

Japanese Sentence Processing: Evidence from Topic sentences

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1. Introduction

Sentence processing is one of the fastest growing fields and much is known about the mechanisms of English sentence processing. However, much of Japanese sentence processing mechanisms remain unknown. This paper attempts to explore the mechanisms of Japanese sentence processing, drawing examples from topic sentences in Japanese.

Japanese topic sentences violate Subjacency because topic phrases are not derived via movement but rather base generated and empty categories in topic sentences are pro (Saito 1985). Given this explanation, topic sentences in which topic phrases are coindexed with pros in relative clauses should be all grammatical; they are properly licensed by principles of the grammar within the framework of Government and Binding. However, some topics are acceptable, while some others are not, as illustrated by the following examples:

- 1.a Hanako_i-wa [_S [_{NP} [_S e_i e_j aishite-ita] hito_j]-ga
TOP love-PAST person-NOM
jisatsu shite-shimat-ta]
suicide do-PRFT-PAST
'Speaking of Hanako, the person who (s/he) loved
committed suicide.'
- b.*Hanako_j-wa [_S [_{NP} [_S e_i e_j aishite-ita] hito_i]-ga
TOPS love-PAST person-NOM
jisatsu shite-shimat-ta]
Suicide do-PRFT-PAST
'Speaking of Hanako, the person who loved him/her
committed suicide.'

There remain questions about circumstances under which those topic sentences become unacceptable. To account for such contrast in acceptability of topic

sentences, various attempts were made in the past. For instance, Kuno (1973) proposes a pragmatic constraint called "aboutness relation", which must exist between a topic and the rest of the sentence. More strict grammatical conditions are also proposed. Hasegawa (1981) proposes a constraint appealing to grammatical relations between the topic and the head of a relative clause, on one hand, and their corresponding gaps. Ue (1982) claims Fodor's nested dependency constraint is applicable to Japanese topic sentences. Yet, none of these studies can successfully explain the acceptability and unacceptability of all the topic sentences that I will examine in this paper. The failure of the past analyses lies in the failure to consider parsing contexts, such that gaps are not all detected at once nor gaps are all filled at once in the parsing.

This paper examines a variety of topic sentences containing multiple gap dependencies, some of which have never investigated before, and shows that topic sentences become unacceptable due to some parsing difficulty; more specifically, it demonstrates that topic sentences result in parsing breakdown because the parser immediately and obligatorily constructs a syntactic representation of a word string and deterministically assigns a filler to a potential gap, which turn out illegitimate at the end of the sentence. This paper does not only explain how the acceptability/unacceptability of topic sentences with multiple gaps are determined but also suggests how the human parser comprehend topic sentences with multiple gaps in Japanese, which has not yet been studied in detail in the past.

Topic sentences containing multiple gaps create two major problems from a parsing perspective: gap detection and assignment of a filler to a potential gap¹. In what follows, we will show that topic

¹When we investigate sentences from a parsing perspective, there is one more factor we have to consider, namely filler identification (cf. Clifton and Frazier (1989)). In this paper I will not refer to this problem at all simply because the topic sentence does not create any interesting problems in identifying a filler. The filler in the topic sentence is clearly

sentences become unacceptable when the human parser fails to detect a gap and/or to assign a filler to an intended gap, .

2. Gap detection

Japanese is a head-final language and hence complements of a head precede the head. When complements of a verb are phonetically null (empty categories), the existence of them in a sentence cannot be detected until a verb is encountered (until which point, nothing indicates the existence of gaps). Upon reaching a verb, the parser postulates gaps in accordance with the subcategorization information of that verb (see Inoue (1984) and Mazuka (1990) for similar views). For instance, in sentence 2 when the parser encounters the first verb, namely narat-ta, it realizes that two arguments of that verb are phonetically null and postulates two gaps as illustrated in 3:

2. sono-gakusee-wa kyonen narat-ta sensee-ga
that student-TOP last year learn-PAST teacher-NOM
naku-nat-ta
die-PAST
'Speaking of the student, the teacher who he
learned from last year died.'
3. sono-gakusee-wa [_S _E _E kyonen narat-ta]

However, gaps are not always identified by the parser. When gaps are not successfully detected, the sentence is judged unacceptable. In the following two subsections, we will examine those unacceptable sentences and explore mechanisms employed by the parser to detect gaps.

2.2.1 Failure to detect a gap (I)

When there is a lexical NP that can be an argument of a verb, it is impossible to detect a gap for that position. For instance, in parsing example 4, there is a choice between taking the lexical NP, namely Iaroo-ga as an argument of the first verb, aishte-i-ta and

marked with the particle wa and placed at the sentence initial position. Hence, I assume that the parser recognizes it without any special difficulties.

positing a gap for that position, as indicated 5.a and 5.b respectively:

4. Hanako-wa Taroo-ga aishite-i-ta hito-o
 TOP NOM love-PAST person-ACC
 koroshite-shimat-ta
 kill-PRFT-PST
- 5.a Hanako_i-wa [_S e_i [_{NP} [_S Taroo-ga e_j aishite-i-ta]
 hito_j]-o koroshite shimat-ta]
 'Speaking of Hanako, she killed the person Taro
 loved.'
- b *Hanako_i-wa [_S Taroo-ga [[e_i e_j aishite-i-ta]
 hito_j]-o koroshite shimat-ta]
 'Speaking of Hanako, Taro killed the person she
 loved.'

In 5.a the lexical NP, Taroo-ga is analyzed as the subject argument of the verb, aishite-i-ta and a gap is posited as the object argument of the verb. In 5.b two gaps are postulated as the arguments of the verb, aishite-i-ta, and the lexical NP, Taroo-ga is analyzed as the subject argument of the main verb, koroshite-shimat-ta.

Although these two interpretations of example 4 should be equally possible, (a)-interpretation is acceptable, while (b)-interpretation is not.

Similarly, the following example can be interpreted in two ways, yet only one interpretation is acceptable, as contrasted in acceptable example 7.a and unacceptable example 7.b:

6. Hanako-wa Taroo-o aishite-ita hito-ga
 TOP ACC loved person-NOM
 koroshite-shimat-ta
 killed
- 7.a Hanako_i-wa [_S [_{NP} [_S e_i Taroo-o aishite-ita]
 hito_j]-ga e_j koroshite-shimat-ta]
 'Speaking of Hanako, the person who loved Taroo
 killed her.'
- b *Hanako_i-wa [_S Taroo-o_j [_S [_{NP} [_S e_i e_k aishite-ita]
 hito_j]-ga e_j koroshite-shimat-ta]]
 'Speaking of Hanako, the person who she loved
 killed Taroo.'

In 7.a, the lexical NP, namely Taroo-o is interpreted as the object argument of the verb, aishite-i-ta and a gap is posited as the subject argument of the verb. In 7.b, two gaps are posited as the arguments of the verb,