

# Prosodic Changes in the Inverted English Sentences Accompanying Periphrastic *do/have*

迂言的 *do/have* を伴う英語倒置文における韻律変化

市 崎 一 章

## 要 旨

英語の発話に於いて、ある語彙が文の中位から文頭へ倒置されると、その継続時間は、伸長した。また、文から迂言的 *do/have*・倒置語・ポーズを除いた部分は、文末よりも文頭で、そして文の後半よりも文の前半で、短縮された。この結果はつまり、情報の価値の優位性は、文の中位、文頭、文末の順に大きくなることを、音の長さというひとつの韻律素性から、裏付ける一因となった。倒置が起きる前後の、卓立を付与された音節の変化からも、文の中位に対して文末における情報の価値の優位性が立証された。ピッチの変化が卓立を生み出す大きな要因になっていることが示唆され、文頭へ転置された副詞の基本周波数パターンは多様になることが例証された。また、文の常位／倒置に関係なく、複文に於いて両節間に吸気なしのポーズが入った場合、先行節に比べて後続節の音圧レベルが低下するが、吸気を伴った場合は、両節に、ほぼ同等の音圧レベルが付与されることが判明した。

## 1. Introduction

Inversion is one of the ways in which speakers emphasize points, and is often heard in daily conversation. The inverted items sometimes accompany periphrastic *do* when they are adverbials, and especially negatives. Earlier studies on prosody of English inversion (Ichizaki 2000, 2001d, 2002a, 2002b, 2003) proved that prominence, duration, and information priority increased at the end of the sentence over the beginning and that pitch movement and intensity seemed to raise prominence. This paper deals with the inverted English sentences having periphrastic *do/have* and focuses on sound pressure in addition to prominence, pitch, and duration by using sound analyzing software. The aim of this paper is clarify how such prosodic traits change in emphasized forms and supply objective data to learners of English.

## 2. Investigation and Analysis

### 2.1 phonetic corpus

A total of six pairs of declarative sentences, those with normal word order and those with inversion having *do/have*, were quoted from Takanashi (1973). The tonetic stress marks designed by Quirk *et al.* (1972), which are shown in Table 1, were used in section 3 as the system could represent pitch transition and stress with one mark, which seems to be the simplest and most useful system for describing prosodic features.

**Table 1 Tonetic Stress-Marks Used in This Paper**

Rising (  $\overset{\frown}{\quad}$  )

Falling (  $\overset{\smile}{\quad}$  )

Rise-fall (  $\overset{\wedge}{\quad}$  )

A marked step in pitch downwards in relation to the preceding syllable (  $\downarrow$  )

### 2.2 informants

A total of seven native speakers of English who teach English at colleges in Japan, shown in Table 2, uttered the phonetic corpus and the utterance was recorded onto a mini-disc.

**Table 2 Details of Informants**

initial	sex	age	nationality	native place	register used (Hz)
S. P.	female	28	U.S.A.	New Jersey	83-340
C. L.	female	37	U.S.A.	Vermont	123-372
C. I.	female	43	U.S.A.	Florida	109-372
S. D.	male	58	U.S.A.	New Mexico	87-296
T. S.	male	41	Canada	Ontario	83-179
M. T.	male	46	England	East Anglia	73-166
R. B.	male	54	England	Somerset	54-216

### 2.3 procedure

The informants were asked to utter the corpus by using the speed and natural manner of their daily speech in recording. Except for coughs, mispronunciations or the like, the utterance was carried out only once after

the informants had read through the corpus to confirm if there was something unnatural in the corpus. A microphone and a mini-disc recorder were used for recording. The fundamental frequency ( $F_0$  henceforth) contours, which could be reckoned as intonation contours<sup>1)</sup>, the duration of inverted items and *do/have*, the duration of pauses, and sound pressure level were investigated and measured with sound analyzing software "SUGI Speech Analyzer" (Sugito, 2000). Besides, prominence was identified by the American from New Mexico and the Englishman from Somerset as they listened to the mini-disc.

Prominent syllables were represented with bold type and shifted items were underlined in the corpus of section 3. Intonation contours and prominent syllables with 70% or more concordance were recognized as representative intonation and prominence for the corpus in this paper as Ichizaki (2001a, 2001b, and 2001c) reported that many well-known earlier studies showed the typical intonation or nucleus/nuclei of the sentence with a concordance of just 60% or so. Therefore, the prosodic descriptions for each corpus in this section, using the tonetic stress-marks shown in Table 1, were limited to cases with a concordance of five or more out of seven informants.

