Perceptual Similarities and Differences in English Prosody: A Preliminary Study

Perceptual Similarities and Differences in English Prosody: A Preliminary Study[1]

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1. Introduction

English prosody is a difficult area of study. Although many distinguished researches have been conducted so far (e.g. Palmer (1922), Kingdon (1958), Schubiger (1958), Halliday (1967), Crystal (1969), O'Connor and Arnold (1973), Couper-Kuhlen (1986), Cruttenden (1997), Roach (2000)), unlike the study of English segments, there is not a unified classification system yet. The number of categorical tones is different, and the sub-categorization of each major tone is also different.

Another major problem with English prosody is that even professional phoneticians do not perceive it in the same way, and this different interpretation is detected even in such core prosodic elements as tone-unit boundaries, tonic syllables and tone types (Knowles et al. (1996)). Some say that such and such transcription here is simply wrong as if they believed that there is only one interpretation, but this kind of statement may be wrong. Instead, it should be presupposed that people do not perceive prosody in the same way – even though they have studied its theory in detail and practiced its application extensively. One further logical reason would be that people do not speak as textbooks say.

In this paper, the author would like to examine how similarly and differently professional English-speaking phoneticians perceive English prosody, especially focusing on such key elements as tone-unit boundaries, tonic syllables and tone types. There are two main reasons for asking such phoneticians in this research, not ordinary English-speaking people. First, it is expected that core differences with a high degree of importance will be found as they share a common knowledge of English prosody. Second, it is assumed that ordinary English-speaking people do not know how to transcribe English prosody.

2. Data

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To achieve the objectives of this paper, the author selected recorded materials from British and American news programs. Such news programs are ideal for this research, because they include both read speech and spontaneous speech, and it is possible to examine how these two types of speech may affect native speakers' perception. It is known that spontaneous speech is more difficult to transcribe, and how difficult this is will be discussed in the course of this work. For research material, the author selected a news program from Berwick and Thorne (2003) and Kashiwagi (2004).

In this paper, the first part of read speech, which is read by an experienced BBC newscaster, is examined as a preliminary study of this research. The news script reads: "Britain is facing a crisis over its rubbish. Each year every household in the country produces a ton of rubbish, and eighty percent of it is buried in landfill sites. European Union rules say that's far too much. Richard Bilton has been to Edmonton in North London and Edmonton, Canada, where recycling is a way of life." There are four sentences consisting of 57 words. This part is read in 19.2 seconds, which means that the average speed is 178 words per minute.

3. Research Design

Five professional English-speaking phoneticians (four British and one American) participate in this research. There are three males and two females, but when one phonetician is referred to in a pronoun, 'he' is used all the time irrespective of the real gender in order to assure greater anonymity. It should be emphasized that this research should never be used simply to criticize how each phonetician perceives English prosody.

All the correspondences between these five phoneticians and the author were made by email. After the author received their permission to participate in this research, he sent them news scripts and audio files. Their transcriptions were sent to the author in a couple of months by email or post. There are three tasks involved in this research: identifying the tone-unit boundary, the tonic syllable and the tone type. All five phoneticians did not use acoustic analysis. Their auditory impression is entirely reflected in this research.

4. Results

The five phoneticians are simply referred to here as Phonetician 1, Phonetician 2, Phonetician 3, Phonetician 4 and Phonetician 5. It should be noted at the outset that not all of them transcribe the data in the same way. Phonetician 1 distinguishes Falls from non-Falls and does not make a distinction between Rises and Fall-Rises. Phoneticians 1 and 4 do not make a high/low distinction. Phonetician 2 transcribes all prosodic markers: pre-head, head, tonic syllable and tail.

The five phoneticians transcribe the data as follows. The Rise symbol in Phonetician 1 means both a

Rise and a Fall-Rise.

Phonetician 1: | Britain is facing a crisis over its`rubbish. | Each ´year | every household in the `country | produces a´ton of rubbish, | and eighty percent of it is buried in`landfill sites. | European Union´rules | say that's far too`much. | Richard Bilton has been to Edmonton in North´London | and Edmonton,`Canada, | where récycling | is a way of life. |

Phonetician 2: |`Britain is | facing a`crisis | over its`rubbish. | Each ˇyear | every household in the `country | produces a`ton of´rubbish, | and eighty percent of it is buried in`landfill sites. | European Unionˇrules | say that's far too`much. | Richard`Bilton | has been to Edmonton in Northˇ London | and Edmonton,`Canada, | where rècycling | is a way of life. |

Phonetician 3: | Britain is facing a`crisis | over its`rubbish. | Each ´year | every household in the `country | produces a`ton of´rubbish, | and eighty peřcent of it | is buried in`landfill sites. | European Unionˇrules | say that's far too`much. | Richard`Bilton | has been to Edmonton in Northˇ London | and Edmonton,`Canada, | where rècycling | is a way of life. |

Phonetician 4: |ˇBritain | is facing aˇcrisis | over its`rubbish. | Each ˇyear | every household in the ˇcountry | produces aˇton of rubbish, | and eighty peřcent of it | is buried in`landfill sites. | European Unionˇrules | say that's far too`much. | Richard`Bilton | has been to Edmonton in Northˇ London | and Edmonton,`Canada, | where rěcycling | is a way of life. |

Phonetician 5: |ˇBritain | is facing a`crisis | over its`rubbish. | Each ˇyear | every household in the ˇcountry | produces aˇton of rubbish, | and eighty peřcent of it | is buried in`landfill sites. | European Unionˇrules | say that's far too`much. | Richard`Bilton | has been to Edmonton in Northˇ London | and Edmonton,`Canada, | where rècycling | is a way of life. |

