K-ToBI (Korean ToBI) Labelling Conventions

(Version 3.0)

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ABSTRACT

This chapter presents an overview of Korean intonational structure and proposes a revised version of K-ToBI (Korean TOnes and Break Indices), a prosodic transcription convention for Seoul Korean. In the new version of K-ToBI, a tone tier is separated into two tiers: a phonological tone tier and a phonetic tone tier. A phonological tone tier labels tones marking the prosodic structure of an utterance, and a phonetic tone tier labels individual tones of an AP and an IP conforming to the surface pitch contour. Labelling surface tonal patterns will provide us data to test the underlying tonal patterns and to build phonetic implementation rules.

Keywords: Accentual Phrase, Intonation Phrase, K-ToBI, Phonetic tone tier, Break index

1. BACKGROUND

K-ToBI (Korean TOnes and Break Indices) is a prosodic transcription convention for Seoul Korean. It is based on the design principles of the original English ToBI (see Silverman et al., 1992; Beckman & Hirschberg, 1994; Pitrelli et al. 1994), and more directly on J_ToBI, the Japanese ToBI system, devised by Jennifer Venditti (see Venditti, 1995; Campbell & Venditti, 1995). Like the other ToBI systems, therefore, K-ToBI assumes intonational phonology with a close relationship to a hierarchical model of prosodic constituents as proposed by Pierrehumbert and her colleagues (e.g., Pierrehumbert 1980, Beckman & Pierrehumbert 1986, Pierrehumbert & Beckman 1988). The intonational analysis and attendant prosodic model of Seoul Korean adopted for K-ToBI are based on Jun (1993, 1995, 1996, 1998; also see Lee 1989 and de Jong 1989 for earlier studies). The first version of K-ToBI was developed at ATR Interpreting Telecommunication Systems in Japan in late 1994 by Mary Beckman and Sun-Ah Jun, as part of Korean synthesis development project. The second version (Beckman & Jun 1996) was an updated one modified in November 1996 by the same authors in

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accordance with the discussion of the Japanese/Korean working group at the Prosody Transcription Workshop held just before ICPhS (International Congress on Phonetic Sciences) in Stockholm, August 1995. The current version is a revised one from the second version by Sun-Ah Jun after Korean ToBI Workshop in Korea, August 1998, and was presented at the workshop "Intonation: Models and ToBI Labelling", a satellite meeting of ICPhS in San Francisco in August 1999. Before introducing the revised K-ToBI labelling conventions, a brief description of the intonational structure of Seoul Korean proposed in Jun (1993, 1996, 1998) is in order.

1.1 Intonational structure of Seoul Korean

The intonational structure of Seoul Korean has two intonationally defined prosodic units: Intonation Phrase (IP) and Accentual Phrase (AP). An AP is smaller than an IP and larger than a phonological word, a lexical item plus a case marker or postpositions. An IP is marked by a boundary tone (%) and final lengthening. An AP is marked by a phrasal tone, THLH (T=H if the AP initial segment is aspirated or tense, T=L otherwise), but not by final lengthening. The intonational structure of Seoul Korean is schematically represented in Figure 1.

An IP can have one or more APs, which in turn can have one or more Phonological words, W. An IP is marked by a boundary tone at the end, but not the beginning, of an IP, and delivers various pragmatic meanings as well as information about the sentence type. The boundary tone is realized in the IP final syllable, and depending on the shape of Fo contour starting from the onset of the IP final syllable, at least nine boundary tones have been identified (L%, H%, LH%, HL%, LHL%, HLH%, HLHL%, LHLH%, LHLHL%). For example, H% and LH% differ in the timing of rising; LH% rises later than H%, showing a Fo valley at the beginning of the IP final syllable. The same is true with HL% vs. LHL% or HLH% vs. LHLH%. In general, tones ending with H% often have a function of seeking information (i.e. question) and those ending with L% often have a function of making a statement. However, it is often the case that tones and meaning have many-to-many relationship. That is, more than one boundary tone can be used to mark the same meaning or sentence type, and more than one meaning is realized by the same boundary tone. For example, a wh-question can be marked by L%, H%, LH%, HL%, or HLH% (see Jun & Oh 1995), and HL% marks both a declarative and a wh-question. More research is needed to identify distinctive pragmatic meaning for each boundary tone.
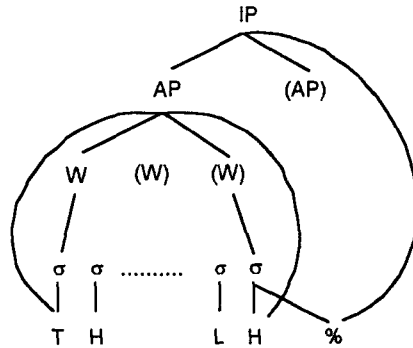
Figure 1. Intonational Structure of Seoul Korean
IP: Intonation Phrase   AP: Accentual Phrase
w: phonological word   σ: syllable
T= H, when the syllable initial segment is aspirated/tense, otherwise, T= L
%: Intonation phrase boundary tone