A t-test was carried out to check if the inverted word(s) and the items excluding *do/have*, shifted words and pause were lengthened or shortened. Table 3 lists detailed values : the duration of *do/have* ; the duration of inverted words; the rate of durational change of the inverted words; the results of the t-test; the duration of the items excluding the above mentioned words; and so on. Discussion on the results is made in the following section classifying the corpora into three groups according to grammatical structure or semantic contents as follows.

### 3. Results and Remarks

#### 3.1 duration

Durational change of particular items between the corpus with normal word order and the corpus with inversion was measured and the differences between the shifted word in the former corpus and that in the latter corpus were t-tested, which was shown in Table 3.

**Table 3 Duration of Particular Items and the Result of T-test**

The averaged values of the seven informants are listed. Durational change rate (a value more than 1.00 means lengthening and a value smaller than 1.00 means shortening) and the results of t-tests were calculated. (D of *do/have* : duration of *do/have* ; D of SW : duration of shifted words; DCR of SW : durational change rate of shifted words; D of Rest : duration of the items excluding *do/have*, shifted item(s), and pause if there was any; DCR of Rest : durational change rate of the rest)

Corpus	D of do/have (ms)	D of SW (ms)	DCR of SW	t-test	D of Rest (ms)	DCR of Rest	t-test
1a 1b	122	408 395	0.97	t=0.32, df=6, ns	797 914	1.15	t=2.48, df=6, p<.05
2a 2b	177	403 81	0.95	t=0.74, df=6, ns	878 896	1.02	t=0.68, df=6, ns
3a 3b	132	1,764 1,666	0.94	t=1.08, df=6, ns	322 511	1.59	t=4.64, df=6, p<.01
4a 4b	173	359 462	1.29	t=3.59, df=6, p<.025	1,521 1,328	0.87	t=6.47, df=6, p<.005
5a 5b	161	338 384	1.14	t=1.37, df=6, ns	2,015 1,993	0.99	t=0.19, df=6, ns
6a 6b	142	549 616	1.12	t=2.60, df=6, p<.05	2,039 1,963	0.96	t=1.70, df=6, ns

The duration of periphrastic *do* and *have*, both of which are monophthongs, was 122-177ms. Comparing the duration of the word to be shifted with that of the shifted word, three words (in (4b), (5b), and (6b)) out of six were lengthened with regard to the durational change rate as DCR of SW shows in the table. All of the lengthened words were shifted from the middle of the sentence to the beginning of the sentence. As the result of t-tests, however, two of them were found to be significant : the shifted word was lengthened in (4b) with the significance of at the 2.5% level, and it was significant in (6b) with the significance at the 5% level. Both the corpus pairs (1) and (2), which had the shift from the end of the sentence to the beginning, showed no significance. Nor did the pair (3). The corpus (3b) had the shift of longer items from the last part to the first part. Moreover, the items excluding periphrastic *do/have*, the shifted word(s), and pause inserted were focused, the duration of the items was measured and the differences of the items between the two sentences in each pair were t-tested. The pair corpora (1), (2), and (3), in opposition to the result of the shifted words, showed lengthening as for durational change rate. As the result of t-tests, however, two of them were found to be significant : the remaining items were lengthened in (1b) (significant at the 5% level) and they were lengthened in (3b) (significant at the 1% level) . In the corpora having the shift from the middle of the sentence to the beginning, only in (4b) was shortening recognized at the 0.5% level although durational change rate was decreased in all of (4), (5), and (6). The temporal compensation, i. e. the shifted item(s) is lengthened or shortened while the remaining item(s) change(s) in an opposite way, was noticed only between (4a) and (4b), where an item was shifted from the middle to the beginning.