5. Tone-unit Boundary

Among the four sentences, the third sentence is divided into identical tone-units: | European Union rules | say that's far too much |. In dividing a sentence into tone-units, all five phoneticians mark the boundary at punctuation marks (i.e. commas and periods). Grammatical units also seem to play a key role. A division tends to be made between a subject and a predicate, and an adverbial phrase tends to be marked as a separate tone-unit. This is understandable, because generally speaking, people speak with chunks of meaning. No pause is likely to be made within a chunk of meaning unless the speaker pauses to look for an appropriate word in a naturally occurring speech. Such a chunk usually matches a grammatical unit (e.g. a noun phrase and a verb phrase). This feature becomes more noticeable in

read speech. The four sentences under analysis here are uttered by a professional BBC newscaster. His principal role is to convey the news to the audience accurately. This accuracy is particularly important because this part comes at the top of the news, and without a good understanding of it, the audience may find it difficult to follow the rest of the news. It is natural, therefore, that he should be careful of grammatical units in reading the news and that the tone-unit should be divided between a subject and a predicate. The third sentence is short and grammatically simple with no long modifying phrases. It is assumed that because of read speech and simple grammatical construction, all five phoneticians mark the tone-unit boundary in the same way – between the subject and the predicate. In the other grammatically more complicated four sentences, however, there is more than one type of tone-unit boundary.

In the first sentence 'Britain is facing a crisis over its rubbish', there are four types of tone-unit boundary: (1) | Britain | is facing a crisis | over its rubbish |; (2) | Britain is | facing a crisis | over its rubbish |; (3) | Britain is facing a crisis | over its rubbish |; and (4) | Britain is facing a crisis over its rubbish |. Phoneticians 4 and 5 agree with the first type. The difference between (1) and (2) lies only in which tone-unit the be-verb 'is' – a marker to signify a progressive form – belongs to. The grammatical construction of this sentence is subject (i.e. noun phrase) + verb phrase + adverbial phrase. The boundaries made in the first three types of transcription coincide with these grammatical units, especially the one made at the beginning of the adverbial phrase 'over its rubbish'. The big difference is whether the whole sentence should be treated as a single tone-unit or not. Only Phonetician 1 treats this sentence as a single tone-unit.

In the second sentence, there are two types of tone-unit boundary: (1) | Each year | every household in the country | produces a ton of rubbish, | and eighty percent of it is buried in landfill sites | and (2) ... | and eighty percent of it | is buried in landfill sites |. The difference between the two types is made only in the second part of the sentence. Phoneticians 1 and 2 treat this part as a single tone-unit, while the other three treat it as two tone-units, with the boundary being located between the subject and the predicate. In the first part of the sentence, all five phoneticians agree with the boundary site: after the sentence-initial adverbial phrase and after the subject. All the boundaries made here correspond to grammatical units.

In the fourth sentence, there are two types of tone-unit marking: (1) | Richard Bilton | has been to Edmonton in North London | and Edmonton, Canada, | where recycling | is a way of life | and (2) | Richard Bilton has been to Edmonton in North London |... As this shows, all the boundaries made here also match grammatical units, and there is a good agreement among the five phoneticians, especially in the second part of the sentence. The only difference is found in the first part of the sentence, where only Phonetician 1 treats this part as a single tone-unit and the other four make a boundary between

the subject and the predicate. It may be worth noting that this phonetician seems to perceive longer tone-units. He may tend not to pay so much attention to small differences in pitch.

6. Tonic Syllable and Tone Type

There are two major differences in the way of marking the tonic syllable among the five phoneticians. First, Phoneticians 2, 3 and 5 make the H/L distinction, but the other two do not. Second, Phonetician 1 makes a distinction between a Fall and a non-Fall only. In this section, therefore, no mention is made of the H/L distinction and the Fall-Rise/Rise distinction. These distinctions, however, are highlighted in section 7, where perceptual similarities and differences are acoustically analyzed.

In the third sentence, where all five phoneticians mark the tone-unit boundary in the same way, the same tonic syllable is selected and its tone type is also marked identically: 'rules' with a non-Fall and 'much' as a Fall.

In the first sentence, all five phoneticians mark the first syllable of 'rubbish' as the tonic syllable with a Fall. The first syllable of 'crisis' is selected as the tonic syllable and marked with a Fall by Phoneticians 2, 3 and 5 and with a non-Fall by Phonetician 4. Phoneticians 2, 4 and 5 select the first syllable of 'Britain' as the tonic syllable, and Phoneticians 4 and 5 mark it with a non-Fall while Phonetician 2 marks it with a Fall.

In the second sentence, all five phoneticians select 'year', the first syllable of 'country', 'ton' and the first syllable of 'landfill' as the tonic syllables. Among them, 'year' and 'land' are marked with the same tone type: 'year' with a non-Fall and 'land' with a Fall. The first syllable of 'country' is marked with a Fall by Phoneticians 1, 2 and 3 and with a non-Fall by the other two. As mentioned in Section 5, Phoneticians 3, 4 and 5 divide the second half of the sentence into two tone-units: | and eighty percent of it | is buried in landfill sites |, and all the three mark the second syllable of 'percent' with a non-Fall.