2. STRUCTURE OFf K-ToBI

The original English ToBI, Japanese ToBI, and Korean ToBI have four parallel tiers (word, tone, break-index, and miscellaneous), but allow the free proliferation of site-specific extra tiers. Each ToBI users are encouraged to add their own customized tiers to label events of site-specific interest, and keep records of why each particular tier was added and how it is used. By comparing extra tiers across labeling sites, we may find that we all agree on the desirability of some generally used tiers and can make it to be obligatory for Seoul Korean or other dialects.

Sites with aligner for English, for example, have generally added a phones tier for phonetic segmentation, and J_ToBI users have agreed to add an obligatory "finality" tier where intonational phrases that sound "final" to a turn are minimally marked as such (until they can develop a more complete discourse model of discourse finality to govern a hierarchy of labels for this tier). In accordance with this general design principle, the current version of K-ToBI expands a tone tier into two tiers, a phonological tone tier and a phonetic tone tier, in order to describe surface tonal patterns which are not predictable from the distinctive underlying tones. Therefore, a K-ToBI transcription for an utterance consists minimally of a recording of the speech, an associated record of the fundamental frequency contour, and the transcription proper symbolic labels for events on the following five parallel tiers:

1. a word tier
2. a phonological tone tier
3. a phonetic tone tier
4. a break index tier
5. a miscellaneous tier

2.1 Motivation of revision

The expansion of a tone tier was devised to label the surface tonal pattern of an accentual phrase (= AP) separately from the underlying tones marking the AP boundary. This was motivated by the following four reasons. First, ToBI labeling system assumes that tones are labeled only when they are distinctive (Beckman & Ayers 1994, http://ling.ohio-state.edu/~tobi/). Non-distinctive pitch events that can be automatically extractable from the signal should not be labeled. This is true for English ToBI. However, in Korean, distinctive pitch events do not come from an individual phrasal tone but as a set of tones forming an AP. Furthermore, though the most common tone pattern of an AP is LHLH or HHLH when the AP is longer than three syllables, an AP in Seoul Korean can be realized in at least fourteen different tonal patterns, with more variation when the AP has shorter than three syllables (i.e., LH, LHH, LLH, LHLH, HH, HLH, HHLH, LL, HL, LHL, HHL, HLL, LHLL, HHLL). Though these various patterns do not seem to differ in meaning among themselves, nor predictable, it is not known yet if all these variations are indeed not distinctive nor predictable. By labelling surface tonal patterns, we will be able to investigate if there is any meaning difference among these patterns.

Second, the earlier version of K-ToBI labels only two types of tones for an AP: 'H-' marking an AP initial H tone when realized, and 'LHa' marking the end of an AP. When there is no initial H in an AP, H- was not labelled. However, when an AP-like phrase ends in an L tone, 'LHa' was not labelled. Instead L% was labelled at a tone tier and a break index '2m' was labelled at a break index tier to indicate that the boundary juncture does not match the tone pattern. That is, the degree of juncture is the same as that of the usual AP boundary, i.e., '2', but the tonal mark, L%, shows the boundary of an Intonation Phrase. Sometimes this was indeed the case. However, observation of more natural data revealed that an AP boundary is sometimes realized in an L tone due to the tonal interaction of adjacent tones and stylistic variations. At the moment, the detail condition of AP final L tone and its pragmatic meaning are not known. We hope to get answers to these issues by labelling 'La' for a falling AP boundary at a phonetic tone tier.

