Conceptual accessibility and Word-order in Japanese

Mikihiro Tanaka

Department of Psychology, University of Edinburgh

E-mail: Mikihiro.Tanaka@ed.ac.uk

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ABSTRACT

In human sentence production, there is a tendency for animate referents (e.g. person, animal) to come earlier than inanimate ones (e.g. objects). This is because they are more conceptually accessible - more easily retrieved from memory (Bock & Warren 1985). Although Bock & Warren's English study suggests that conceptual accessibility does not affect word-order, English word-order is `fixed'- thus it would be arguable whether it would be the same case for a language which has relatively free-word order (e.g. Prat-Sala & Branigan, 1999 in Spanish).

I report a recent experiment for a free word order language, Japanese. It extends existing evidence against Bock and Warren's finding that animacy affects word order, and supports the argument that conjunctions are not good examples for testing word order effects.

1 INTRODUCTION

Language production involves converting thoughts (the message) into sentences, the mapping of cognitive concepts into a linear order of speech sounds. The message has to be mapped onto a linguistic output in order to communicate with an addressee. This output involves: semantic, syntactic, lexical and phonological processing. Understanding the way these levels interact and the implications of this interaction has been the target of much research in linguistics, psycholinguistics, and cognitive psychology.

Current theories of language production (Garrett, 1975, 1980, and Bock and Levelt, 1994) distinguish between three different levels of processing – Message generation, Grammatical encoding, and Phonological encoding. At the message generation level, the message captures features of the speaker's intended meaning and provides the raw material for the processes of grammatical encoding. This grammatical encoding involves two different levels of processing – functional and positional processing. Functional processing involves lexical selection (the identification of lexical concepts), and syntactic functions (the assignment of grammatical roles). During positional processing, constituent processing (the creation of ordered sets of word slots) and morphological processing take place. The primary motivation for the distinction between functional and positional processing in the current model of language production comes from

the existence of free word order languages. Finally, phonological encoding involves spelling out the phonological structure of the utterance, in terms of both the phonological segments of word forms and the prosody of larger units.

The concept of grammatical encoding has been the focus of psycholinguistic research. In particular, the relationship between grammatical assignment and word order has been debate.

Bock and Warren (1985) reported that there is a tendency for animate (or, concrete or imageable) entities to appear in subject position, because the increased conceptual accessibility, 'the ease with which the mental representation of some potential referent can be activated in or retrieved from memory' (Bock and Warren, 1985, p50), influences processes of language production. In detail, animate entities (e.g, person, animal) are more easily accessible than inanimate ones (e.g, objects), and grammatical functions are assigned along an NP accessibility hierarchy, with higher functions being assigned to the most accessible entities and lower functions to less accessible entities; as a result, animate nouns claim higher grammatical functions (e.g., subject), and inanimate ones claim lower grammatical functions (e.g., direct object).

However, there are several reasons that we cannot take Bock and Warren's hypothesis as a conclusion. One of them is the word order of English. Bock and Warren concluded that conceptual accessibility would not affect word-order, but their conclusion was based on a study in English. As Branigan and Feleki (1999) pointed out, English is a 'fixed' word order language which does not have a rich inflectional or case marking system. Thus, in order to determine syntactic function, English heavily relies on word order. This naturally leads us to speculate that studying English would provide limited opportunities to test the real effects of conceptual accessibility on word order.

To counter this problem, Bock and Warren used phrasal conjuncts in their experiment to test pure word order effects (The lost hiker fought time and winter - The lost hiker fought winter and time). When they found no significant tendency to position the more imageable noun as the first conjunct, they concluded that the conceptual accessibility affects only grammatical function assignment, and not word order. However, according to Branigan and Feleki (1999) and Prat-Sala and Branigan (1999), there is a concern that conjuncts might not be good examples to examine the word-order effects.