### 3.2 prominence, intonation, sound pressure level, and pause

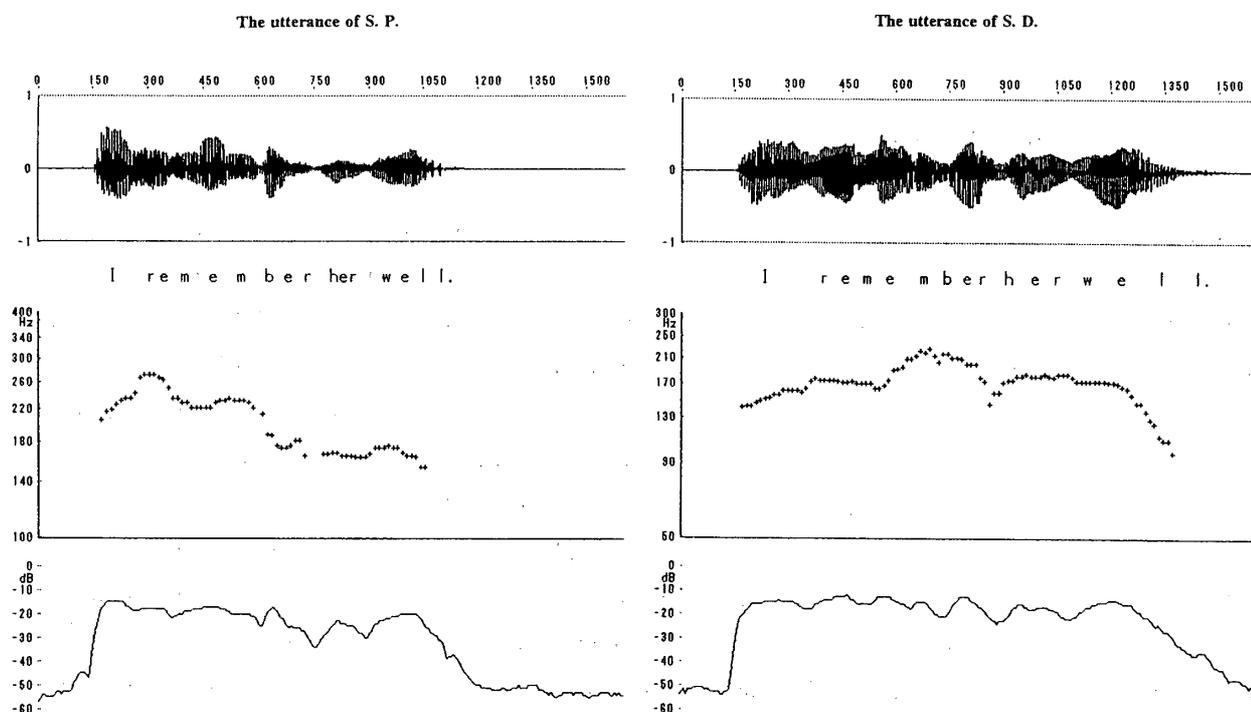
#### A : adverbials

When adverbials are put at the beginning of a sentence for emphasis, the Verb + Subject word order is often followed. Such an usage sounds somewhat literary.

(1a) I remember her well.

(1b) Well do I remember her.

For better understanding, two displays — one female's and one male's — which the following discussion depended on were shown as Fig. 1.



**Figure 1** Samples of Speech Waveform , F<sub>0</sub> Contour, and Sound Pressure Level

(Considering the difference of frequency range of utterance between the two sexes, the range of 100-400Hz was set for females and the range of 50-300Hz was set for males)

Five informants out of seven gave prominence to *-mem-* and all the seven informants gave one to *well* in (1a) while in (1b) there were only two informants that gave prominence to *-mem-* although all the seven gave prominence to *Well*. The F<sub>0</sub> contours of (1a) showed four patterns : three informants reached the highest peak at *re-*, the second highest at *-mem-*, and made a small peak at *well*; two informants made the only peak at *-mem-*; C. I. made *I* a salient rise, fell at *re-*, and continued level until *we-*; and R. B. rose gradually, reached

the highest peak at *we-* and zoomed down. The  $F_0$  contours of *Well* in (1b) showed a great variety : a level tone, a level with rising at the end, a rising, a rising to level, a rise-fall, a level to falling, and a falling to level. The contours thereafter were level in general with two informants making *-mem-* a tiny peak. The highest sound pressure level of (1a) was found at four different syllables : three informants at *-mem-*; two at *I*; C. L. at *re-*; and R. B. at *her* while that of (1b) was concentrated on *Well*. Six informants gave the greatest pressure level to *I* or *remember* (on word level) and the second greatest level to the other item. Five out of the six, excluding C. I., produced differences of only 1-2dB between the two items. Only C. I. showed a much greater difference of 8dB with *I* being  $-13$ dB and *-mem-* being  $-21$ dB. The contours of sound pressure level of *Well* in (1b) were easily able to be discriminated from the contours of the other items compared with the successive contours of (1a), because the transition from the end of *Well* to the beginning of *do* appeared as a fall-rise tone. Moreover, since the periphrastic *do* was unstressed, the difference in sound pressure level at peak between *Well* and *do* was as large as 7-10dB among five informants out of seven.