By allowing 'La' to mark an AP boundary, this revised version now has a different definition of the break index '2m'. Before, it was used for a mismatch between tone and break index covering two cases: "2-like break but not AP-like tone" and "AP-like

tone but not 2-like break". In the current version, a break index '2m' refers only to the former: 2-like break but not AP-like tone. "AP-like tone but not 2-like break" will be labelled in two ways depending on the degree of perceived juncture: either 1m (1-like break with AP-like tone) or 3m (3-like break with AP-like tone).

Third, the AP initial tone in Seoul Korean is in general either L or H depending on the initial segment of an AP: H when the segment is aspirated or tense, but L otherwise. Regardless of this, the second syllable of an AP is H when the AP has more than 3 syllables. Thus, an AP can have H on the first syllable or on the second syllable or both. In the earlier version of K-ToBI, we labeled 'H-' at the first occurrence of a high pitched syllable, either first or second syllable or rarely on the third syllable, without considering the origin of the H tone or the alignment of the peak to syllables. However, quantitative data show that phonetic realization of these H tones differs depending on their origins and locations. Fo is significantly higher for the H tone on the AP initial syllable (i.e., HHLH) than the H tone after the AP initial L tone (i.e., LHLH). In addition, this raised Fo value in the beginning of the HHLH pattern influences the following syllables, if there is any, by raising Fo values, compared to those in the LHLH pattern, up to the penultimate syllable of an AP (see Lee (1999) for more detail). Assuming that the initial L in LHLH or the second H in HHLH is predictable, we did not label these tones in the earlier version. But these are not always predictable, and furthermore, as mentioned earlier, the individual tone itself forming an AP does not seem to be meaningful. What is important in Korean intonational phonology is the boundary marker of an AP and an IP. Therefore, in this revised version, we will label the AP and IP boundaries at a phonological tone tier, and the individual AP tones at a phonetic tone tier aligned with the corresponding surface Fo event. Labelling surface tonal events at a phonetic tone tier will provide us data by which we can determine whether these tones are meaningful in Korean intonational phonology. It will also provide valuable information to researchers working on speech synthesis and recognition.

Fourth, by separating a tone tier into phonological and phonetic tone tiers, we can easily accommodate tonal transcriptions of other dialects. For example, unlike Seoul Korean, the tonal pattern of an AP in the Chonnam dialect (Southwestern dialect of Korean) is LHL or HHL (Jun 1989, 1993, 1996, 1998), with the alternation of the AP initial tone being caused by the same principles as in Seoul. However, the accentual phrasing of this dialect is the same as that of the Seoul dialect. Thus, a phonological tone tier for Seoul Korean will remain the same for transcribing tones for the Chonnam dialect, while a phonetic tone tier of these two dialects will differ conforming to the surface realization of each dialect.

In the following sections, each of the five tiers is defined, and labels and symbols

proper for each tier are introduced. In addition, example sentences illustrate in a text format how to label information in each tier, and pitch tracks of all sentences are shown in Appendix B.

3. TIERS

3.1 A word tier

The word tier in K-ToBI corresponds to the "orthographic tier" in English ToBI. In this tier, words may be labeled using either Hangul orthography or some conventional romanization, depending on what is more convenient for the users' labeling platform or on what is most appropriate for exporting to relevant applications. Since what constitutes a "word" in Korean is a matter of some debate, we cannot be very specific here about how frequently to place word labels. For example, the intended applications at one site might require that a word label be placed for each morpheme string that has its own separate entry in some on-line dictionary. At the other end of the scale, another site may need only that there be as many labels as there are spaces in a standard Hangul transcript of the text. We anticipate that different sites may find that the intended applications pose specific needs as to how finely an utterance should be broken up into words, and that eventually a consensus will emerge from these needs. In this version, we consider 'word' as a sequence of segments divided by space in a written text.

