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【Forum】

# Cognitive Processing of Japanese Sentences with Ditransitive Verbs*


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Key words: canonical word order, linking problem, plausibility judgment task, scrambling


## 1. INTRODUCTION

There are three perspectives on the syntactic structure of sentences with ditransitive verbs in Japanese. One is the traditional analysis by Hoji (1985), which argues that all ditransitive verbs project their arguments in the same way, with dative objects higher than accusative objects. The second approach recently proposed by Matsuoka (2003) makes the contrary claim that Japanese has two types of ditransitive verbs that link their internal arguments to different structural positions. The last perspective stems from Miyagawa's (1997) research suggesting that either the dative object or the accusative object can be freely base-generated in


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a position higher than the other. The present study evaluates these three perspectives with experimental data on human sentence processing.

## 2. SYNTAX OF DITRANSITIVES AND PREDICTIONS IN HUMAN PROCESSING

Word order in the Japanese language is relatively free. For example, ditransitive verbs like *miseru* ('show') permit both of the orders in (1).

(1) a. John-ga Mary-ni sono hon-o mise-ta.
John-NOM Mary-DAT that book-ACC show-PAST
'John showed that book to Mary.'
b. John-ga sono hon-o Mary-ni mise-ta.
John-NOM that book-ACC Mary-DAT show-PAST

This syntactic feature in ditransitives constitutes one of the central questions in the study of Japanese syntax: *What is the basic word order among the internal arguments of the ditransitive construction?* The same issue has been addressed in a number of other languages, given that the answer will definitely contribute to revealing the nature of mapping between the argument (or conceptual) structure and the syntactic structure (i.e. the linking problem), and hence to advancing our understanding of the human faculty of language (see, among many others, Larson 1988, Mahajan 1990, Marantz 1993, Hale and Keyser 1993, Belletti and Shlonsky 1995, Baker 1997, Clahsen and Featherston 1999, Sekerina 2003).

In his seminal work, Hoji (1985) claims that the dative argument is projected in a position higher than the accusative argument, yielding the basic order of NOM-DAT-ACC-V as in (1a) above (see also Takano 1998, Yatsushiro 2003). The ACC-DAT order as in (1b) is derived from the DAT-ACC order by repositioning the accusative object to a position structurally higher than the dative object. This is schematically shown in (2).



(2) Hoji (1985)
a. [NP-NOM [NP-DAT [NP-ACC V]]]
b. [NP-NOM [NP-ACC$_i$ [NP-DAT [t$_i$ V]]]]

The present paper, following convention, indicates a trace (or gap) left behind by scrambling with the symbol *t* co-indexed with the scrambled item.

Miyagawa (1997) advances an alternate hypothesis, according to which both the DAT-ACC and ACC-DAT orders can be base-generated without syntactic movement, as shown in (3) (see also Kitagawa 1994, Koizumi 1995).

(3) Miyagawa (1997)
a. [NP-NOM [NP-DAT [NP-ACC V]]]
b. [NP-NOM [NP-ACC [NP-DAT V]]]

A recent study by Matsuoka (2003) provides a more detailed analysis, in which he argues that Japanese has two types of ditransitive verbs. One type of verb, represented by *miseru* ('show'), generates the dative object in a position higher than the accusative object, yielding the canonical DAT-ACC order, and the ACC-DAT order is derived by scrambling the accusative object. The other type of verb, represented by *watasu* ('pass'), projects the accusative object higher than the dative object, with the ACC-DAT order being the canonical order and the DAT-ACC order derived by scrambling:

(4) Matsuoka (2003): *Show*-type verbs
a. [NP-NOM [NP-DAT [NP-ACC V]]]
b. [NP-NOM [NP-ACC$_i$ [NP-DAT [t$_i$ V]]]]
(5) Matsuoka (2003): *Pass*-type verbs
a. [NP-NOM [NP-ACC [NP-DAT V]]]
b. [NP-NOM [NP-DAT$_i$ [NP-ACC [t$_i$ V]]]]

The morphologically related inchoative variants of these verbs con-

stitute the basis of this proposal. While the dative NP becomes the subject of the inchoative variant in the case of *show*-type verbs, the accusative NP does so with *pass*-type verbs. The logic behind this observation, Matsuoka argues, is that the structurally higher argument is promoted to the subject.