In the fourth sentence, all five phoneticians select the first syllable of 'London', the first syllable of 'Canada', the second syllable of 'recycling' and 'life' as the tonic syllables. Among them, 'Lon', 'Can' and 'life' are marked with the same tone type: 'Lon' with a non-Fall, and 'Can' and 'life' with a Fall. There is a perceptual difference, however, in the second syllable of 'recycling': a non-Fall by Phoneticians 1 and 4 and a Fall by the other three. As mentioned in Section 5, Phoneticians 2, 3, 4 and 5 treat 'Richard Bilton' as a single tone-unit and all of them regard the first syllable of 'Bilton' as the tonic syllable and mark it with a Fall.

It is worth noting that the following four tonic syllables are marked with the entirely opposite tones: 'Britain', 'crisis', 'country' and 'recycling'.

7. Analysis

This section examines why there are the abovementioned differences in tone-unit boundary site, tonic syllable site, and tone type. According to Cruttenden (1997: 39-45), tone-unit boundaries are marked on external criteria and internal criteria. The external criteria mean such phonetic cues as pause, anacrusis, final syllable lengthening and change in pitch of unaccented syllables. An anacrusis means any unstressed syllables at the beginning of an utterance that are spoken with great speed, and signals the beginning of a tone-unit. The final syllable in a tone-unit is often lengthened, and signals the end of a tone-unit. A change in pitch level and/or pitch direction in unaccented syllables generally signals the beginning of a tone-unit boundary. The internal criteria mean that there should be a minimum internal structure in a tone-unit, which means at least one stressed syllable and a pitch movement.

7-1. Sentence 1

The first sentence 'Britain is facing a crisis over its rubbish' is acoustically analyzed. All the maximum F0 scales in this paper are 300 Hz.

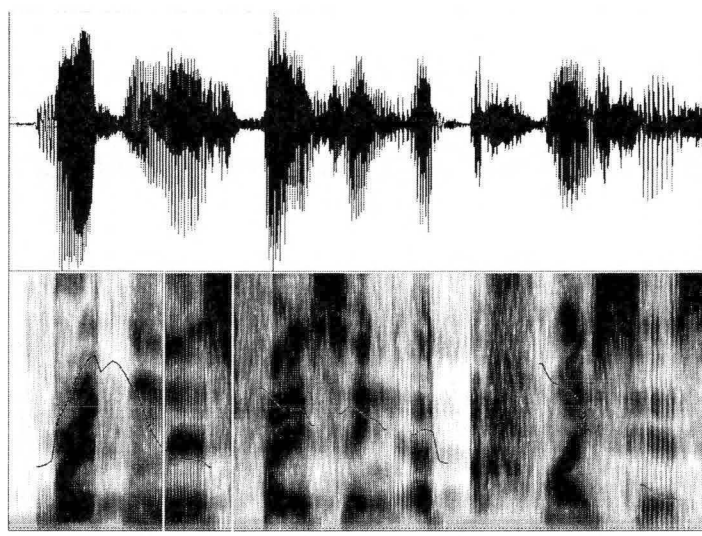

Fig. 1. Spectrogram and F0 of 'Britain is facing a crisis'

There are two panels in this figure. The top panel shows a waveform, and the bottom panel represents a spectrogram and the F0. The F0 is displayed in a discontinuous wavy line. Two vertical lines are drawn here to indicate the beginning and the end of 'is'. In 'Britain', the F0 simply falls after the initial rise[2]. There is no rise at the end. Since the F0 steps up between 'is' and 'facing', it is considered that the first syllable of 'facing' works as a high head, at least acoustically. From 'facing' to 'a', there

[2] The initial rise is commonly found at the beginning of a Fall.

is a downward trend in the F0, called declination. After this natural fall, there is an abrupt step-up at the beginning of 'crisis', followed by a fall to the low pitch. This indicates the tonic syllable spoken with a Fall. An overall high-low-high transition from 'Britain' through 'is' to the beginning of 'facing' may make Phoneticians 4 and 5 perceive that 'Britain' is uttered with a Fall-Rise. In other words, when a Fall is followed by a high head, some may perceive it as a Fall-Rise. Acoustically, this interpretation is incorrect, but acoustic analysis may not always reflect human perception. Unlike the F0 contour, pitch curve is a continuous movement manifested mentally.

A similar example is also found in the first syllable of 'crisis', which is perceived as a Fall-Rise by Phonetician 4. Fig. 2 displays the acoustic analysis of 'crisis over its rubbish'.

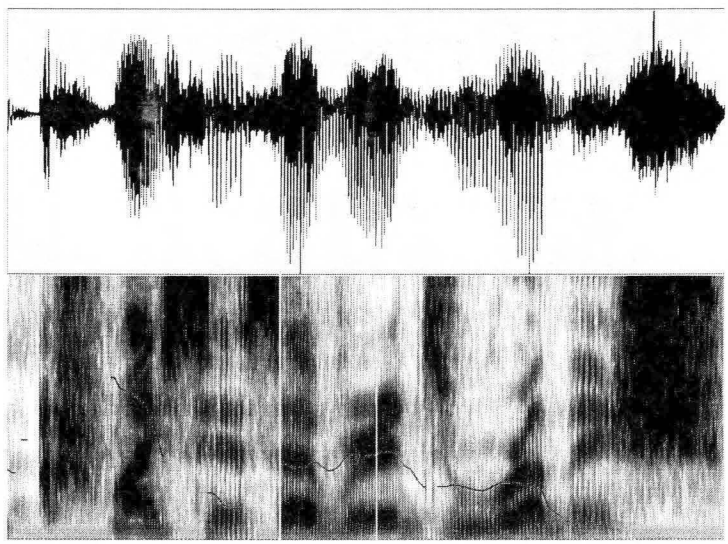

Fig. 2. Spectrogram and F0 of 'crisis over its rubbish'