If the labeling platform is xwaves and xlabel (or any similar labeling platform that works in terms of time flags), the word label should be placed at the end of the final segment in the word, as determined by the labeler from the waveform or spectrogram record. That is, each word should be marked at its right edge. Filled pauses and the like should also be marked, using some site specific convention for the Hangul or romanized spelling. A romanization convention used at UCLA site is in Appendix A.

3.2 A phonological tone tier

A phonological tone tier will be used to mark the boundary tone of an Intonation Phrase (IP) and the boundary tone of an IP-medial Accentual Phrase (AP). Since an AP boundary tone in an IP-final position is overridden by an IP-final boundary tone, only IP final boundary tone (%) will be labeled at the end of an IP.

To mark the end of an AP, we will use 'LHa' as a short term for LHLHa or HHLHa. This implies that the most common AP final tone in Seoul Korean is a rising tone (LH). To mark the end of an IP, we will use nine different boundary tones, i.e. H%, L%, HL%, LH%, HLH%, LHL%, HLHL%, LHLH%, LHLHL%. To simplify the

description of IP boundary tones, 'T' is used below as a variable of the IP boundary tones. Instructions of where to put phonological tone labels are given below. Sentence examples labelled with phonological tones will be shown after the description of a phonetic tone tier in the next section.

LHa   Marks the end of an IP-medial AP, aligned with the end of AP final segment determined from the waveform. The LHa tone should be placed at or just before the corresponding break index marker regardless of the actual location of the peak.

T%   Marks the end of an IP, aligned with the end of IP final segment determined from the waveform. 'T' can be H, L, HL, LH, HLH, LHL, HLHL, LHLH or LHLHL. A T% tone at a phonological tone tier should be placed at or just before the corresponding break index marker regardless of the actual location of the peak. When a word is final to an AP and final to an IP, only the IP boundary tone is written at the end of the word.

3.3 A phonetic tone tier

A phonetic tone tier will be used to mark the surface realization of AP tones and IP tones. As for AP tones, we will have three initial tones (i.e. L, H, and +H) and three final tones (i.e. La, Ha, and L+). Among the initial tones, L and H are for the tone on the first syllable of an AP, and +H is for the tone on the second (and sometimes the third when the AP is long) syllable of an AP. Among the final tones, La and Ha are for the tone on the final syllable of an AP, and L+ on the penult of an AP. Therefore '+' sign in Korean ToBI refers to a syllable boundary and implies a grouping of the tone; +H is for the tone on the second syllable of an AP, thus an initial tone, and L+ is for the tone on the penult of an AP, thus a final tone. This is different from '+' in English bitonal pitch accents such as L+H*, L*+H or H+!H*, where two tones are associated with a stressed syllable, with the starred tone being aligned with a stressed syllable and the unstarred tone being realized either before the starred tone, i.e., a leading bitone as in L+H*, or after the starred tone, i.e., a trailing bitone as in L*+H.

When an AP has three syllables, the tone on the second syllable can be either L (ex. LLH) or H (ex. LHH). In this case, we will consider the medial L as a part of the final AP tone and the medial H as a part of the initial AP tone because we believe that both are derived from the underlying LHLH pattern. That is, LLH is parsed as L-LH with the undershoot of the first H of LHLH, and LHH is parsed as LH-H with the undershoot of the second L of LHLH. Therefore, LLH will be labelled as L, L+, and Ha, and LHH will be labelled as L, +H, and Ha, on each of the three syllables. The realizations and locations of three AP final tones and three AP initial tones are

described below.

AP final tones:

Ha   This is the most common AP final tone of an IP-medial AP. It can be
       either the end of a rising tone or a high flat tone. This label is placed
       aligned with an actual f0 peak on the AP final syllable.

La   This is a less common AP final tone, sometimes seen when the
       following AP begins with a H tone. This label is placed aligned with
       an actual f0 valley on the AP final syllable.

