Constituent ordering preferences in Japanese:  
Implications for models of language production

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0. Abstract

The current research investigates constituent ordering in Japanese. In particular, it examines preferences for short-before-long (SL) vs. long-before-short (LS) constituent orderings in (1) the evaluation and (2) recall of simple transitive and ditransitive constructions. The main goal of the current research is to investigate the cross-linguistic validity of the claim that SL ordering preferences in English (a head initial language) result from a delay in the processing of longer, and hence more complex, phrases. For experiment 1, 18 Japanese native speakers performed an acceptability rating task for LS and SL ordered ditransitive (24 sentences) and simple dative constructions (24 sentences). For experiment 2, ten Japanese native speakers participated in a repetition task which employed the same 48 sentences as were used in experiment 1. In one condition, participants repeated sentences directly, and in another, participants performed a memory task after hearing, but before repeating target sentences. Results of experiment 1 show that LS orderings were generally rated as more acceptable compared to SL orderings. This preference, however, was mediated by grammatical category such that shorter nominative marked subjects (NOM) and to a lesser degree shorter indirect objects (IOs) were rated equally acceptable in initial position. The results of experiment 2 paralleled those of experiment 1. Specifically they indicated that SL orderings were harder to produce as significantly more errors occurred in the repetition of SL ordered sentences in the memory task condition. This effect was also found to interact with
grammatical category such that shorter subjects (NOM) in initial position were not found to be significantly more difficult to produce. Implications of these results are considered for the ongoing debate between ‘accessibility’ (e.g., Stallings et al., 1998) vs. ‘efficiency’ (e.g., Hawkins, 1990, 1994) accounts of ordering phenomena as well language production models in general (e.g., Bock & Levelt, 1994; Levelt, 1989).

1. Introduction

The following example is a dative alternation construction in which the indirect object (IO) (the woman whom he had loved for years) is longer or ‘heavier’ than the direct object (DO) a ring.

1a) John gave (the woman whom he had loved for years) a ring.
1b) John gave a ring (to the woman whom he had loved for years).

In sentence 1a, the heavy IO precedes the DO whereas in sentence 1b it follows the DO. Although both 1a and 1b are grammatical sentences, English speakers generally agree that sentence 1b is easier to process. Researchers have noted a similar processing preference for having heavy constituents to the right of lighter constituents with Heavy-NP constructions (examples 2a and 2b) and verb-particle constructions (examples 3a and 3b) (e.g., Hawkins, 1990, 1994; Stallings, MacDonald & O'Seaghdha, 1998).

Heavy-NP shift

2a) The choir performed (the song that they had rehearsed for months) with great joy.
2b) The choir performed with great joy (the song that they had rehearsed for months).(preferred)
Verb-particle constructions

3a) John put (the box that he had been carrying for hours) down.
3b) John put down (the box that he had been carrying for hours). (preferred)

Currently, there are at least two competing accounts of the above short-before-long (SL) ordering preferences in English. According to accessibility accounts, shorter items appear before longer ones because they are less complex and therefore easier to process (Stallings et al., 1998). Efficiency accounts, on the other hand, claim that SL orderings maximize the efficiency with which constituent structures can be processed (Hawkins, 1990, 1994).

1.1 Accessibility accounts

The application of the concept of ‘accessibility’ to phrase length is an extension of its application to lexical and semantic features. Within production studies of word ordering, the role of accessibility has received significant attention (e.g., Bock, 1987; Bock & Warren, 1985; Kelly, Bock, & Keil, 1986; McDonald et al., 1993). Specifically, it has been found that certain features cause items to be more easily retrievable from memory and therefore easier (i.e., faster) to produce. Studies have examined a variety of aspects of ‘conceptual’ accessibility including recency (Bock, 1986), imageability (Bock & Warren, 1985), prototypicality (Kelly et al., 1986) and animacy (McDonald et al., 1993).

