures in Chinese. Left-branching clauses are considered to be more difficult to produce and comprehend than right-branching clauses in English (Levin & Garrett, 1990), whereas right-branching clauses are syntactically more complex than left-branching clauses in Chinese. The age differences tend to be more prominent in the clauses which are more difficult to produce, so right-branching clause was the stronger predictor of the age differences in Chinese-speaking adults.

Besides, this study found an age-related decline in verbal fluency among older adults, which was consistent with previous studies from English-speaking older adults (e.g., Hultsch et al., 1992; Salthouse, 1993). The decline in verbal fluency with ageing seems to be a universal phenomenon across different languages.

5. Conclusions

In summary, this study found significant decrements in sentence length, verbal fluency and number of right-branching clauses in the discourse samples of Chinese-speaking older adults. Older adults showed a significant decline in syntactic complexity and produced more sentence fragments than younger adults. These changes might result from general cognitive decline (Kemper, 1987a). However, in this study, we only made a preliminary attempt to explore the changes of syntactic complexity in language production, without further investigating the potential contributors to such changes. Although working memory decline could be a major reason for such changes, there are many other factors such as the intentional use of simple structures to facilitate communication with the ageing peers. Further research is needed to investigate the cognitive and social motivations for the age-related changes in language production.

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