(6) *Show*-type verbs

a. Ditransitive

| | | | |
|---|---|---|---|
| John-ga | Mary-ni | sono hon-o | mise-ta. |
| John-NOM | Mary-DAT | that book-ACC | show-PAST |

'John showed that book to Mary.'

b. Inchoative

| | | |
|---|---|---|
| Mary-ga | sono hon-o | mi-ta. |
| Mary-NOM | that book-ACC | see-PAST |

'Mary saw that book.'

(7) *Pass*-type verbs

a. Ditransitive

| | | | |
|---|---|---|---|
| John-ga | hanataba-o | Mary-ni | watasi-ta. |
| John-NOM | bouquet-ACC | Mary-DAT | pass-PAST |

'John passed a bouquet to Mary.'

b. Inchoative

| | | |
|---|---|---|
| Hanataba-ga | Mary-ni | watat-ta. |
| Bouquet-NOM | Mary-DAT | pass-PAST |

'A bouquet passed to Mary.'

Each of the three hypotheses above has its own merits, and it has proven difficult, if not impossible, to decide purely on theoretical-linguistic methods which hypothesis has the better claim. Consequently, it is necessary to examine empirical data from different perspectives. Our contribution of evidence pertains to human sentence processing.

At least since Chujo (1983), it has been observed that comprehending scrambled sentences takes longer than comprehending their canonical counterparts. Employing a plausibility judgment task similar to Chujo's, and using a wide range of sentence-types such as active transitive, passive



and potential sentences, Tamaoka, Sakai, Kawahara, Lim and Miyaoka (2003) argue that the primary source of the difference in reaction times between the canonical and scrambled sentences is not the linear sequence of thematic roles (such as agent and theme), nor the linear ordering of case particles (such as the nominative *ga* or the accusative *o*); rather, the difference in syntactic complexity is accountable. In other words, they show that scrambled sentences take longer to process than their canonical counterparts in that these exhibit more complex syntactic structures (cf. Babyonyshev and Gibson 1995, Pritchett and Whitman 1995, Gibson 1998).

The three analyses of ditransitive sentences above, then, make different predictions. (i) Hoji's (1985) analysis predicts that the ACC-DAT order takes longer to process than the DAT-ACC order; (ii) Miyagawa's (1997) predicts that the difference in processing times for the two orderings are almost negligible; and (iii) Matsuoka's (2003) predicts that with *show*-type verbs, the ACC-DAT order takes longer than DAT-ACC order, whereas with *pass*-type verbs, the DAT-ACC order yields a longer reaction time than the ACC-DAT order.

(8) Predictions about Reaction Times

a. Hoji (1985): DAT-ACC < ACC-DAT

b. Miyagawa (1997): DAT-ACC = ACC-DAT

c. Matsuoka (2003):

*Show*-type verbs –DAT-ACC < ACC-DAT

*Pass*-type verbs –ACC-DAT < DAT-ACC

Previous processing studies of the ditransitive construction in Japanese reported mixed results. Sentences with different word orders did not yield significantly different reading times in Yamashita (1997), whereas Miyamoto and Takahashi's (2002) subjects took longer to read sentences with the ACC-DAT order than to read those with the DAT-ACC order (see also Sakamoto 2002, and Mazuka, Itoh and Kondo 2002). These apparently conflicting results may be partly due to the different experimental

tasks these authors employed, which make any direct comparison of their results impractical (see the Discussion and Conclusion section below, and Tamaoka, Sakai, Kawahara and Miyaoka 2003 for further discussion on methodology). The most serious problem with previous processing studies of ditransitive sentences, within the context of the present paper, is that they do not take Matsuoka's (2003) dichotomy into consideration, and hence are incapable of addressing its validity.

To test all the predictions summarized in (8), including those by Matsuoka (2003), the present study conducted an experiment on the human processing of both *show*-type and *pass*-type sentences.

## 3. EXPERIMENT

The present experiment tested whether native Japanese speakers take longer to process *show*-type sentences with the ACC-DAT order than those with the DAT-ACC order, as well as whether they take longer to process *pass*-type sentences with the DAT-ACC order than those with the ACC-DAT order.

### 3.1 Method

#### 3.1.1 Participants

Twenty-four graduate and undergraduate students (19 females and 5 males) at Hiroshima University in Japan, all native speakers of Japanese, participated in the experiment. Ages ranged from 18 years and 2 months to 27 years and 8 months. The average age was 21 years and 4 months with a standard deviation of 7 years and 8 months on the day of testing.