Branigan and Feleki (1999) suggested that in terms of grammatical function and event role, the elements of a conjunct have the same role. There is some evidence that conjunct order outside a a sentential contex is linked to animacy, but, this effect is neutralised when the two nouns have the same grammatical function (McDonald et al., 1993). In addition, frequency, word brevity, and rhythm somehow influence the word order of conjuncts (ibid). Finally, the order of conjuncts might be influenced by rhythmical and euphonic considerations. For instance, Kelly

and Bock (1988) have detected a pattern of conjunct which reflects a preference for alternations between weak and strong stresses.

The facts above indicate that word order of conjuncts is 'multifactorial', thus conjuncts may not be the best place to seek the conceptual accessibility on word order.

In addition, there are some cross-linguistic studies providing evidence against Bock and Warren's hypothesis. Prat-Sala and Branigan (1999) investigated the effects of word order in English, Spanish and Catalan. According to Prat-Sala and Branigan, all three languages allow passivisation but Catalan and Spanish additionally allow dislocated actives, allowing for OVS word order. A picture description task was conducted (pictures contained two entities, animate and inanimate, or two inanimates; the agent was always inanimate). Their English results could be interpreted in terms of Bock and Warren's account or in terms of a link between animacy and word order, but the Spanish and Catalan results showed unambiguous effects of animacy on word order. This finding is a clear contrast to Bock and Warren's findings for English conjuncts. In addition, Branigan and Feleki (1999) conducted an experiment using modern Greek. According to Branigan and Feleki, Modern Greek can be described as a free word order language, and simple SVO sentence can be changeable into 6 types – SOV, VSO, VOS, OVS, OSV. They used a sentence-recall task like Bock and Warren (1985) and found clear effects of animacay upon word order. These two cross-linguistic experimental results clearly suggested that conceptual accessibility does affect word-order[1].

To overcome these conflicts, using Japanese would be particularly useful. First of all, most of the evidence against Bock and Warren's hypothesis comes from European languages – Spanish (Prat-Sala & Branigan 1999), Greek (Branigan and Feleki, 1996). There has been little investigation of this issue using an East-Asian language (a notable exception is Chang et al., 2001). Secondly, Japanese is a free-word order language. Unlike English, Japanese has case-marking to determine syntactic function - wa (Topicalization), ga (Nominative), ni (Dative), O (accusative) etc. Thus as long as there is a case-marking, Japanese speakers know which syntactic function the noun has. This fact is particularly useful when we aim to see the effect of word order in language production. For instance, while only simple declaratives sentences (1-1 and 2) are possible in English, in Japanese, two more scrambled sentences (1-3 and 4) are possible[2];

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[1] German was also tested for this conceptual accessibility effect, however, while two studies (Kempen and Harbusch, 2003 and van Nice and Dietrich 1999) suggested an animacy effect on word order, Teufel and Fekeki (1996) showed supportive evidence for Bock and Warren. These conflicts have to be investigated in further research.

[2] Abbreviations are as follows; Ani – Animate, Inani – Inanimate, Nom – Nominative, Acc - Accusative

(1)

1… S(ani) O(inani) V 旅行者がタクシーを捕まえた。 ryokousha-ga takushii-o tukamaeta. Traveller-nom taxi-acc pick up-past 'A traveler picked up a taxi.'	2… S(inani) O(ani) V タクシーが旅行者を捕まえた。 takushii-ga ryokousha-o tukamaeta. Taxi-nom traveller-acc pick up-past 'A taxi picked up a traveler.'
3…O(inani) S(ani) V タクシーを旅行者が捕まえた。 takushii-o ryokousha-ga tukamaeta. taxi-acc traveller-nom pick up-past 'A taxi, a traveler picked up.'	4…O(ani) S(inani) V 旅行者をタクシーが捕まえた。 ryokousha-o takushii-ga tukamaeta. traveller-acc Taxi-nom pick up-past 'A traveler, a taxi picked up.'

