

## Phrasal complexity and the occurrence of filled pauses in presentation speeches in Japanese

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### Abstract

Filled pauses are ubiquitous in everyday speech. I investigated whether linguistic complexity of upcoming phrases affects filler rate at phrase boundaries in presentation speeches in Japanese. Filler rate at phrase boundaries increased monotonically with complexity of the following phrases. However, when the following phrase was composed of more than 11 Bunsetsu-phrases, the filler rate did not show any constant increase. The results indicate that filler rate at phrase boundaries is closely related to cognitive load of local linguistic encoding and that the maximum planning span for linguistic encoding is about 10 Bunsetsu-phrases in Japanese monologues.

**Index Terms:** filled pause, Bunsetsu-phrase, linguistic complexity, planning load

### 1. Introduction

Levelt's [1] speech planning model assumes three stages of planning: 1) conceptualizing; 2) formulating (grammatical and phonological encoding); 3) articulating. Speech disfluencies such as filled pauses (fillers) and repetitions are claimed to occur when some troubles happen at any of these stages. A number of studies have investigated factors affecting the occurrence of disfluencies. Among the factors investigated are the degree of difficulty of lexical access to the word which speakers intend to utter, the range of choice in vocabulary that speakers can utilize, and the complexity of the linguistic constituents which immediately follow [2, 3, 4].

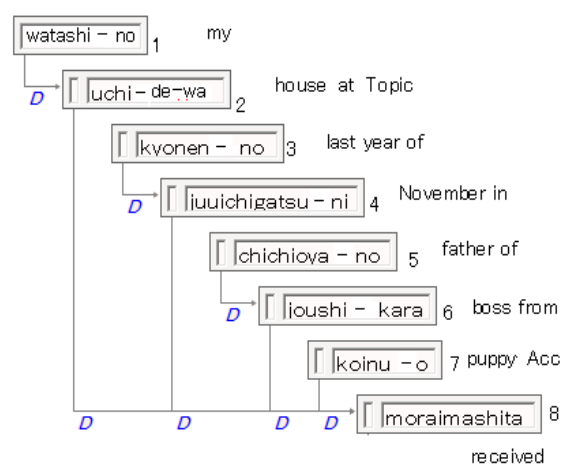
In this paper I focus on relevance of filled pauses to the complexity of the immediately following phrases. A previous study on Japanese filled pauses reports higher filler rate at syntactically stronger clause boundaries than at weaker ones [5]. Interestingly, the study also found clearer correspondence between filler rate and the complexity of immediately following clauses at weak clause boundaries than at stronger ones. No effect of the complexity of immediately following clause was observed at sentence boundaries, which are stronger than clause boundaries. Speakers are more likely to be engaged in global message planning at deep syntactic boundaries, such as sentence or coordinate clause boundaries, than at shallower ones. From the results of the previous study, I inferred that filler rate at syntactic boundaries reflects complexity of the immediately following linguistic units when a burden of global message planning is light. In other words, I expected that filler rate would show clearer correspondence to the complexity of the immediately following linguistic units at syntactic boundaries which are weaker than sentence or clause boundaries. To test this hypothesis, I investigated filler rate at phrase and weak clause boundaries as a function of the complexity of the immediately following phrases.

I focused on Bunsetsu-phrases as a unit of planning. A Bunsetsu-phrase (I call Bunsetsu, hereafter) is composed of one content word with or without function words. It is a component of clauses and sentences. Bunsetsu is a prosodic word and one or more Bunsetsu compose an accental phrase. Interjectional particles can be added to the end of any Bunsetsu, and back-channeling is often given at or near the end of Bunsetsu in conversation. Bunsetsu has been regarded as one of the smallest planning units in Japanese [6].

I looked at dependency structure of Bunsetsu-phrases. Japanese is a head final language: A head Bunsetsu appears after all its dependent Bunsetsu-phrases. Figure 1 shows examples of Japanese sentences and their dependency structure. Sentence (b) has more complex structure than sentence (a). Each box represents a Bunsetsu. The number on the right of each box indicates id for the Bunsetsu in the sentence. Dependency relation is indicated by an edge from a dependent Bunsetsu to its head. The figure indicates that the last Bunsetsu, "moraimashita" has more dependent Bunsetsu in Sentence (b) than in sentence (a).