(2a) He resembles you **wèll**.

(2b) **Well** does he resemble you.

The structure of pair (2) is quite similar to that of pair (1). Although the verb *remember* of (1b) was not recognized as prominent, the verb *resemble* and the adverbial *well* were both prominent in either (2a) or (2b). Five informants made *-sem-* prominent and all the seven made *well* prominent in (2a) while all the seven did so for *Well* and six did so for *-sem-* in (2b). The  $F_0$  contour of (2a) showed three patterns : four informants made three peaks at *He*, *-sem-*, and *well* with decreasing pitch in this order; two informants made two peaks at *He* and *well* with the former being higher, with lowering *resembles you*; and R. B. also had two peaks at *He* and *well* with the latter being slightly higher, with rising *-bles you*. Although it was not so great as it was in (1b), there was some variety in  $F_0$  contours for *Well* of (2b). Three informants used a level tone, two informants used a rise-fall, C. I. used a falling, and S. D. used a rising to level. Five informants used level tone for *does he resemble* and a falling tone for *you*; T. S. made *-sem-* a small peak; and R. B. started *he* with high pitch (163Hz) after low *does* (81Hz), and zoomed down at *-sem-*. Concerning sound pressure level, there was not consistency in (2a). Three informants gave similar values at each item, two informants gave much greater values ( $-10$ dB,  $-10$ dB) at *He* than their second highest values at *-sem-* ( $-18$ dB,  $-16$ dB), S. P. gave much greater values at *He* ( $-14$ dB) and *-sem-* ( $-15$ dB) than the values at *you* ( $-22$ dB) and *well* ( $-21$ dB), and M. T. gave by far the greatest values at *-sem-* ( $-6$ dB) and *well* ( $-6$ dB) with the low values at *He* ( $-14$ dB) and at *you* ( $-22$ dB). The values at *Well* of (2b) were just like they were in (1b). The contours of *Well* were easily discriminated from the contours of the other items. After they reached the highest peaks of  $-5$ dB to  $-12$ dB at *Well*, they first fell to a bottom of about  $-35$ dB and then made a tiny peak at *does*. Five informants showed a considerable difference (7dB through 12dB) between the peak value of *Well* and that of *does* while the difference between the two of R. B. was 4dB and that of S. D. was 2dB.

**B : object**

(3a) I got only **ône** little gleam of **hòpe**.

(3b) Only one little gleam of hope ↓ did I **gèt**.

All the seven informants made *one* and *hope* prominent syllables in (3a) while all the seven made *one* and *get* prominent syllables in (3b). The numbers of the informants who made *got* prominent in (3a) and who made *hope* prominent in (3b) were none and four, respectively, neither of which reached the standard to be significant of this paper. The result of this distribution seems to suggest the priority on prominence at the end of sentence over the middle. There were three items which appeared highest in the observation of  $F_0$  contours in (3a). Three informants made *one*, two made *I*, and two made *only* the highest peak. On the other hand, in (3b), there were four patterns in the distribution of the highest peak. Three informants made *only*, two made *one*, S. P. made *little*, and S. D. made *one* and *little* the highest. In the comparison for individual informants, four informants who used a fall-rise tone for *only one* in (3a) adopted the same tone for *Only one* in (3b) and two informants who used a rise-fall for *only* and a level for *one* in (3a) also adopted the same tone for the items in (3b) whereas C. L. only used different contours, a falling for *only* and a rise-fall for *one* in (3a) and a rise-fall for *Only* and a rising for *one* in (3b). With regard to sound pressure level in (3a), four informants showed little difference among the items, C. I. made *I* the greatest (-11dB) which was 3dB greater than the second greatest *got*, S. P. made *one* the greatest (-10dB) which was 4dB greater than the second greatest *I*, and T. S. made *got* and *one* the equally greatest (-12dB) which was 3dB greater than the second greatest *litt-*. In (3b), four informants, C. L., S. D., T. S., and R. B., showed little difference, either, throughout the utterance. They were exactly the same four informants that showed little difference in (3a). Both S. P. and M. T. gave *one* comparatively greater values and C. I. gave *one* and *litt-* greater values.