Although these studies indicate that accessibility affects word order in production, this effect appears to be significant only when grammatical role assignment is involved. For example, Bock & Warren (1985) found that people produce a passive sentence more often when the intended referent of the direct object is more imageable. They report, however, that imageability did not affect the ordering of noun phrases within a conjunctive noun phrase. Bock (1987), Kelly et al. (1986), and McDonald et al. (1993) report similar findings regarding recency, prototypically, and animacy, respectively. These studies suggest that accessibility affects the
ordering of items early in the production process (i.e., during the phase of message conceptualization). At this phase, more accessible items may be more easily (i.e., quickly) retrieved and thus the assignment of grammatical category (and consequently order) is affected.

The role of accessibility in determining the order of phrases in production has been studied far less than the role of accessibility in determining the order of words. In one of the few studies to date, Stallings et al. (1998) found that animacy had little or no role in determining the ordering of DO or IO phrases in production. Because the relative ordering of IO and DO does not affect the grammatical role of phrases, this lack of an animacy effect parallels findings of word ordering studies. However, Stallings et al (1998) found a significant affect of length such that people tended to produce shorter phrases before longer ones. The results of Stallings et al's production experiment support observations that long phrases tend to follow shorter phrases in English (e.g., Quirk, Greenbaum, Leech & Svartvic 1972; Hawkins, 1994, Wasow, 1997a, 1997b, Arnold, Wasow, Losongco & Ginstrom, 2001). Stallings et al. attribute their results to the “complexity” of long phrases, a claim which goes against McDonald et al.'s (1992) finding that length has little or no effect on word ordering in production. The explanation which Stallings et al. offer for this discrepancy is that word and phrase ordering do not occur at the same stage of production. According to current production models, (e.g., Bock & Levelt, 1994), phonological information (i.e., word length) is not available at the stage in which word ordering is determined. Therefore, word length can not influence word order. However, information on complexity (e.g., syntactic, conceptual, prosodic) is available at the positional stage of production and therefore such information can influence ordering such that shorter, less complex, phrases will be processed faster than longer, more complex, phrases and consequently appear earlier in production output.
1.2 Efficiency accounts

Although accessibility accounts claim that the salience of shorter phrases causes them to appear in earlier positions, Hawkins (1990, 1994) notes that when long phrases are in final position, the resulting constituent structure is syntactically more efficient. According to Hawkins, it is the drive to achieve these optimal structures which underlies shifting phenomena in general.

In the examples below, all terminal nodes necessary to process the VP are numbered. In sentence 4a, 10 terminal nodes from the head of the VP (gave) to the head of the final direct object NP (the determiner 'a' of 'a ring') must be processed. In contrast, in sentence 4b, only 4 terminal nodes from the head of the VP (gave) to the head of the indirect object NP (to), must be processed. Because the constituent recognition domain (CRD) for 4b is shorter than it is for 4a, Hawkins claims that 4b is more efficient and therefore the preferred structure.

4a) John VP[gave NP[the woman whom he had loved for years]NP[ a ring]].
   1  2  3  4  5  6  7  8  9  10

4b) John VP[gave NP[a ring]NP[ to the woman whom he had loved for years]].
   1  2  3  4

Hawkins formalizes these observations by calculating what he calls immediate constituent ratios (IC-ratios) for these CRDs. For the above examples, 4a has an IC-ratio of 3/10 or 30% because the 3 constituents can be processed in a window of 10 terminal nodes, whereas 4b has an IC-ratio of 3/4 or 75%. The higher the IC-ratio is, the more efficient the structure. Hawkins claims that the preference for heavy items appearing to the right in English can be explained in terms of a drive to minimize domains across which constituent heads can be recognized (Hawkins, 1990, 1994).

In a head-final language, such as Japanese, Hawkins’ theory predicts an LS ordering preference for the two VP internal objects of a ditransitive construction. This is illustrated with Example (5) below.
5a) watashi-wa Mary-ni Jon-ga tsureteki-ta tomodachi-o shoukaishi-ta
I-top Mary-dat John-nom bring-past friend-acc introduce-past
'I introduced the friend that John brought to Mary.'