L+   This tone is not for the final syllable of an AP, but to label the low
       toned penultimate syllable of an AP, either before the AP final H tone
       or before the IP final H boundary tone. Do not label this tone if it is
       predictable from adjacent tone labels. For example, when an AP is
       continuously falling from an initial H to final La, L+ should not be
       labelled. Also when an AP initial is L and final is La, L+ should not
       be labelled. When not predictable, this label is placed aligned with an
       actual f0 valley on the penult of an AP. When there is no valley but
       only a low plateau, place this label at the beginning of the low plateau
       when preceded by an initial H, or at the end of the plateau when
       followed by a final H.

AP initial tones:

L   This tone marks an L tone on the first syllable of an AP. This label
       should be placed aligned with the Fo valley on the first syllable of an
       AP.

H   This tone marks a H tone on the first syllable of an AP. This label
       should be placed aligned with the Fo peak on the first syllable of an
       AP (but avoid the first pitch point at the beginning of a vowel which is
       most likely due to the segmental perturbation).

+H   This tone marks the H tone on the second syllable (or sometimes the
       third syllable when the AP is long or uttered fast or produced under
       focus) of an AP. This label should be placed aligned with the Fo peak
       on the second syllable. When the peak continues over the following
       syllable, place this label aligned with the latest Fo peak of the phrase
       initial peak.

   Schematic Fo contours of fourteen types of AP realizations and corresponding
phonetic tone labels are shown in Figure 2. The first row shows AP patterns with a H
boundary, Ha, and the second row shows AP patterns with a L boundary, La. The third
row shows contours of a long AP where all four underlying tones are realized with
either a Ha or La boundary.
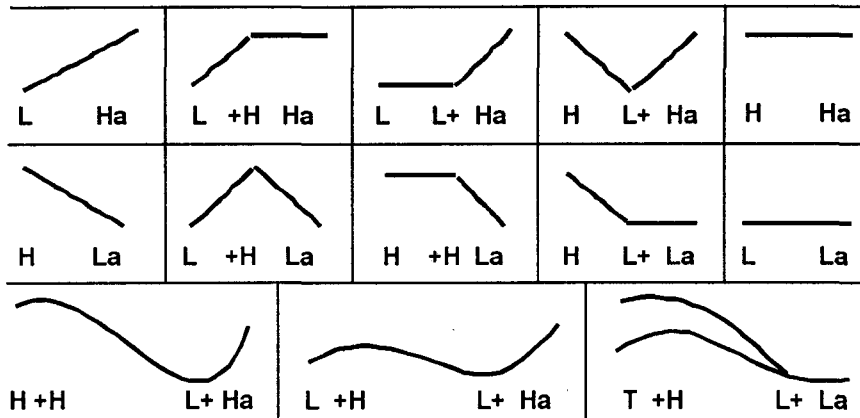
Figure 2. Schematic Fo contours of fourteen tonal patterns of AP.

For the IP boundary tones, five tones ending in L boundary tone (i.e., L%/HL%/ LHL%/HLHL%/LHLHL%) are placed at the Fo minimum toward the end of an IP final syllable, and four tones ending in H tone (i.e., H%/LH%/HLH%/LHLH%) are placed at the Fo maximum toward the end of an IP final syllable. For complex boundary tones ending in H% but has a H tone before the final H tone (ex., HLH%, LHLH%), '>' referring to an 'early peak' should be placed at the Fo peak corresponding to the first H tone in the boundary. For complex boundary tones ending in L% but has one or more H tones before the final L tone (ex. HL%, LHL%, LHLHL%), '>' should be placed aligned with each peak in Fo contour. The following provides surface realization rules of each boundary tone, and its location relative to words and Fo contours.

IP tones:

L%   A level ending, or a gently falling boundary tone spread over much of the IP-final AP from the Fo peak at the beginning of the AP. This tone should be placed at the end of the phrase aligned with the minimum Fo value. This tone is the most common in stating facts.

H%   A rising boundary tone that begins to rise before the IP final syllable, and reached its peak during the final syllable. Therefore, the rise is earlier than that in LH%. This tone should be placed at the end of the phrase aligned with the maximum Fo value. This tone is the most common in seeking information as in yes-no questions.