#### 3.1.2 Materials

As listed in the Appendix, a total of 52 sentences were used for the experiment. These consisted of 20 correct and 12 incorrect sentences for the target stimuli, combined with 10 correct and 10 incorrect, 'dummy' sentences. The 10 *show*-type and 10 *pass*-type sentences (i.e. 20 correct 'Yes' responses) were arranged in scrambled order. For example, the



linguistically assumed canonical order (according to Matsuoka 2003) of a *show*-type sentence *Zyunko-ga Taroo-ni syasin-o mise-ta* ('Junko showed a picture to Taro') was altered to a putative scrambled order *Zyunko-ga syasin-o Taroo-ni mise-ta*. Likewise, the assumed canonical order of a *pass*-type sentence *Kazuko-ga aikagi-o Taroo-ni watasi-ta* ('Kazuko passed a spare key to Taro') was arranged to an assumed scrambled order of *Kazuko-ga Taroo-ni aikagi-o watasi-ta*. Since pairs of 'canonical' and 'scrambled' sentences were identical in terms of words used, differences in syntactic structure can be directly compared in reaction times and error rates.

Twelve semantically implausible *pass*-type sentences were used for correct 'No' responses to the task. As with sentences with correct 'Yes' responses, scrambled sentences were created on the basis of canonical sentences. For example, the phrase order of a canonical sentence *Tomoko-ga hanataba-o Taroo-ni umeta* ('Tomoko buried flowers in Taro') was re-arranged to read *Tomoko-ga Taroo-ni hanataba-o umeta*. *Show*-type sentences were limited in variation; the present experiment could not therefore prepare such sentences for correct 'No' responses. This correct 'No' condition, however, did not prove a hindrance in the present experiment.

It was expected that reading times would become shorter when participants saw sentences containing the same words. Thus, in order to prevent the problem of repeatedly encountering sentences with the same words, a counterbalanced design (or a Latin square design) was used to assign participants to different canonical and scrambled sentences. Two lists of sentences were given to two groups of participants. Each list consisted of 20 sentences (5 canonical and 5 scrambled for 10 *show*-type, 5 canonical and 5 scrambled for 10 *pass*-type) for the correct 'Yes' responses and 12 *pass*-type sentences (6 canonical and 6 scrambled) for the correct 'No' responses. In addition, 10 correct and 10 incorrect sentences were inserted into each list as 'dummy' sentences (a total of 52 sentences each), such as *Hakata-de tabeta hugu-wa oisikatta* ('The blowfish I ate in Hakata was tasty').

### 3.1.3 Procedure

The presentation was controlled by Microsoft's Visual Basic 6.0+ Microsoft DirectX8 computer program. Stimuli with both 'Yes' and 'No' correct responses were presented to the participants in random order in the center of a computer screen 600 milliseconds after the appearance of an asterisk '*' indicating an eye fixation point. The participants were instructed to respond as quickly and as accurately as possible in deciding whether or not sentences made sense, with responses for each being registered by pressing a 'Yes' or 'No' button. Twenty practice trials were given to the participants prior to the commencement of actual testing.

### 3.2 Analysis and Results

There were no extremes among sentence correctness decision times (measured as less than 400 milliseconds or longer than 4,000 milliseconds). The means of correct 'Yes' and 'No' reaction times and error rates for sentence correctness decisions are presented in Table 1. Before performing the analysis, reaction times outside of 2.5 standard deviations at both the high and low ranges were replaced by boundaries indicated by 2.5 standard deviations from the individual means of participants in each

Table 1. Reaction Times and Error Rates for Correctness Decisions

| Response Type | Type of Verbs | Sentence Type | Reaction Time (ms) | | Error Rate (%) | |
|---|---|---|---|---|---|---|
| | | | M | SD | M | SD |
| 'Yes' Responses | *Pass*-type | Order of DAT-ACC | 1414 | 374 | 1.67 | 5.65 |
| | | Order of ACC-DAT | 1512 | 310 | 1.67 | 5.65 |
| | *Show*-type | Order of DAT-ACC | 1570 | 275 | 3.33 | 7.61 |
| | | Order of ACC-DAT | 1679 | 360 | 10.00 | 13.19 |
| 'No' Responses | *Pass*-type | Order of DAT-ACC | 1513 | 321 | 7.64 | 12.02 |
| | | Order of ACC-DAT | 1589 | 355 | 7.64 | 12.02 |

*Note*: M refers to means while SD refers to standard deviations.



category. The statistical tests which follow analyze both subject ($F_1$) and item ($F_2$) variability. Only stimulus items of correct responses were used in the analyses of reaction times.