According to Bock and Warren's hypothesis, animate entities preferentially appear as subjects. We should not therefore expect to find differences in the *order* in which participants recall the nouns in these sentences. However, if Prat-Sala and Branigan, and Branigan and Feleki are correct, who claimed that conceptual accessibility does affect word-order, then it is expected that participants will tend to recall sentences in a way that allows an animate noun to appear in an early word order position. Thus participants should invert the order of nouns when recalling (2) and (4), to allow the animate entity to appear first. This would of course interact with the overall preference for SOV order over OSV order. Hence, we would predict most inversions (recalling the sentence with an inverted order of nouns from that originally presented) in (4), followed by (2) and (3), with least in (1), where both the original word order and the original order of nouns are those preferred by speakers:

(2)

1…S(ani) O(inani) V – least inversions
2…S(inani) O(ani) V – some inversions
3…O(ani) S(inani) V – some inversions
4…O(inani) S(ani) V – most inversions

2 Experiment

The sentence recall task was used in this experiment. To prepare the experimental materials, I carefully selected 48 sets of animate&inanimate nouns, creating 6 different types of sentences (S(ani)O(inani)V, S(inani)O(ani)V, O(inani)S(ani)V, O(ani)S(inani)V, conjunct (animate and

inanimate, inanimate and animate)). The experiment sentences have two parts - the 'clue' part (*In front of the station*) at the beginning, and then the sentences for recall (the rest of the sentences). In the real experiment, 8 sets of sentences are read at once, then the only clue parts are read and subjects are asked to recall the rest of the sentences.

(3)

1… S(ani) O(inani) V 駅の前で、旅行者がタクシーを捕まえた。 eki no mae de, ryokousha-ga takushii-o tukamaeta. Station in front of, Traveller-nom taxi-acc pick up-past 'In front of the station, a traveler picked up a taxi.'	2… S(inani) O(ani) V 駅の前で、タクシーが旅行者を捕まえた。 Eki no mae de, takushii-ga ryokousha-o tukamaeta. Station in front of, Taxi-nom traveller-acc pick up-past 'In front of the station, a taxi picked up a traveler.'
3…O(inani) S(ani) V 駅の前で、タクシーを旅行者が捕まえた。 Eki no mae de, takushii-o ryokousha-ga tukamaeta. Station in front of, taxi-acc Traveller-nom pick up-past 'In front of the station, a taxi, a traveler picked up.'	4…O(ani) S(inani) V 駅の前で、旅行者をタクシーが捕まえた。 Eki no mae de, ryokousha-o takushii-ga tukamaeta. Station in front of, traveller-acc Taxi-nom pick up-past 'In front of the station, a traveler, a taxi picked up.'
5… conjunct (animate and inanimate) V 駅の前で、旅行者とタクシーが待っていた。 eki no mae de, ryokousha-to takushii-ga matteita. Station in front of, traveller-and taxi-nom were waiting. 'In front of the station, a traveler and a taxi were waiting.'	6… conjunct (inanimate and animate) V 駅の前で、タクシーと旅行者が待っていた。 eki no mae de, takushii-to ryokousha-ga matteita. Station in front of, traveller-and taxi-nom were waiting. 'In front of the station, taxi and a traveler were waiting.'

There are two important conditions to be controlled in this experiment. First, the correlation between the clue part and two nouns has to be equally chosen. For instance, if one of the nouns is more correlated than the other (station – train, station – plug), one of them is more easily recalled than the other.

In order to prevent this, a correlation test was conducted. I asked 20 subjects how closely these nouns from 48 sets are correlated. They were asked to decide the correlation rating between 1 to 10 as below;

(4)

Station - Traveller									
1(unrelated)	2	3	4	5	6	7	8	9	10(very related)
Station - Taxi									
1(unrelated)	2	3	4	5	6	7	8	9	10(very related)