**C : negatives**

(4a) She **nêver** eats between **mèals**.

(4b) Nêver does she eat between **meals**.

Prominence was drawn toward both *nev-* and *meals* both in (4a) and (4b) by all the seven informants. Only one informant gave prominence to *eats* in (4a) and two informants gave one to *eat* in (4b) as the other prominent syllables. The  $F_0$  contours of (4a) were separated in two ways : five informants made *never* the only salient peak and two informants made *never* the highest peak and made *meals* the second highest. Since the  $F_0$  contours of two informants in (4b) were not identified, the contours of the remaining five are to be mentioned here. Both S. P. and R. B. made *Never* the only great peak and gradually fell thereafter; both C. I. and S. D. had three peaks at *Never*, *eat*, and *meals* with decreasing pitch in this order, which was considered to be catathesis; and C. L. had two peaks at *Never* and *meals*, with the former being much higher. Content words which are *never*, *eat*, and *meals* and function words which are *does*, *she*, and *between* appeared

alternately in (4b) while *never* and *eats* appeared in succession in (4a). This seems to be why no catathesis was noticed in (4a). Six informants out of seven gave by far the greatest sound pressure level to *nev-* in (4a) while only S. D. uttered each item with similar amount of pressure level,  $-13\text{dB}$  at *She*,  $-14\text{dB}$  at *nev-*,  $-11\text{dB}$  at *eats*,  $-13\text{dB}$  at *-tween*, and  $-12\text{dB}$  at *meals*. Similarly in (4b), all the seven informants gave *Never* the greatest sound pressure level. However, six of them gave *eat* the second level and gave *meals* the third level and there was little difference in level among the three items. Only C. L. gave *eat* and *meals* the same values ( $-25\text{dB}$ ) with *Nev-* being the greatest ( $-19\text{dB}$ ). Roughly speaking, therefore, the contours of sound pressure level of (4b) fell gradually on the whole.

(5a) They **litt**le **drè**amed ↓ that they would see her **agà**in.

(5b) **Litt**le did they **drè**am ↓ that they would see her **agà**in.

In either corpus the syllables recognized as prominent were the same three : *litt-*, *dreamed*, and *-gain*. All the three syllables were done by all the seven informants in (5a) and *litt-* also by all seven, *dreamed* by six, and *-gain* by six in (5b). No other syllable was given prominence except *see* which was done by one in (5a) and by two in (5b). The word *little* was the only projecting item throughout the  $F_0$  contours of all the informants. Four informants used a gentle rise-fall for *see her again*, two used a level tone for *that through her* and fell at *again*, and C. I. made *see* another peak. Ms. C. I. was one of the two informants who made *see* prominent in (5a). In the observation of the first clause of (5b), six informants made *Little* through *dream* a wide rise-fall with three of them falling at *did they* in the middle, and only S. P. made *Little* a salient peak. Four informants made the second clause a wide gentle rise-fall, two made it nearly level, and C. I. made *see* another salient peak. Ms. C. I. was the only informant that made *see* prominent in (5b), which suggests that pitch movement had much to do with prominence. In order to check the sound pressure level of each clause of compound corpora, the averaged values of corpus (5a), (5b), (6a), and (6b) and the result of t-tests were shown in Table 4.

**Table 4 Averaged Sound Pressure Level of the Peaks of the Items in Each Clause of the Compound Corpora and the Result of T-test**

The averaged values of the seven informants are listed.

(Av.of SPL : averaged sound pressure level)

Corpus	Clause	Av.of SPL (dB)	t-test
5a	1st	-14.7	t=6.23, df=6, p<.005
5a	2nd	-19.5	
5b	1st	-15.6	t=5.27, df=6, p<.01
5b	2nd	-21.1	
6a	1st	-12.5	t=4.97, df=6, p<.01
6a	2nd	-17.7	
6b	1st	-16.5	t=4.93, df=6, p<.01
6b	2nd	-20.8	