5b) watashi-wa [VP [PP Mary-ni] [NP Jon-ga tsureteki-ta tomodachi-o] shoukaishi-ta]

5c) watashi-wa [VP [NP Jon-ga tsureteki-ta tomodachi-o] [PP Mary-ni] shoukaishi-ta

In 5b, 8 terminal nodes\(^1\) must be processed in order to recognize the entire constituent structure of the VP. This spans the distance from the head of the IO (the accusative case marker 'ni') over the long dative marked DO, until the head of the VP, the verb. In contrast, the same constituent structure can be processed in just 4 terminal nodes when the DO is preposed, as in 5c. Thus, the recognition domain for the VP is shorter when a long DO is preposed compared to when it is not. The corresponding IC-ratios are 3/8 = 38% for 5b and 3/4 = 75% for 5c. Because example 5c has a shorter recognition domain and subsequent higher IC-ratio, these LS orderings are claimed to be more efficient and predicted to be preferred over the alternative SL ordering.

2. Current Study

Both experimental studies (Yamashita & Chang, 2001) and corpus analyses (Hawkins, 1994) suggest that there exists a general LS ordering preference in Japanese. For example, Hawkins (1994) reports that as the relative length differential between two VP internal PP's increases the proportion of constructions

\(^{1}\)Hawkins counts case markers, prepositions and verb inflection markers as terminal nodes.
with LS orderings also increases. He reports similar findings for the distribution of the relative orderings of DO and IO phrases for ditransitive constructions. Hawkins argues that these Japanese data offer evidence against accessibility accounts of ordering, and makes the further claim that such models, having been based primarily on English data, are typologically inadequate.

However, as discussed in Stallings et al. (1998), both “inherent performance constraints” and “strategies induced by a concern for the listener” affect language production (p. 393). Therefore, one possible explanation for LS ordering preferences in Japanese is that they result from listener accommodation, rather than speaker needs in production. In order to test this possibility and to assess the validity of ‘accessibility’ and ‘efficiency’ based accounts of constituent ordering, first a study was conducted (experiment 1) to verify Japanese preferences regarding the acceptability of LS vs. SL ordered sentences. Then, to test the degree to which ordering preferences in Japanese reflect speaker needs, a repetition experiment (experiment 2) was conducted which compared participant performance on LS and SL ordered constituents with and without an additional memory task. In the memory task condition, as processing resources are taxed, poorer performance on more difficult constructions was predicted, thereby offering a way to assess the effect of processing constraints on the production of these two types of constructions.

2.1 Experiment 1

In this experiment, participants rated the acceptability of LS vs. SL ordered sentences that were identical except for constituent ordering. The goal of the experiment was to test if people's acceptability judgments on these constructions differ from ordering preferences reported in previous studies.
2.1.1 Participants

18 Osaka University recruited from an undergraduate introductory linguistics course participated as volunteers in the experiment.

2.1.2 Materials

The materials, chosen selectively from Yamashita & Chang (2001), consisted of 48 sentences: 24 ditransitive and 24 simple transitive constructions. Half of the ditransitives contained a dative marked IO modified by a relative clause (long dative, short accusative: LDSA) (example 6a) and half an accusative marked DO modified by a relative clause (short dative, long accusative: SDLA) (example 6b). For the simple transitive constructions, half contained a nominative marked subject modified by a relative clause (long nominative, short accusative: LNSA) (example 7a) and half an accusative marked DO modified by a relative clause (short nominative, long accusative: SNLA) (example 7b).

6a) relative clause modifying the dative marked argument (LDSA).

Akiko-wa | nantonaku dokoka kawatteiru yuujin-ni | zasshi-o | kashita.
Akiko-top | somehow somewhere strange friend-acc | magazine-acc | lent.
"Akiko lent the magazine to her friend who is somehow kind of strange."

6b) relative clause modifying the accusative marked argument (SDLA).