The two vertical lines indicate the beginning and the end of 'over'. As this figure shows, the F0 simply descends in 'crisis', followed by a step-up in 'over'. As in the first syllable of 'Britain', acoustically this preposition works as a high-pitched element – probably as a high head. The assumed pitch curve in the final /s/ in 'crisis' is not continuous with the F0 contour in 'over', because they are differently angled. This again will prove that the first syllable of 'crisis' is not spoken with a Fall-Rise. It seems that Phonetician 4, who interprets a Fall as a Fall-Rise in the first syllable of 'Britain', is likely to perceive Fall-Rises more often than the other phoneticians.

As mentioned above, a tone-unit boundary is generally made between a subject and a predicate. Phonetician 2, however, marks a boundary after 'is', which is used as part of a progressive form. This is a violation against the general rule. As Fig. 1 shows, the F0 contour is continuous from 'Britain' to 'is', with no disruption. Between 'is' and 'facing', however, there is a temporal gap in the F0, created

by two voiceless consonants /z, f/ and there is also a noticeable frequency difference in the F0 between them. This is a good example to show that a tone-unit boundary does not always coincide with a grammatical boundary. In other words, in cases like this, transcribers need to make a decision whether they should place more emphasis on grammatical information or phonetic reality, and this decision is difficult to make.

It is also necessary to examine the third possibility – treating the whole sentence as a single tone-unit. The whole sentence is acoustically analyzed as in Fig. 3.

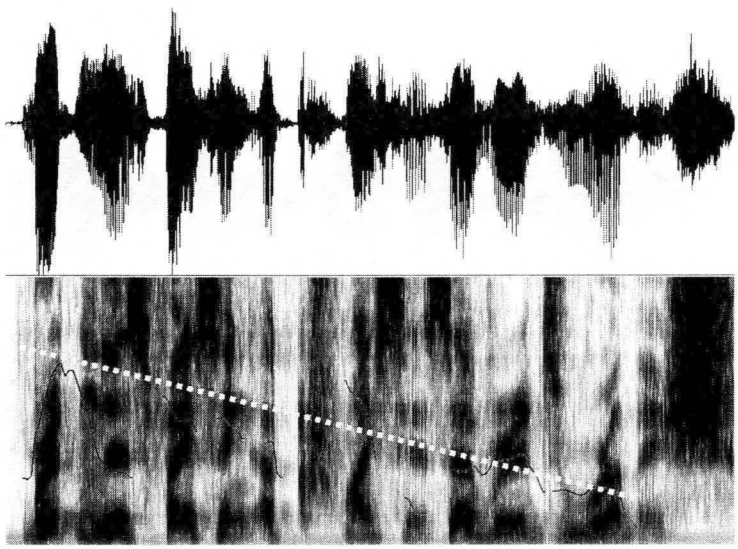

Fig. 3. Spectrogram and F0 of 'Britain is facing a crisis over its rubbish'

As the supplemental dotted line indicates, the whole F0 contour may be interpreted as a general trend of declination, with a slight jump in the middle, which corresponds to 'crisis'. This slight jump may be regarded simply as special emphasis and not be great enough to make a boundary here. This is the way Phonetician 1 perceives this sentence.

Among the five different types of transcription, it is possible for the author to choose one particular type through the acoustic analyses, but he does not do so here. That is not the purpose of this paper. What is under investigation here is to examine how similarly and differently English prosody is perceived and the reasoning behind it.

7-2. Sentence 2

The second sentence is 'Each year every household in the country produces a ton of rubbish, and eighty percent of it is buried in landfill sites'. The interpretation of four syllables is particularly

examined here: 'year', the first syllable of 'country', 'ton' and the second syllable of 'percent', as their tone types are perceived differently.

First, 'year' in 'each year' is examined. As mentioned in Section 6, all five phoneticians mark this syllable with a non-Fall. A close examination reveals that Phoneticians 2, 4 and 5 perceive it as a Fall-Rise. It is not certain whether Phonetician 1 perceives it as a Fall-Rise or simply as a Rise, but Phonetician 3 perceives it as a Rise.

According to Couper-Kuhlen (1986: 92-97), Rises are typified by upward pitch movement on or beginning on a prominent syllable, while Fall-Rises are characterized by a phonetically prominent fall followed by a phonetically less prominent rise on one and the same syllable or this movement is spread over one nuclear prominent syllable and the tail.[3] She also states that in RP there may be a short falling on-glide[4] in the case of a Rise. If such a fall is neither long nor short, the division between Rises and Fall-Rises may become ambiguous. Fig. 4 displays the acoustic analysis of 'each year'.