Six informants gave *litt-* the greatest sound pressure level in (5a) and there was not a great difference in level among *They*, *litt-*, and *dreamed*. All the six gave comparatively greater pressure level to the first clause whereas M. T. gave *see* in the second clause the greatest level (-7dB) which was 3dB greater than *litt-* in the first clause, which had the second greatest level (-10dB). The contours of sound pressure level of (5b) showed a variety : two informants gave *Litt-* the greatest level and gave rather greater level to the first clause, two gave similar levels to each item and their contours fell at *her again*, S. D. also used similar levels for each item but made *did* the greatest, and the remaining two gave rather greater levels to the first clauses compared with their second clauses. Mr. T. S. was the only informant that used pause after the first clause in either corpus, 313ms in (5a) and 499ms in (5b). And comparative decrease in sound pressure level in the second clause was noticed in both cases. Comparing the averaged value of the peaks of the items in the first clause with that of the peaks of the items in the second clause in the utterance of T. S., the difference between the clauses in (5a) was 8.1dB and that in (5b) was 11.3dB, both of which were greater than the other difference values of the informants who gave less pressure level in the second clause<sup>2)</sup>. It might suggest that sound pressure level decreases after a pause in the second clause of a compound sentence regardless of whether the sentence has inversion or not.

(6a) He was **caught again** ↓ when he had **scarcely escaped**.

(6b) **Scarcely** had he **escaped** when he was caught **again**.

A notice before discussion must be given to the above pair. It would seem from a grammatical point of view that the clause following the conjunction *when* is the subordinate clause. According to such a view the preceding clause would be the principal clause in both corpora. In the case of (6b), however, *Scarcely had*

*he escaped* sounds like the subordinate clause which needs some following clause to the ears of the informants. In other words there is little difference in semantic focus between the two corpora. Therefore, (6b) was supplied as the appropriate inverted corpus of (6a) here.

There were four prominent syllables in (6a) as the bold letters show while there were three in (6b). Five informants made *caught* of (6a) prominent while there were only two that gave enough prominence to *caught* of (6b). Six informants made *caught again* the successive greater peak and *scarcely* the smaller peak in (6a). There was some difference in pitch between the first item *He* and the greater peak : three of the six had little difference (smaller than 20Hz), S. D. had a difference of 50Hz; R. B., 75Hz; and S. P., 79Hz. The remaining informant, T. S., showed a particular  $F_0$  contour which had three even peaks at *caught*, *again*, and *escaped*. In (6b) the  $F_0$  contour of R. B. was not identified. The contours of four informants represented similar features : the first clause showed a wide rise-fall with *Scarcely* being a peak, a level tone ran from *when* to *caught*, and fell at *again*. Another informant, M. T., made a small peak at *-caped* after the wide rise-fall and T. S. added another peak at *again*. With regard to sound pressure level in (6a), each informant showed his/her original distribution : although three informants gave *He* the greatest level, there was some difference in pitch between *He* and the item with the second greatest pressure level; two informants gave the greatest level to *caught*; S. P. gave the greatest level evenly to *He* and *caught*; and R. B. made *-gain* the greatest. Three informants made *scarce-* in the second clause the peak having nearly the same level as the item having the greatest level in their first clauses. The levels in the second clause of the other four informants were smaller than those in the first clause on the whole. On the other hand, in (6b), six informants gave *Scarce-* the greatest pressure level and only S. P. gave the greatest level to *caught* in the second syllable but its value was  $-13\text{dB}$  which was only  $1\text{dB}$  greater than her *Scarce-* in the first clause. Only T. S. used a pause, which was as long as 912ms with inhalation, after the first syllable. There was a little difference in sound pressure level between the peaks in the first clause ( $-20.5\text{dB}$ ) and those in the second clause ( $-22.8\text{dB}$ ). Unlike in (5a) and (5b), the inhalation seems to have reset his breathing for utterance and the compound corpus seems to have been uttered as if it had been two separate clauses.

#### 4. Conclusion

Confirming the results shown by Table 3, the duration of the items excluding periphrastic *do/have*, the shifted item(s), and pause is inclined to be lengthened in the inversion from the end to the beginning and from the last part to the first part of the sentence. Moreover, in the inversion from the middle to the beginning, the shifted item(s) have a tendency to be lengthened.

The appearance and disappearance of prominent syllables between (3a) and (3b) suggests the propriety of prominence, i. e. the value of information, at the end of the sentence over in the middle. The result corroborated again, as Ichizaki (2000, 2001d, 2002a, 2002b, and 2003) did, the claim made by O'Connor and Arnold (1961), Halliday (1970), Quirk *et al.* (1972, 1985), and Leech and Svartvik (1975) and so forth that information value is greatest at the end in English utterance.