A series of one-way analyses of variance (ANOVAs) with repeated measures in canonical and scrambled noun phrase order were conducted on reaction times (milliseconds) and error rates (percents) for both the *show*-type and *pass*-type sentences, using subject ($F_1$) and item ($F_2$) variabilities.

For correct 'Yes' responses, the *show*-type sentences with the DAT-ACC order resulted in shorter reaction times than those with the ACC-DAT order [$F_1(1,23)=7.30$, $p<.05$; $F_2(1,9)=9.40$, $p<.05$]. The error rates of the DAT-ACC order were lower than those with ACC-DAT order in subject analysis [$F_1(1,23)=5.41$, $p<.05$], but not in item analysis [$F_2(1,9)=2.44$, $p=.153$]. A similar trend was found in the *pass*-type sentences. Sentences with the ACC-DAT order were processed slower than those with the DAT-ACC order [$F_1(1,23)=4.33$, $p<.05$; $F_2(1,9)=5.15$, $p<.05$], while there was no difference in error rates [$F_1(1,23)=2.45$, $p=.131$; $F_2(1,9)=0.74$, $p=.407$].

The same ANOVAs were carried out for reaction times of correct 'No' responses. There was no significant difference between sentences with DAT-ACC and ACC-DAT [$F_1(1,23)=2.45$, $p=.131$; $F_2(1,11)=0.74$, $p=.407$]. As shown in Table 1, error rates were identical for the DAT-ACC and ACC-DAT orders [$F_1(1,23)=0.00$, $p=1.00$; $F_2(1,11)=0.00$, $p=1.00$]. Thus, semantically anomalous *pass*-type sentences used for correct 'No' responses did not show any difference between the two orders.

## 4. DISCUSSION AND CONCLUSION

The aim of the present study was to evaluate, from a viewpoint of sentence processing, the three prominent syntactic analyses of ditransitive constructions in Japanese. Hoji (1985) claims the DAT-ACC order is canonical, while the ACC-DAT order is a scrambled order. Miyagawa (1997) suggests that both the DAT-ACC order and the ACC-DAT order

are canonical. Matsuoka (2003) argues that with *show*-type verbs, the DAT-ACC order is canonical and ACC-DAT is a derived order, whereas with *pass*-type verbs, the ACC-DAT order is canonical and the DAT-ACC order is a scrambled order. Given that scrambled sentences in general take longer to process than their canonical counterparts due to the difference in syntactic complexity (Tamaoka, Sakai, Kawahara, Lim and Miyaoka 2003), these syntactic analyses make different predictions, as already summarized in (8).

The results of the present experiment reveal that both *show*-type and *pass*-type acceptable sentences are processed faster with the DAT-ACC order than with the ACC-DAT order. This indicates that the DAT-ACC order is the canonical order of ditransitive sentences regardless of the type of verb used. As such, the present findings support the traditional analysis of Japanese ditransitives by Hoji (1985) rather than the more recent proposals of Miyagawa (1997) and Matsuoka (2003). The same tendency was not observed with anomalous *pass*-type sentences used for correct 'No' responses. This may be because the nature of their anomalies was of various types including a selectional restriction violation and pragmatic incongruity, which affect cognitive processing differently.

The conclusion of the present article is consistent with the experimental results reported in Miyamoto and Takahashi (2002), but not with those obtained by Yamashita (1997). There are three possible reasons why Yamashita failed to find the effect of scrambling with ditransitive sentences.

The first reason has to do with the method of stimulus presentation. In her experiment, the sentences were presented to subjects using a phrase-by-phrase, self-paced reading presentation. It has been pointed out that with this method subjects tend to press a key at a constant pace, and hence measured times may not reflect actual reading times (Tamaoka, Sakai, Kawahara and Miyaoka 2003). In addition, Yamashita (1997) compared different words in the same sentential position in reading time. Since word frequency is a well-known factor to determine speed of word



processing (e.g. Hino and Lupker 1998, Taft 1979, 1991, Tamaoka and Takahashi 1999), the comparison of different words while ignoring word frequency has a strong and direct bearing on results.