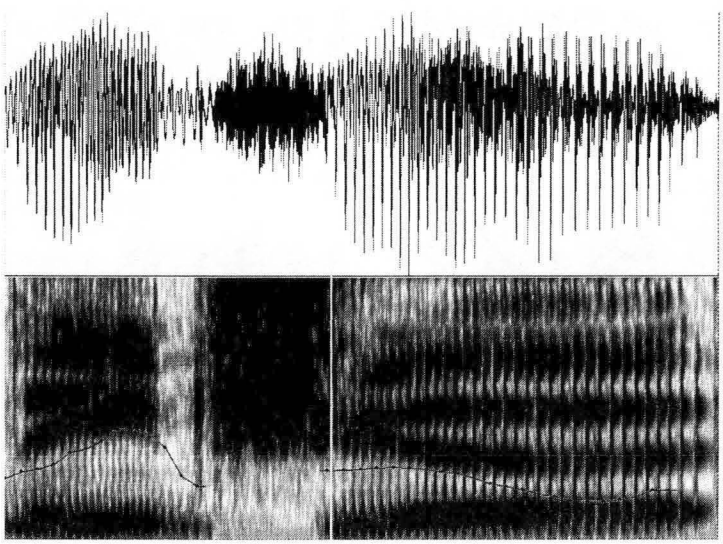

Fig. 4. Spectrogram and F0 of 'each year'

The vertical line in Fig. 4 indicates a boundary between the two words. As this figure shows, changes in the F0 are more noticeable in 'each' than in 'year', but no phonetician treats the first monosyllabic word as the tonic syllable. This may have something do to with their knowledge of how stress is

[3] When the tail follows the tonic syllable, the form of Fall-Rises may be divided into three types. When there is one syllable in the tail, the rise part is carried by this syllable. When there are more syllables in the tail, the rise begins at the final stressed syllable. When no such stressed syllable exists, the rise happens on the final syllable. See Roach (2000: 171-172) for more details.

[4] This on-glide is contrasted with the abovementioned short rising on-glide in the case of a Fall.

constituted in a phrase, where a headword is most stressed.[5] It may also be related to a quantity difference – 'year' is pronounced longer than 'each'. There is a slight rise in the end of 'year', whose peak is lower than its initial peak. All five phoneticians, however, perceived this slight rise as a key to marking this syllable as a non-Fall. In this particular case, it seems that the fall part is much stronger than the rise part, because of the bigger pitch difference and longer pronunciation on the fall part. Another interpretation may also be possible if the initial flat part is regarded as a non-tonic level and the following fall part as an essential downward movement for a Rise to happen. This may be how at least Phonetician 3 perceives this phrase.

There is also a difference in transcription of 'country'. Though all five phoneticians treat the first syllable as the tonic syllable, Phoneticians 1, 2 and 3 mark it with a Fall, while the other two with a Fall-Rise. Fig. 5 shows the acoustic analysis of 'country produces a'.

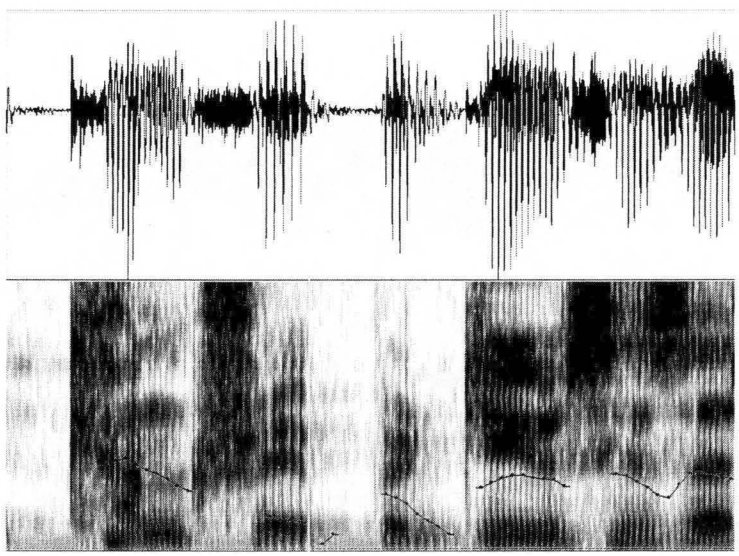

Fig. 5. Spectrogram and F0 of 'country produces a'

The vertical line in Fig. 5 indicates the boundary between 'country' and 'produces'. No rise is detected in the second syllable of 'country' – the F0 is level or falls very slightly. What is important here is that the F0 becomes higher in the first syllable of 'produce' and that the second syllable is also higher than the first. This F0 contour type exactly matches the one we saw in 'Brit' and 'cri' in the first sentence, where a Fall is followed by a head and the head is higher pitched than the end of the Fall.[6] Some phoneticians, particularly Phonetician 4, interpret this type as a Fall-Rise, and they may find more

[5] The phrase 'each year' itself is a noun phrase, consisting of an adjective and a noun, but it works as an adverbial phrase, modifying the whole sentence.

[6] Phonetician 2 marks the second syllable of 'produce' with the low head.

cases of this tone. It may be worth examining whether a specific difference in the F0 is involved between the previous syllable and the next, but this will be discussed when more data are accumulated.

In the British tradition, the Fall-Rise is usually divided into two types: simple Fall-Rise and split or compound Fall-Rise (i.e. Fall + Rise). Phonetician 2 clearly distinguishes between these two types[7]. According to O'Connor and Arnold (1973: 29-30), there are three differences in form. First, in the split Fall-Rise the fall often has a wider range than in the simple Fall-Rise. Second, in the simple Fall-Rise the syllables after the fall often gradually rise one after the other; in the split Fall-Rise they always remain at the lowest level until the final rise. Third, in the simple Fall-Rise all the stresses after the fall may be weakened or suppressed altogether; in the split Fall-Rise this does not happen. When a head precedes the tonic syllable, it is a falling head in the simple Fall-Rise but is a high head in the split Fall-Rise. There is also a semantic or communicative difference between them. When 'Try not to be late' is uttered with the simple Fall-Rise, it may be followed by 'even if it's difficult'. On the other hand, when it is uttered with the split Fall-Rise, it may be followed by simply 'please'. In other words, the simple Fall-Rise indicates given information or more to follow, while the split Fall-Rise indicates new information followed by an addition, and this new information is uttered with a fall and the addition with a rise. Fig. 6 shows the acoustic analysis of 'produces a ton of rubbish'.