As for  $F_0$  contour, there was a variety for the adverbial in the pair corpora, (1) and (2). In the inversion

with more items shifted in (3), both  $F_0$  contour and the distribution of sound pressure level is inclined to be identical in the comparison for individual informants between the two corpora. Pitch movement seems to have much to do with the production of prominence in (5), where pause without inhalation brought about the decrease of sound pressure level in the following clause compared with the level of the previous clause regardless of whether the sentence was with normal word order or with inversion. The pause with inhalation in (6), on the other hand, did not cause such a difference between the two clauses.

Some features have been found as above and especially  $F_0$  contour and the distribution of sound pressure level showed great divergence even with only seven informants. Although few people would disagree to the claim about the value of information depending on the position in the sentence as a number of previous experiments and investigations, including the author's (Ichizaki 2000, 2001d, 2002a, 2002b, and 2003), have suggested, there are left not a few questions to the other claims. However small it is, every discovery would clarify the system of such mysterious prosodic features step by step as constant dripping wears away the stone.

### Notes

- 1) Stevens and Volkmann (1940) illustrated that pitch changed in proportion to  $F_0$  in the range of 50-1,000Hz which was the range of human speech.
- 2) Excluding T. S., there were five informants in (5a) and three informants in (5b) who gave less sound pressure levels to the second clause. The difference values of the other informants were 5.3dB (S. P.), 4.2dB (C. L.), 6.3dB (C. I.), 1.9dB (S. V.), and 3.1dB (R. B.) in (5a) and 5.3dB (S. P.), 5.6dB (C. I.), and 5.9dB (M. T.) in (5b).

### References

- Halliday, M. A. K. (1970) *A Course in Spoken English: Intonation*. London : Oxford UP.
- Ichizaki, Kazuaki (2000) "Gojuntochi niyoru eigo no keizokujikanhenka," *Proceedings of the 14th General Meeting of the Phonetics Society of Japan*, 207-12.
- Ichizaki, Kazuaki (2001a) "Johoteiji to inritsutokusei : Shudai to shoten eno oncho to kaku no taio," *Proceedings of the 3rd EPSJ Kyushu-Okinawa Branch*, 26-33.
- Ichizaki, Kazuaki (2001b) "Information processing and prosodic prominence in English : Intonation patterns and nuclei embodied," *Journal of the English Phonetic Society of Japan* 4, 163-82.
- Ichizaki, Kazuaki (2001c) "Eigo no aimabun niokeru intonation pattern to kaku," *Journal of the Phonetic Society of Japan* 5 : 2, 75-83.
- Ichizaki, Kazuaki (2001d) "Gojun to johoteiji: Oncho· keizokujikan· takuritsu no jissai," Paper delivered at the 10th Meeting of EPSJ Chubu Branch, Nagoya.
- Ichizaki, Kazuaki (2002a) "A prosodic study of English inverted sentences : Intonation patterns, nuclei, and rate of utterance," *Bulletin of Miyazaki Women's Junior College* 28, 1-9.

- Ichizaki, Kazuaki (2002b) "Information processing in English hyperbaton : Intonation, duration, and prominence," *Journal of the English Phonetic Society of Japan* 5, 161-76.
- Ichizaki, Kazuaki (2003) "A prosodic observation in English hyperbaton," *Bulletin of Miyazaki Women's Junior College* 29, 1-15.
- Leech, G. N. and Svartvik, J. (1975) *A Communicative Grammar of English*. London : Longman.
- O'Connor, J. D. and Arnold, G. F. (1961) *Intonation of Colloquial English : A Practical Handbook*. London : Longman.
- Quirk, R., Greenbaum, S., Leech, G. and Svartvik, J. (1972) *A Grammar of Contemporary English*. London : Longman.
- Quirk, R., Greenbaum, S., Leech, G. and Svartvik, J. (1985) *A Comprehensive Grammar of the English Language*. London : Longman.
- Stevens, S. S. and Volkman, J. (1940) "The relation of pitch to frequency : A revised scale," *The American Journal of Psychology* 53 : 8, 329-53.
- Sugito, M. (2000) *SUGI Speech Analyzer CD-ROM*, Yokohama : Fujitsu Animo.

#### Source of the Corpora

Takanashi, K. (1973) *Sokaieibunpo*. Kyoto : Biseisha.