LH%   A rising boundary tone that is more localized than H%, rising sharply from a valley well within the final syllable. That is, by comparison to H%, this is a sharper later rise, starting after the onset of the final syllable. This tone should be placed at the end of the phrase aligned with the maximum Fo value. This is very commonly used for questions, continuation rises and explanations. It is also used to signal 'being annoyed' or unpleasant (ex. <gIrEtaniKa gIrEne>! 'I have already told you so. (Why do you keep asking me?)' or <bEryESE!> '(Did you) throw it out? (I can't believe that!)'). [Please see Appendix A for Romanization conventions.]

HL%   A falling boundary tone that rises to a peak before the last syllable, and then falls during the last syllable. -- essentially a combination of H% followed by L%. However, in some cases such as in news, this boundary tone is realized earlier than the final syllable showing the H tone on the penult and L on the final syllable. This is easily noticeable because H tone does not show up on the penultimate syllable otherwise. This tone should be placed at the end of the phrase aligned with the minimum Fo value, and the location of H is marked by '>' aligned with the Fo peak whether it be on the penultimate or final syllable. This tone is very common in declaratives and wh-questions.

LHL%   A rising-falling boundary tone that rises during the IP final syllable. Unlike HL%, the IP final syllable starts a minimum Fo value, and rise begins considerably later -- essentially a combination tone consisting of LH% followed by L%. This tone should be placed at the end of the phrase aligned with the minimum Fo value, and the location of H is marked by '>' above the Fo peak. This tone is also common in declaratives like HL%, but implies being more persuasive, insisting, and confirmative. It is also used to show 'being annoyed or unpleasant' (ex. <hazima>! 'Don't do it (I told you before)', <hASEyo> 'I DID').

HLH%   A fall-rise boundary tone -- a combination of HL% and H%. That is, the timing of the rise is the same as HL% but followed by a shallow dip and then another small rise. This tone should be placed at the end of the phrase aligned with the maximum Fo value. The location of the first H is marked by '>' above the Fo peak. The tone is not as common as other types, and some speakers use this type more often than others. This type is used when a speaker is confident and expecting listeners' agreement.

LHLH%   A rising-falling-rising boundary tone -- a combination of LHL% and H%. The timing of rise is like LHL%, followed by H%. This tone should be placed at the end of the phrase aligned with the maximum Fo value. The location of the first H is marked by '>' above the Fo peak. This tone is less common than others.

HLHL%   A falling-rising-falling boundary tone. The timing of rise is like HLH%, followed by L%. This tone should be placed at the end of the phrase aligned with the minimum Fo value. The location of the two Hs are marked by '>' above the Fo peak. This tone is more common than LHLH%, and has a meaning of intensifying HL%, confirming and insisting one's opinion. Sometimes, like LHL%, it delivers nagging or persuading meanings.

LHLHL%   A rising-falling-rising-falling boundary tone. The timing of rise is like LHLH%, followed by L%. This tone should be placed at the end of the phrase aligned with the minimum Fo value. The location of the two Hs are marked by '>' above the Fo peak. The meaning of this tone seems to be similar to LHL%, but with more 'intense meaning of being annoyed'. It is not clear at the moment if this tone is categorically different from LHL%.

Schematic Fo contours of eight types of IP boundary tone realizations are shown in Figure 3. The first row shows an IP boundary ending with L% and the second row shows those ending with H%. The vertical line shown in each contour marks the beginning of the IP final syllable.
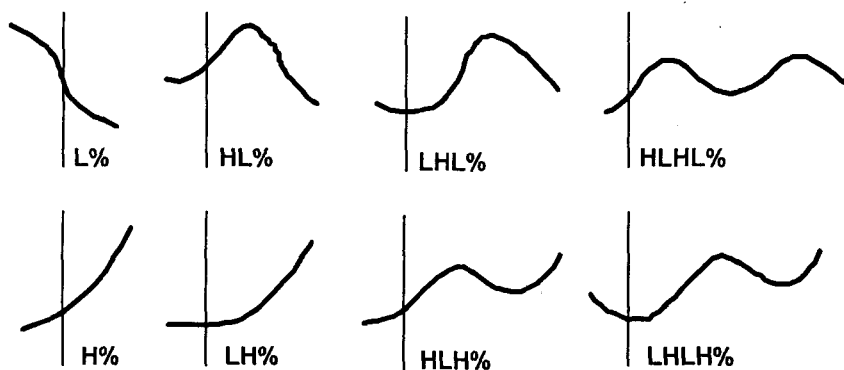
Figure 3. Schematic Fo contours of eight boundary tones of IP.