Masako-wa | otoko-ni | shinbun-de shoukai-sarete-ita okashi-o | todoketa.
Makaso-top | man-dat | newspaper-in introduced-was cake-acc | delivered.
"Masako delivered the cake which she found out about in the newspaper to the man."
7a) relative clause modifying the nominative marked argument (LNSA).

isankanri-ni ijounamade nesshin-na miboujin-ga bengoshi-o utagatta
inheritance-in extremely interested widow-nom | attorney-acc | suspected.
"The widow who was extremely interested in the inheritance suspected the attorney."

7b) relative clause modifying the accusative marked argument (SNLA).

keiji-ga | seiga-takakute gasshiri-shita hannin-o | oikaketa
detective-nom | height-tall solid was criminal-acc | chased.
"The detective chased the big tall criminal."

2.1.3 Procedure
Two sentences, identical except for the relative ordering of their arguments, were
separated by a continuum ranging from 1 to 7. For the ditransitives, the order of the
DO and IO was reversed (8a and 8b) and for the simple transitives the order of the
DO and subject was reversed (9a and 9b).

Ditransitive
8a) long accusative, short dative (LASD)
long IO/short DO 1...2...3...4...5...6...7 short DO/long IO
8b) short accusative, long dative (SALD)
short IO/long DO 1...2...3...4...5...6...7 long DO/short IO

Simple Transitive
9a) long nominative, short accusative (LNSA)
long Sub/short DO 1...2...3...4...5...6...7 short DO/long Sub
9b) short nominative, long accusative (SNLA)
short Sub/long DO 1...2...3...4...5...6...7 long DO/short Sub
Participants rated the two structures by selecting a number along the continuum that was closer to the ordering that sounded more natural. Selecting the number in the middle of the continuum indicated that the two structures sounded equally natural. The relative order of arguments was balanced across all 48 item pairs, which were randomly ordered in a single list.

2.1.4 Results

Figures 1 through 4 are histograms of the responses for each of the four construction types examined. On opposite ends of each figure appear the two constructions which participants rated. The bars along the X-axis represent the number of responses participants provided for each of the rating point along the continuum.

Two major patterns can be discerned from figures 1 through 4. First, participants clearly rated the LS ordered constructions as more natural than the SL ordered constructions when the accusative marked DO was the shorter of the two arguments (figures 1 and 3). This tendency was slightly stronger in the case of the simple transitives (figure 3) as compared to the ditransitives (figure 1). In contrast, when the DO was the longer of the two arguments, the number of people who preferred the LS ordered constructions was nearly equal to the number of people who preferred the SL ordered constructions (figures 2 and 4). However, in the case of the simple transitives (figure 4), slightly more people preferred the SL ordering to the LS ordering.

A two-way ANOVA with factors Construction Type (Simple Transitive & Ditransitive) and Length (LA & SA) revealed a significant main effect of construction type by participants only, $F_1 (1, 17) = 11.52$, $p < .005$, $F_2 (1, 44) = 2.7$, $p = .12$. Length had a significant main effect both by participants, $F_1 (1, 17) = 121.41$, $p < .000$, and by items, $F_2 (1, 44) = 138.75$, $p < .000$, such that a long accusative in initial position had a significantly higher rating (Mean=4.11, SD=0.72) than a long dative/nominative in initial position (Mean=2.3, SD=0.84), indicating a stronger
preference for the LS ordering when the S or IO were long. The interaction between construction type and length was also significant in both analyses, $F_1(1, 17)=29.13$, $p<.000$, $F_2(1, 44)=18.62$, $p<.000$, such that the rating score for the simple transitive constructions showed greater fluctuation across conditions. This reflected a stronger preference for the nominative marked argument in initial position when it was both short (resulting in a higher overall score) and long (resulting in a lower overall score).

2.1.5 Discussion

The results show that participants prefer to have the subject before the DO in simple transitive constructions and the IO before the DO in ditransitive...
constructions. This preference, however, was mediated by weight such that when the DO is longer than the subject or the IO, people are more willing to accept it in initial position. The acceptability rating for fronted DO, however, is not equal for ditransitive and simple transitive constructions. In ditransitives, a fronted long DO is equally acceptable as a fronted short IO, whereas in simple transitive constructions people slightly prefer a short subject in initial position over a long DO in initial position.