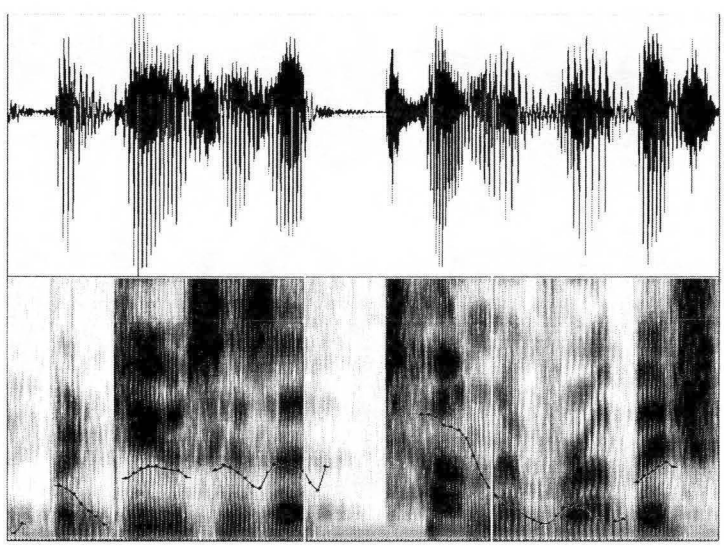

Fig. 6. Spectrogram and F0 of 'produces a ton of rubbish'

The two vertical lines mark the end of 'a' and 'ton'. Judging from this figure, there are three features that support that this Fall-Rise is a split version. First, the tonic syllable 'ton' is high pitched – there is

[7] Phonetician 3 uses two types of the Fall-Rise, but he seems to use the split Fall-Rise symbols when the Fall-Rise extends beyond the word boundary.

a noticeable step-up between 'a' and this syllable. Second, two syllables 'of' and 'rub' remain at the low level until the final rise in 'bish'. Third, there is no pitch drop in 'a'. It is difficult to tell whether the semantic or communicative difference works in this case, because the tonic syllable is in the middle of the sentence. When the syllable is in this place, it is natural that there should be more to follow, which may help to interpret a Fall-Rise as the simple Fall-Rise in the semantic or communicative sense. As a result, an entirely different interpretation comes out. It may be better to apply this semantic or communicative criterion to dialogues. Differences in form may be more logical and persuasive in news reading.

A major difference is also found in 'and eighty percent of it is buried in landfill sites'. Phoneticians 3, 4 and 5 divide this part into two tone-units, while the other two mark no boundary. All five phoneticians, however, treat the first syllable of 'landfill' as the tonic syllable and mark it with a Fall. It is, in fact, unlikely to interpret this syllable with another tone, because this comes at the end of the sentence and the newscaster simply reads a statement. In other words, he needs to complete this sentence with a sense of finality, which must be marked with a Fall. Fig. 7 displays the acoustic analysis of 'and eighty percent of it is buried in landfill sites'.

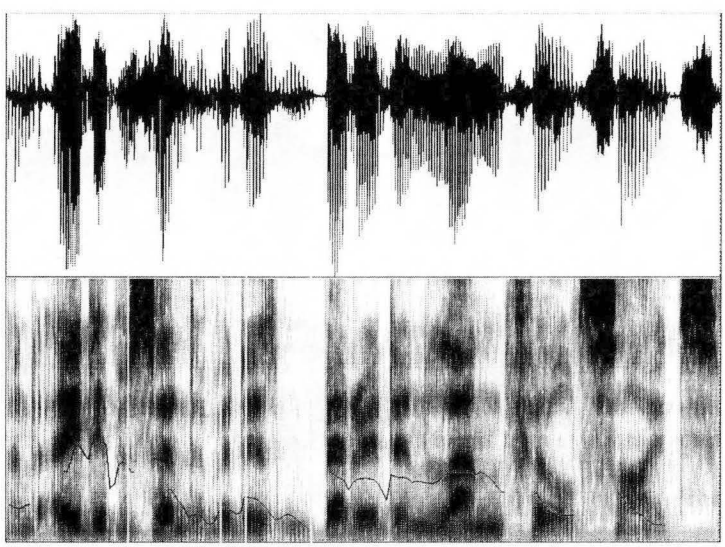

Fig. 7. Spectrogram and F0 of 'and eighty percent of it is buried in landfill sites'

Four vertical lines are drawn in this figure. They indicate, from left to right, the end of 'per', the end of 'of', the end of 'it', and the end of 'is'. If this part is divided into two parts, there is only one possibility of where the tone-unit boundary should be located – between 'it' and 'is'. There is a smooth high-low-high F0 movement between 'per' to 'it', which shows a Fall-Rise, but this smooth movement is disrupted at 'is'. It may be better, therefore, to mark a boundary before this be-verb, and this site is

grammatically justified because it is located between the subject and the predicate. It should be noted that there is a considerable difference in speed between the subject noun phrase and the verb phrase: 361 words per minute vs. 182 words per minute, and it is because of this difference that Phoneticians 1 and 2 may treat this subject part as an anacrusis and mark the whole part as a single tone-unit. This is a good example indicating how speed influences judgments on the tone-unit boundary.