(a) I got a puppy from my friend.



(b) At my house we got a puppy from my father's boss last November.

Figure 1: Examples of dependency structure of Bunsetsu-phrases in simple and more complex Japanese sentences.

Speakers must have planned the head at least to certain extent when they start speaking a dependent phrase. When they want to convey rich information concerning the head, they need to plan and utter number of relevant dependents, and consequently the dependency structure will be complex, as in example sentence (b). When a given dependent phrase is far from its head and many other dependents are to be uttered before the head, the speaker needs to plan them while or immediately after he or she articulates the dependent. I hypothesized that the more dependent phrases to be planned between a given dependent phrase and its head, the higher the filler rate immediately after the dependent phrase, if filler rate corresponds to cognitive load of local linguistic encoding.

## 2. Method

### 2.1. Data

107 presentation speeches from the *Core* part of *The Corpus of Spontaneous Japanese* (CSJ) were used for analysis [7]. The presentations were given by paid volunteers to a small audience in informal settings. They are called simulated public speaking (SPS) in the corpus. 54 of them were given by female speakers and 53 by male speakers. All the speakers were those of Tokyo dialect. They talked about general topics such as “the happiest memory in my life” or “my town” for about 10 minutes. The speakers were instructed to prepare for a note for their speeches beforehand, but not to read out their manuscripts. All the speeches are transcribed and detailed linguistic information is given to the transcription.

### 2.2. Procedures

The corpus contains annotation of Bunsetsu boundaries and the head of each dependent Bunsetsu. There are 65,022 dependent Bunsetsu in total. I counted the number of Bunsetsu from each dependent Bunsetsu to its head. I regard the number as an index of complexity from the dependent to its head and call it “distance” for the dependent. In sentence (b) in Figure 1, for example, the first Bunsetsu, “watashi-no” depends on the second Bunsetsu. So the distance for the first Bunsetsu is one. As the second Bunsetsu “uchi-de-wa” depends on the eighth, the distance for the second is six. I grouped all the dependent Bunsetsu according to the distance to their heads. I computed filler rate immediately after each dependent Bunsetsu group, and examined whether there is any correspondence between the distance and the filler rate.

## 3. Results

Figure 2 shows filler rate immediately after each dependent Bunsetsu group as a function of the number of Bunsetsu to the head (distance). The rate for Bunsetsu groups the distance of which exceeds 20 is omitted because the number of samples is less than 50 and the rate is unreliable. The figure illustrates that there is a leap in filler rate between a Bunsetsu group with distance one and a group with distance two. However, the rate monotonically increases with distance after that until the distance reaches 11. When the distance is larger than 11, no consistent tendency is observed, though the rate is always higher than 25%.

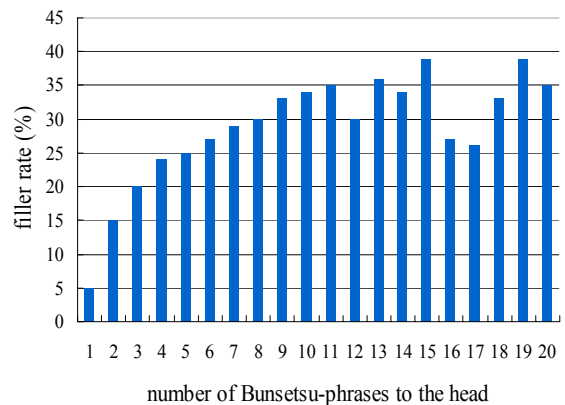


Figure 2: Filler rate immediately after dependent Bunsetsu-phrases as a function of distance to the head.

## 4. Discussion

The filler rate immediately after dependent Bunsetsu groups increased with complexity of the following phrases. This result is in accordance with the results of a study on repetition rates of articles and pronouns in English [4], and supports the hypothesis that filler rate reflects cognitive load of local linguistic encoding. However, no clear correspondence to complexity was observed when the distance to the head was larger than 11. This may be because speakers use additional fillers or other means, such as silent pauses, in the middle of dependency structure to gain time when they need to plan more than 11 Bunsetsu to convey a message. The results indicate that the maximum linguistic encoding span in Japanese presentation speech is approximately the length of ten Bunsetsu-phrases.

## 5. Acknowledgements

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## 6. References

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