In so far as a main effect of length was found, these results support previous studies, which report a LS ordering preference in Japanese (Hawkins, 1990; Yamashita & Chang, 2001). In addition, these findings show that constructions with subjects in initial position are strongly preferred. This pattern has also been reported in cross-linguistic studies. Based on a comparative analysis of approximately 50 languages, Keenan & Comrie (1977) develop an accessibility hierarchy for noun phrases which ranks subject over DO and DO over IO (i.e., SUB>DO>IO). Bock and Warren (1985) apply this hierarchy to explanations of ordering phenomena in language production and postulate that noun phrases higher up on the hierarchy will have a stronger disposition towards appearing in initial position. Although the current findings do not match these prediction exactly, they do provide tentative support for a hierarchy of accessibility regarding grammatical categories and evidence of a significant interaction between these preferences and the affect of length in the ordering of constituents in production.

2.2 Experiment 2

Findings from previous studies (Hawkins, 1994; Yamashita & Chang, 2001) as well as the results of Experiment 1 confirm an overall LS ordering preference in Japanese. However, as discussed above, these preferences may be the result of listener accommodation and not underlying production constraints. The goal of experiment 2 is to test this hypothesis by assessing the degree to which LS preferences in Japanese reflect speaker needs in the production process.
2.2.1 Participants

10 Osaka University linguistics graduate students participated as volunteers.

2.2.2 Materials

The materials were the same 48 sentences used in the Experiment 1. Half of the sentences had the relative clause modifying the phrase in initial position and half had the relative clause modifying the phrase in imbedded position. The resulting break down of stimuli is illustrated below in 10(a-d) and 11(a-d).

Ditransitives (24 items)

10a) Long Dative / Short Accusative (LDSA) (6 items)
    top [..........dat][..acc] v
10b) Short Accusative / Long Dative (SALD) (6 items)
    top [..acc][..........dat] v
10c) Long Accusative / Short Dative (LASD) (6 items)
    top [..........acc][..dat] v
10d) Short Dative / Long Accusative (SDLA) (6 items)
    top [..dat][..........acc] v

Simple Transitives (24 items)

11a) Long Nominative / Short Accusative (LNSA) (6 items)
    [..........nom][..acc] v
11b) Short Accusative / Long Nominative (SALN) (6 items)
    [..acc][..........nom] v
11c) Long Accusative / Short Nominative (LASN) (6 items)
    [..........acc][..nom] v
11d) Short Nominative / Long Accusative (SNLA) (6 items)
    [..nom][..........acc] v
Half of the sentences from each of the above categories were presented in the memory condition and half in the non-memory conditions. Participants were divided into 2 groups (group A & group B) and the conditions of presentation were reversed for each group. As a result, data on each item in each condition was obtained. The order of the sentences in the two lists was randomized and the presentation of the list sets was balanced across subjects.

An underlying assumption of Experiment 2 is that response type reflects the processing ease or difficulty of a particular structure (see Daneman & Carpenter, 1980; Forester & Ryder, 1971; King & Just, 1991). Therefore, more errors and fewer correct responses are predicted for constructions that are more difficult to process. However, due to the nature of the task, performance reflects both comprehension and production. This is because participants must first successfully comprehend the aural stimuli before they can successfully repeat them. Therefore, performance errors may be due to difficulty in comprehending the stimuli as well as difficulty in producing them. In order to separate out these two potential effects a two-condition design utilized for which half of the stimuli were repeated directly and the other half were repeated after completing a digit repetition memory task.