7-3. Sentence 3

The third sentence 'European Union rules say that's far too much' is acoustically analyzed. As stated above, all five phoneticians transcribe this sentence in the same way. One question that arises here is what Phonetician 1 would mean when he says that 'rule' is spoken with a non-Fall. Fig. 8 displays the acoustic analysis of 'Union rules say that's'.

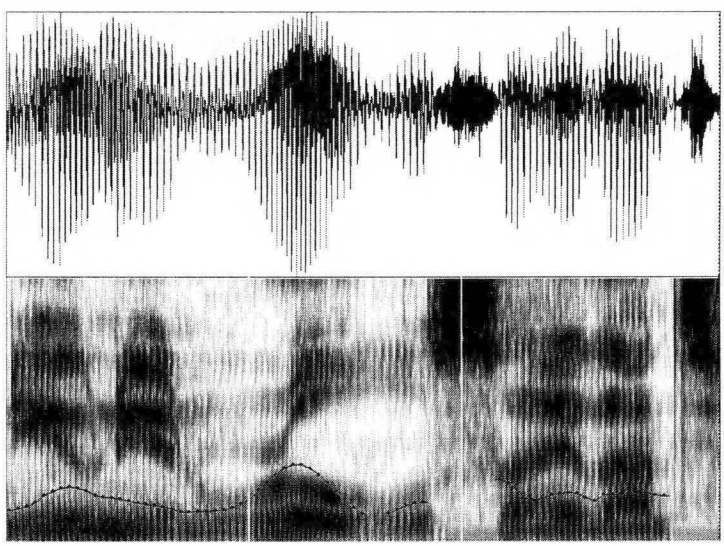

Fig. 8. Spectrogram and F0 of 'Union rules say that's'

The two vertical lines indicate the beginning and the end of 'rules'. As this figure shows, there is a clear falling-rising movement in this tonic syllable. What he probably means is a Fall-Rise. If this is the case, there is not a single difference in transcription among the five phoneticians.

7-4. Sentence 4

Finally, the fourth sentence 'Richard Bilton has been to Edmonton in North London and Edmonton, Canada, where recycling is a way of life' is acoustically analyzed.

Differences in transcription are found in two parts of this sentence. First, Phoneticians 2, 3, 4 and 5 regard 'Richard Bilton' as a separate tone-unit, but Phonetician 1 does not. Second, Phoneticians 2, 3

and 5 mark the second syllable of 'recycling' as a Fall, while the other two mark it as a non-Fall (Phonetician 4 marks it as a Fall-Rise). Fig. 9 shows the acoustic analysis of 'Richard Bilton has been to Edmonton in North London.'

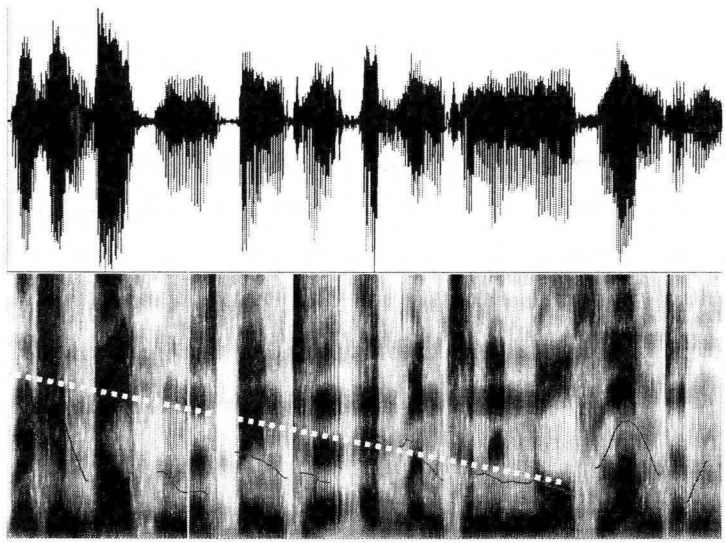

Fig. 9. Spectrogram and F0 of 'Richard Bilton has been to Edmonton in North London'

The vertical line indicates the boundary between 'Bilton' and 'has'. As this figure shows, the F0 contour falls from high pitch to low pitch at 'Bilton', followed by a low level, which corresponds to 'has'. The contour, then, goes up slightly at 'been', up again at 'Edmonton', and greatly up again 'London', where the contour depicts a falling-rising movement – an indication of a Fall-Rise. Every time the contour goes up, it falls slightly because of declination, which does not give any effect in intonation marking. The big difference in pitch at 'Bilton' may signal that 'Richard Bilton' is a separate tone-unit. As Phonetician 1 transcribes, this whole part from 'Richard' to 'London' may also be treated as a single tone-unit on the ground that the fall in 'Bilton' is not relevant to the wholistic movement of the downward F0 movement, which is described in the dotted line in Fig. 9. It seems that this phonetician tends to perceive tone-units in bigger blocks than the other four phoneticians, without paying much attention to smaller changes in the F0 contour. Two other similar examples are the first sentence and the second half of the second sentence in the passage used in this paper. More data need to be examined before reaching a conclusion, but his approach may be described as a wholistic or gestalt approach. He marks the first syllable of 'London' as a non-Fall, but as Fig. 9 clearly displays, what he means would probably be a Fall-Rise, just as the other four phoneticians interpret.