Finally, for a case of uncertain or underspecified tonal events, for both AP and IP, use the following labels at a phonetic tone tier. Underspecified tone labels are used when a labeler knows there is a tone, but s/he has not assigned a label yet.

X   Underspecified tonal event of non-AP final boundary tone. (Tone is there, but the tonal value have yet to be assigned)

a   Underspecified AP final tone

%   Underspecified IP final tone

X?   Uncertain of the type of a tone, which is not an AP final nor IP final boundary tone. (a labeler is not sure of the tone type)

X?a   Uncertain of the type of an AP final boundary tone.

X?%   Uncertain of the type of an IP final boundary tone.

Example sentences labelled with a phonological tone and a phonetic tone are shown below and pitch tracks of all examples labelled with tones are shown in Appendix B. Romanization of Korean font is shown in Appendix A.

Examples of AP realization and IP boundary tones:

Ex.1. <<4boundary-H%>> gIrASEjo 'Is that so?'
phonological tone tier: H%
phonetic tone tier: +H L+H%

Ex.2. <<4boundary-LH%>> gIrASEjo 'Is that so?'
phonological tone tier: LH%
phonetic tone tier: +H   LH%

Ex.3. <<4boundary-HL%>>   gIrASEjo 'Is that so?'
phonological tone tier: HL%
phonetic tone tier: L+H L+>HL%

Ex.4. <<4boundary-LHL%>> gIrASEjo 'Is that so?'
phonological tone tier: LHL%
phonetic tone tier: L+H > LHL%

Ex.5. <<J3A2-HLH% >>   onIR zEnyEge nuga mEgEyo
phonological tone tier: LHa   HLH%
phonetic tone tier: L   L+Ha   L+H   L+ >HLH%
                            'Today night   who   eat?'
                            -> 'Who is eating tonight?'

Ex.6. <<IPboundary-HL%>>   baraMgwa   hANnimi
phonological tone tier: LHa   HL%
phonetic tone tier: L   Ha   H L+ >HL%
                            'The North Wind and the Sun-NOM'
                            'The North Wind and the Sun .....'

Ex.7. <<IPboundary-LH%>>   dubENCA,
phonological tone tier: LH%
phonetic tone tier: L +H   LH%
                                'Second,'

Ex.8. <<2syllAP-LHa>>   nanIN   yEQarIR   miwEhAyo
phonological tone tier: LHa   LHa   L%
phonetic tone tier: L   Ha   L   L+Ha L+H L+ L%
                           'I-TOP   Younga-ACC   hate'
                           -> 'I hate Younga'

Ex.9. <<5syllAP-LHLHa>> yEQmaNinenIN   yEQarIR   miwEhAyo
phonological tone tier: LHa   LHa   L%
phonetic tone tier: L +H   L+Ha   L   L+ Ha   L +H   L%
                           'Youngman's family-TOP Younga-ACC hate'
                           -> 'Youngman's family hates Younga'

Ex.10. <<6syllAP-LHLHa>> yEQi EmEninIN   yEQarIR   miwEhAyo
phonological tone tier: LHa   LHa   L%
phonetic tone tier: L+H   L+ Ha   L L+ Ha   L +H L+ L%
                           'Youngi's mom-TOP Younga-ACC hate'
                           'Youngi's mom hates Younga'

Ex.11. <<5syllAP-HHLHa>> hyEQmininenIN   yEQarIR   miwEhAyo
phonological tone tier: LHa   LHa   L%
phonetic tone tier: H +H   L+ Ha   L   Ha   L +H L%
                           'Hyungmin's family-TOP Younga-ACC hate'
                           -> 'Hyungmin's family hates Younga'