Because the memory task condition is overall a more difficult task, it is likely that performance on all items in this condition will be worse. What is important, however, is the degree of the effect of the memory task on the performance of the LS and SL ordered constructions. Given the added processing demands, greater errors are predicted to occur for the constructions that contain orderings which are inherently more difficult to produce. If LS ordered constructions are more significantly impaired, we can deduce that such constructions are less optimal from a production standpoint, as is argued by proponents of accessibility accounts (Stallings et al., 1998). If on the other hand, SL orderings are more significantly affected, it can be concluded that these constructions are less optimal as is argued by Hawkins with his efficiency based account (Hawkins, 1994).
2.2.3 Procedure

In the non-memory task condition, the experimenter read the list of sentences one by one to the participant. After reading each sentence, the participant repeated back the sentence as quickly and accurately as possible. In the memory task condition, after reading each sentence, the experimenter read a string of digits, equal to the participant's digit span, which had been determined at the beginning of each session using a forward digit span test. After repeating the digits as quickly and accurately as possible, the experimenter prompted participants by reading the final word of the sentence (in all cases the verb). After hearing the prompt, participants repeated back the sentence they had heard as quickly and accurately as possible. Sessions were tape recorded for use in the coding of responses.

2.2.4 Scoring

Responses were coded as either correct or incorrect. Correct responses included repetitions that contained no more than 3 semantic substitutions or omissions (given that they did not alter the overall meaning of the sentence). Errors included inversions (e.g., inversion of argument), semantic substitutions and drops of 4 or more words and other changes that significantly altered the meaning of the sentence (e.g., use of identical case marking for more than one argument). Given the low number of participants, in order to increase the power of the analyses, Chi-square analyses were conducted on the distribution of response type (correct and incorrect) for each of the four construction types across the two conditions (memory task and non-memory task).

2.2.5 Results

2.2.5.1 Simple Transitives

Accusative longer than Nominative (Figure 5)

For the simple transitive constructions in which the accusative marked DO was longer than the nominative marked subject, the distribution of response types for the
LS ordered constructions was significantly different between the non-memory task and memory task condition, \( \chi^2 (1, N=56)=7.35, p=.007 \), such that there were fewer correct responses (26 vs. 14) and more errors (4 vs. 12) in the memory task condition as compared to the non-memory task condition. The distribution of response types for the SL ordered constructions was also significantly different between the two condition, \( \chi^2 (1, N=58)=4.47, p=.04 \), such that there were fewer correct responses (29 vs. 22) and more errors (1 vs. 6) in the memory task condition.

![Figure 5: Response Distribution for Accusative longer than Nominative Constructions](image)

For the simple transitive constructions in which the nominative marked subject was longer than the accusative marked DO, the distribution of response types for the

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2 For the current analyses, N refers to the number of responses analyzed and not to the
LS ordered constructions was not significantly different between the control and memory task condition, $\chi^2 (1, N=55)=1.74$, $p=.187$. For these constructions, there were slightly fewer correct responses (20 vs. 16) and more errors (7 vs. 12) in the memory task condition compared to the non-memory task condition. The distribution of response types for the SL ordered constructions was, however, significantly different between the two condition, $\chi^2 (1, N=51)=4.40$, $p=.036$, such that there were fewer correct responses (18 vs. 10) and more errors (8 vs. 15) in the memory task as compared to the non-memory task condition.

![Figure 6: Response Distribution for Nominative longer than Accusative Constructions](image)

The number of participants.
2.2.5.2 Ditransitives

Accusative longer than Dative (Figure 7)

For the ditransitive constructions in which the accusative marked DO was longer than the dative marked IO, the distribution of response types for the LS ordered constructions was significantly different between the memory task and non-memory task conditions, $\chi^2 (1, N=56)=4.08$, $p=.04$, such that there were fewer correct responses (27 vs. 22) and more errors (1 vs. 6) in the memory task condition. The distribution of response types for the SL ordered constructions was also significantly different between the two condition, $\chi^2 (1, N=58)=5.55$, $p=.02$, such that there were fewer correct responses (22 vs. 12) and more errors (8 vs. 16) in the memory task condition.