The interpretation of the second syllable of 'recycling' also needs to be examined, because the entirely different interpretation is made: a non-Fall by Phoneticians 1 and 4, but a Fall by Phoneticians

2, 3 and 5. In the case of Phonetician 4, he interprets this tonic syllable as a Fall-Rise. Fig. 10 shows the acoustic analysis of 'where recycling is a way of life'.

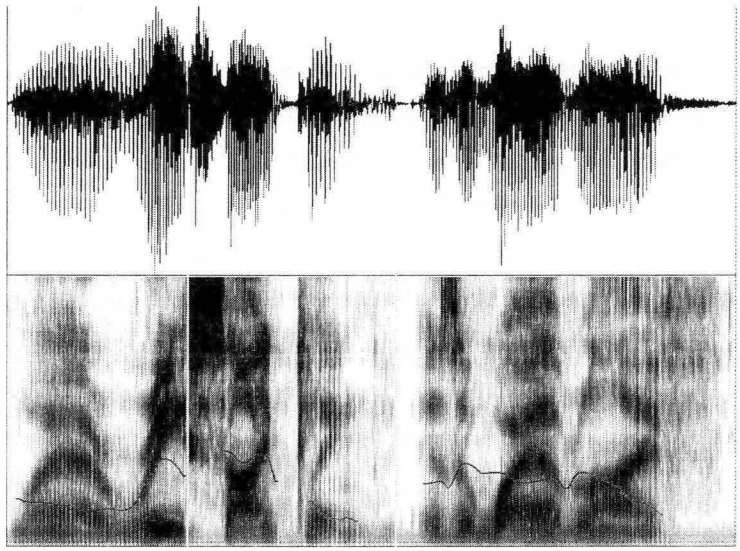

Fig. 10. Spectrogram and F0 of 'where recycling is a way of life'

The two vertical lines indicate the beginning and the end of 'cycling'. As this figure shows, the F0 contour falls in 'cycling'. Before reaching its end, however, this fall already reaches a low pitch, and this pitch level continues till the end of 'cycling'. The accurate F0 contour in 'cycling' is, therefore, a Fall followed by a non-tonic level. This clear fall helps to assume that what Phonetician 1 means by a non-Fall is a Fall-Rise, just like Phonetician 4. As mentioned repeatedly in this paper, when a Fall is followed by a higher pitched element in the following tone-unit – prehead or head, some phoneticians tend to perceive a continuous falling-rising pitch movement beyond the tone-unit boundary and mark the tonic syllable with a Fall-Rise. This tendency is most noticeable in Phonetician 4 among the five phoneticians. It should be noted that this higher pitched element in the following tone-unit may not always be interpreted as a high element. Phonetician 2 transcribes 'way' as a low head and 'life' as a low Fall.

8. Concluding Remarks

The paper deals with a preliminary study on how similarly and differently English-speaking people perceive English prosody. The reason why 'preliminary' is added in the title is that this is the author's first attempt to study this theme and part of the accumulated data is used. The follow-up study will be implemented soon by using all available data and compared with the present study. Five professional

English-speaking phoneticians participate in this research. It is only they who can enable the research to achieve its purpose, because they know the way of perceiving and transcribing prosody systematically.

The five phonetician's perception of English prosody is almost the same, as far as the current data is concerned. Tone-unit boundaries are marked almost in the same way – no difference is made when there are punctuation marks (i.e. commas and periods). Major differences are detected when there are no such marks in a sentence or part of it, and this leads to differences in where the tonic syllable is located in a given tone-unit. Some tend to perceive a tone-unit in a bigger block than others. It is sometimes difficult to decide what type of pitch deviation should be regarded as a marker for a separate tone-unit. In spite of such differences in tone-unit boundary, however, the major tonic syllable in a sentence is identified equally, as in the first syllable of 'rubbish' in the first sentence. The basic tone classification is two-way (i.e. Falls vs. Rises). Although these two categories show entirely different directions, they are not always agreed. Even in the short passages examined in this paper, there are four cases of such disagreement. One noticeable perceptual difference is found when a Fall is followed by a higher pitched element in the following tone-unit, and this tends to be interpreted as a Fall-Rise. It seems that human perception is not always the same as physical reality, but personal preferences may be more involved. It has also been found that grammatical information is sometimes less emphasized than phonetic reality, as in 'Britain is'; and that unaccented syllables spoken rapidly may or may not be interpreted as an anacrusis, as in 'and eighty percent of it', where two phoneticians perceive the second syllable of 'percent' simply as stressed. This paper also discusses the difference between the simple Fall-Rise and the split Fall-Rise. The author would like to analyze more data to examine whether what has been found here is more generally applicable, at least among the five phoneticians.

The present research makes the author more certain that it is simply wrong to pursue a single type of transcription as a correct one, because people do not speak in accordance with classifications described in textbooks. It is true that humans make errors, but what is important is that each transcriber should not press his/her own transcription as the only right answer on others, except when there is an obvious misinterpretation. Through further analyses of more data, more clues to explain perceptual differences will be discovered.

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【日本語要旨】

英語プロソディの知覚上の類似と相違：予備的研究

湯澤伸夫

英語のプロソディの知覚は必ずしも一様でなく，音調単位区分，音調核音節の位置と種類という基本構造でも相違があることが報告されている。本論文では，英語母語話者 5 人の音声学者に，音声データのプロソディを聴覚情報だけで表記してもらい，知覚上の類似と相違が生じる理由を音響的に分析した。音声データの一部を用いたため，予備的研究とした。下降調の後に高いピッチが続くと，下降上昇調とも知覚されることなどが分かった。

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