The second potential factor is the complexity of the test items. As far as can be told, all processing studies that found effects of scrambling as reflected by reading times employed sentences consisting of (a verb and) simple noun phrases without modifiers (e.g. Chujo 1983, Miyamoto and Takahashi 2002, Tamaoka, Sakai, Kawahara, Lim and Miyaoka 2003, as well as the present study). In contrast, most studies that found no difference in reading times between canonical and scrambled sentences used test items containing complex noun phrases with modifiers such as an adjective or a relative clause (e.g. Nakayama 1995, Yamashita 1997). The extra processing load caused by (sometimes very long) modifiers might have masked the relatively small effects of scrambling (cf. Hirose 2002).

The third issue is concerned with the nature of the tasks. In Yamashita's (1997) experiment, participants were asked to answer a probe word question after each sentence, as well as a comprehension question about the content of the sentence they just read after about 25 percent of the sentences. Such a dual task design can be problematic because it may put considerable pressure on the subjects to remember, rather than understand, the sentences, which surely affects reading times. The study reported here is free from these three potential problems, and hence its results more straightforwardly reflect the effects of scrambling.

A conceivable objection to the present study has to do with the assumption that syntactic structure is the major factor that determines the relative speed in processing the two alternative word orders. One might ask if collocation frequency of words rather than relative syntactic complexity determines reading times. Although it cannot be denied that frequency affects processing times, there is good reason to believe that syntactic structure is a more reliable and 'deeper' predictor for relative processing times. First, it is known that collocation frequencies are not always negatively correlated with processing times. In fact, Miyamoto

and Takahashi (2002) report some cases where a more frequently used word order takes longer to read than its less frequently used word order variant. Second, the collocation frequency of a particular expression or construction results from the interaction of more fundamental factors, and the collocation frequencies per se cannot be considered a satisfactory explanation unless the nature of these factors are known. It is very likely that syntactic complexity is one (or even *the*) major such factor (cf. Hawkins 1994, Gibson, Schütze and Salomon 1996). For example, it may be the case that SOV order is more frequently used than OSV order because the former has a simpler syntactic structure, and hence takes less cognitive resources to process. The more complex OSV order is 'less efficient,' and the speakers used it only when there is a special reason to do so. If this conjecture (which may be called an 'economy principle' of language use) is on the right track, syntactic complexity affects processing time not only directly as argued in Tamaoka, Sakai, Kawahara, Lim and Miyaoka (2003), but also indirectly through collocation frequency, which itself is affected by syntactic complexity.



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## APPENDIX

List of Sentences Used in the Experiment

| | DAT-ACC | ACC-DAT |
|---|---|---|
| | ***Show*-type Sentences for Correct 'Yes' Responses** | |
| 1 | 太郎が友子に泥水を浴びせた. | 太郎が泥水を友子に浴びせた. |
| 2 | 健二がパンダに帽子をかぶせた. | 健二が帽子をパンダにかぶせた. |
| 3 | 次郎が和子に浴衣を着せた. | 次郎が浴衣を和子に着せた. |
| 4 | 友子が健二に道理をさとした. | 友子が道理を健二にさとした. |
| 5 | 順子が次郎に写真を見せた. | 順子が写真を次郎に見せた. |
| 6 | 和子が太郎にカバンを預けた. | 和子がカバンを太郎に預けた. |
| 7 | 太郎が順子にピアノを教えた. | 太郎がピアノを順子に教えた. |
| 8 | 健二が和子にノートをかした. | 健二がノートを和子にかした. |
| 9 | 神様が友子に子供を授けた. | 神様が子供を友子に授けた. |
| 10 | 次郎が赤ちゃんに靴下をはかせた. | 次郎が靴下を赤ちゃんにはかせた. |
| | ***Pass*-type Sentences for Correct 'Yes' Responses** | |
| 1 | 太郎が順子に伝言を伝えた. | 太郎が伝言を順子に伝えた. |
| 2 | 友子が太郎に書類を返した. | 友子が書類を太郎に返した. |
| 3 | 健二が和子に水をかけた. | 健二が水を和子にかけた. |
| 4 | 順子が次郎に荷物を届けた. | 順子が荷物を次郎に届けた. |
| 5 | 順子が太郎に遺産を残した. | 順子が遺産を太郎に残した. |
| 6 | 太郎がラクダに荷物を乗せた. | 太郎が荷物をラクダに乗せた. |
| 7 | 友子が次郎に石をぶつけた. | 友子が石を次郎にぶつけた. |
| 8 | 健二が順子にカメラを向けた. | 健二がカメラを順子に向けた. |
| 9 | 次郎が順子に秘密を漏らした. | 次郎が秘密を順子に漏らした. |
| 10 | 和子が太郎に合鍵を渡した. | 和子が合鍵を太郎に渡した. |
| | ***Pass*-type Sentences for Correct 'No' Responses** | |
| 1 | 太郎が順子にお礼を当てた. | 太郎がお礼を順子に当てた. |
| 2 | 友子が太郎に花束を埋めた. | 友子が花束を太郎に埋めた. |
| 3 | 健二が和子に大学を落とした. | 健二が大学を和子に落とした. |