![Figure 7: Response Distribution for Accusative longer than Dative Constructions](image-url)
Dative longer than Accusative (Figure 8)

For the ditransitive constructions in which the dative marked IO was longer than the accusative marked DO, the distribution of response types for the LS ordered constructions was not significantly different between the two conditions, $\chi^2 (1, N=59)=1.01, p=.31$. For these constructions, there were slightly more correct responses (18 vs. 21) and fewer errors (12 vs. 8) in the memory task condition as compared to the non-memory task condition. The distribution of response types for the SL ordered constructions was, however, significantly different between the two condition, $\chi^2 (1, N=59)=17.68, p<.000$, such that there were fewer correct responses (19 vs. 3) and more errors (11 vs. 26) in the memory task conditions.

![Figure 8: Response Distribution for Dative longer than Accusative Constructions](image)

2.2.6 Discussion

As predicted, for all constructions investigated, the memory task condition induced a significantly greater number of error and fewer correct responses as
compared to the non-memory task condition. More significantly, however, in the memory task condition with the exception of the simple transitive constructions with a DO longer than the subject (figure 5), the SL ordered constructions had a greater number of errors than correct responses. This was not the case, however, for the LS order constructions. In other words, the SL ordered sentences were negatively affected to a greater degree by the memory task suggesting that these orderings are less optimal from the standpoint of production. As noted above, in the memory task processing resources are taxed and therefore output is more sensitive to production constraints. It follows from accessibility models that performance on the LS ordered constructions should be significantly worse under such conditions and that performance on the SL ordered constructions should not. However, the opposite was found to be the case, suggesting that the LS ordering preferences in Japanese are not the result of listener accommodation.

In the case of the simple transitive constructions in which the DO was longer than the subject (Figure 5), performance on the LS and SL ordered constructions did not differ across conditions. Based on the limited nature of the current study it is difficult to determine the exact cause of this result. However, as discussed above, it may result from an interaction between ordering preferences for grammatical categories and ordering preferences for syntactically efficient structures.

3. Concluding remarks

Due to the limited nature of the current study, it must be noted that the current findings are tentative and any generalization should be made cautiously. This is particularly the case regarding the findings of experiment 2 which are based on data gathered from only 10 participants. However, taking these limitations into consideration, the current findings have certain implications for current accounts of constituent ordering and models of language production in general. First, the current findings suggest that the association of ‘length’ with ‘accessibility’ (or non-
accessibility) may not provide an accurate account of ordering phenomena at the constituent level. As reported in Stallings et al. (1998), longer constituents are delayed in the production process in English. This they attribute to the ‘complexity’ (and resulting processing difficulty) of such constituents. However, in a head initial language such as English, having long constitutents on the right (i.e., later in the utterance) also increases the overall efficiency of the syntactic structure as calculated by the domain over which syntactic heads can be processed. As pointed out by Hawkins (1994), the opposite is predicted for a head final language such as Japanese. That is, having long constituent on the right results in more efficient structures. The predictions of Hawkins’ account were confirmed in the current study and, however tentative, provide support to the idea that the ordering of constituents is determined largely by the drive to create efficient syntactic structures and not merely the accessibility (or non-accessibility) of constituent units themselves.

The current findings also provide evidence of an interaction between grammatical category type and length of constituent. Specifically, it appears that certain categories (e.g., nominative marked subjects and accusative marked DOs) are preferred in more initial positions and that these preferences, which likely are determined by accessibility, interact with the drive to create efficient syntactic structures in the production process.

Although it is typically assumed that language production occurs in three major stages (i.e., conceptualization, grammatical encoding and phonological encoding), with later stages having no influence on earlier ones (e.g., Bock and Levelt, 1994), the current research offers a hint that a more interactive approach may be called for. Specifically, the current findings suggest that accessibility may affect the ordering of constituents after grammatical category assignment, a findings which if corroborated, would constitute evidence of an interaction between a later (i.e., grammatical encoding) and earlier stage (i.e., conceptualization) in production. Of
course, such grandiose conjectures are far beyond the scope of the current study and, thus, remain a promising area of future research.

4. References