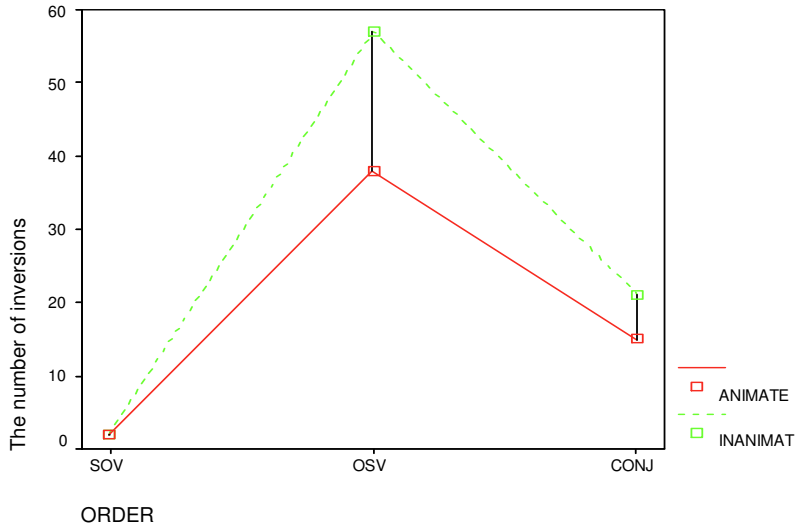
From the results of this test, 42 sets of nouns did not show a significant difference.

Secondly, it has to be decided how long to make the gaps between sentences in both reading time and answering time. In order to check this, I conducted a pilot study with one Japanese subject and found that 4 seconds (reading time) – 8 seconds (answering time) was appropriate.

30 native speakers of Japanese participated in this experiment. They were all recruited in Edinburgh, Scotland and the age range was 2 people (15-20), 9 (21-25), 6 (26-30), 9 (31-35), 1 (36-40), 2 (41-45), and 1 (46-50). 5 pounds were awarded to the people who successfully completed their experiments.
6 different lists were prepared. Each list contained an equal number of each type of sentence in each condition. Across lists, each item was seen by five participants in each condition. Items were presented in a fixed random order. The experimental session started with a practice block.

3 Result

Graph 1



Figures 1 – the Percentages of inversions by subjects

Animacy – word order	**Inversion Per.**	**Number of inversion**
Animate Inanimate SOV	0.95%	(2/210)
Inanimate Animate SOV	0.95&	(2/210)
Animate Inanimate OSV	17.1%	(36/210)
Inanimate Animate OSV	26.2%	(55/210)
Animate Inanimate Conjunction	6.7%	(14/210)
Inanimate Animate Conjunction	10.5%	(22/210)

An ANOVA revealed a main effect of animacy. Overall, there were more inversions when the effect was to place the animate entity in first position (F1 (1, 29)= 4.945 p=.034, F2 (1, 41)=6.374 p=.016). A main effect of word order was also found (F1 (2, 28)=33.617 p=.000 , F2 (2, 40)=41.860 p=.000). There was a significant difference between animate-inanimate OSV and inanimate-animate OSV (t(29)=-2.249 p=.032 for subjects; t(41)= -2.456 p=.018 for items), but no such differences were shown in both SOV and Conjunct sentences(t(29)=0 p=1 for subjects, t(41)=0 p=1 for items; t(29)=-.828 p=.415 for subjects, t(41)=-1.213 p=.232 for items). From these results, we can conclude two things – firstly, in SOV sentences, subjects did not produce inversions irrespective of animacy. However in OSV cases, they produced more inversions when the effect of an inversion was to place an animate entity in first position. This result strongly suggests that conceptual accessibility affects word-order. This is inconsistent with Bock and Warren's finding.

Secondly, if we examine the conjunct sentences, there is no significant difference between animate-inanimate, and inanimate-animate conjunct sentences. Bock and Warren used conjunct sentences to show that word order is not affected by animacy effect; our results show that word order effects can be found with OSV but not with conjuncts. This suggests strongly that conjunct sentences might not be a good place to investigate the animacy effect on word order.

Conclusion

I report two important findings – that there is an animacy effect on word order , and that conjuncts are an inappropriate structure to seek word order effects I argue that this is inconsistent with Bock and Warren's proposal, and that conceptual accessibility does affect word order.

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