| | | |
|---|---|---|
| 4 | 順子が次郎に船を浮かべた. | 順子が船を次郎に浮かべた. |
| 5 | 順子が太郎に寿司を泊めた. | 順子が寿司を太郎に泊めた. |
| 6 | 太郎が和子にキリンを混ぜた. | 太郎がキリンを和子に混ぜた. |
| 7 | 友子が次郎に熱湯をくるんだ. | 友子が熱湯を次郎にくるんだ. |
| 8 | 健二が順子に介護を並べた. | 健二が介護を順子に並べた. |
| 9 | 次郎が順子に約束を戻した. | 次郎が約束を順子に戻した. |
| 10 | 和子が太郎に料理を重ねた. | 和子が料理を太郎に重ねた. |
| 11 | 次郎が友子にファックスを建てた. | 次郎がファックスを友子に建てた. |
| 12 | 和子が次郎に音楽を付けた. | 和子が音楽を次郎に付けた. |
| | **Dummy Sentences for Correct 'Yes' Responses** | |
| 1 | そろそろタイヤ交換をしよう. | |
| 2 | 私は去年何度も風邪をひいた. | |
| 3 | マングローブは人々の暮らしに役立つ. | |
| 4 | 昨日作った餃子は上出来だった. | |
| 5 | 暖かくなったら，動物園に行こう. | |
| 6 | 恵美がバイオリンを習いはじめた. | |
| 7 | ゴミの分別をしないと，罰せられる. | |
| 8 | 博多で食べたフグは美味しかった. | |
| 9 | 4月は学生食堂が最も混雑する. | |
| 10 | 今年はホウレン草を植えてみよう. | |
| | **Dummy Sentences for Correct 'No' Responses** | |
| 1 | 駅前のデパートが牛丼を食べた. | |
| 2 | ガンバ大阪の開幕投手は松坂だ. | |
| 3 | 宏美が美容院にパーマをかけに叫んだ. | |
| 4 | 近所にレストランが回転した. | |
| 5 | 美代ちゃんが公園でラジオ体操を寝た. | |
| 6 | 田中さんが新しい論文に引っ越した. | |
| 7 | 日本列島を桜前線が南下中だ. | |
| 8 | 今春の高校野球大会は接戦が転んだ. | |
| 9 | 五月の連休が終わると，端午の節句だ. | |
| 10 | トマトは連作障害を食べた. | |

# 日本語二重目的語構文の認知解析

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本論文では，述語の項構造と文の統語構造との対応関係の研究の一環として行った日本語二重目的語構文の語順に関する実験結果を報告した．日本語の二重目的語文の基本語順に関して下記の3種類の仮説が提案されており，論争になっている．仮説1：「がにを」が基本語順である．仮説2：「がにを」も「がをに」も共に基本語順である．仮説3：動詞によって「がにを」が基本語順のもの（見せるタイプ）と「がをに」が基本語順のもの（渡すタイプ）とがある．これらの仮説の妥当性を検証するために，文正誤判断課題を用いて，文の読み時間（反応時間）を測定する実験を行った．その結果，見せるタイプの動詞を使った文も渡すタイプの動詞を使った文も共に，「がにを」語順の文のほうが「がをに」語順の文よりも反応時間が有意に短かった．この結果は，二重目的語文は動詞のタイプに関わらず「がにを」が基本語順であることを示唆しており，仮説1が支持された．

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