Ex.12. <<t1p1s2>>-early   doQgi   bujEU   du   hjEQtA zuQesE ...
phonological tone tier: LHa   LHa   LHa   L%
phonetic tone tier: L   Ha   L L+Ha   L Ha H+H   L+L%
                           'motivation providing-POSS two   types   among ...'
                           -> 'Among two types which provide motivation,'

Ex. 13. <<t1p2s8-1m>>   sEQzaQhago   iNnIN gEsi   saraiNnIN gEsida
phonological tone tier: LHa   LHa   L%
phonetic tone tier: H+H L+Ha   L   L+Ha   H+H   L+ L%
                           'to grow-prog. rel.cl. marker-thing-NOM to live-prog.'
                           -> 'Being growing means that it is alive'

Ex. 14. <<gazEQgyosa>> nanIN   siRryEGiNnIN zibaNU gazEQgyosarIR maNnaTTa.
phonological tone tier: LHa   LHa   LHa   L%
phonetic tone tier: L   Ha   H +H   L+ Ha L+H   L+Ha L   L%
                           'I-TOP   powerful   family's tutor-ACC.   met'
                           -> 'I met the tutor of a powerful family'

3.4 A break index tier

Break indices represent a rating for the degree of juncture perceived between each pair of words and between the final word and the silence at the end of the utterance. They are to be marked after all words that have been transcribed in the word tier. All junctures -- including those after fragments and filled pauses -- must be assigned an explicit break index value; there is no default juncture type.

Break indices:

0   For cases of clear phonetic marks of "clitic" groups; e.g. application of vowel coalescence rules. Also for cases of pronouns which are, different from a real "word", not pronounced by itself (e.g. <su> 'way', <de> 'place', <gED> 'thing').

1
         For phrase-internal "word" boundaries not marked by such cliticization phenomena, and can be pronounced by itself. "Word" is defined as a sequence of sounds separated by space in orthography, and is pronounced by itself.

2   For cases of a minimal phrasal disjuncture, with no strong subjective sense of pause -- that is, a sense of phrase edge of the type that is associated typically with the tonal pattern of the Accentual Phrase.

3   For cases of a strong phrasal disjuncture, with a strong subjective sense of pause (whether it be an objective visible pause or only the "virtual pause" cued by final lengthening) -- that is, a sense of phrase break of the type that is associated typically with the tonal pattern at the right edge of an Intonation Phrase.

Note that while the Accentual Phrase and Intonation Phrase are defined in the prosodic model by tonal markings, the break index value indicates the labeler's subjective sense of disjuncture and not simply the juncture that typifies the apparent tones. Thus, the break index tier markings are not completely redundant to the tone tier markings for break index levels 2 and 3. In cases of mismatch, the break index number should follow the perceived juncture rather than the tones, and it should be flagged with the diacritic "m", as in:

1m   A disjuncture that typically would correspond to a phrase medial word boundary, but is marked by the tonal pattern of an AP.

2m   A medium strength disjuncture that typically would be marked by the tonal pattern of the AP, but without any tonal markings, or with the tonal markings of an IP edge.

3m   A highest strength disjuncture that typically would be marked by the tonal pattern of the IP, but with the tonal markings of an AP.

In an xwaves/xlabel type system, the break index label should be associated with a point in time at the end of each word, as indicated in the word tier. It should be located exactly at, or slightly to the right, of this word marker, so that break indices can be unambiguously associated with other tiers. Transcriber uncertainty about break-index strength is to be indicated with a minus ("-") diacritic affixed directly to the right of the break index -- e.g. "1-" to indicate uncertainty between "0" and "1"; "2-" to indicate uncertainty between "1" and "2"; and so on. Note that since the "m" diacritic suggests certainty about the break index analysis in the face of conflicting tonal evidence, the "-" diacritic should not be used together with "m".

For a case of uncertain or underspecified break index labels, use the following labels at a break index tier.

x   Underspecified break index

#- Break uncertain between #-1 and # level (ex. 2- means not sure of 2 or 1). Disfluency after this level of juncture; 1p for abrupt cutoffs after or in the

#p middle of a word; 2p for prolongation of AP final syllable, but not meant to be an IP final.

Example sentences:

Ex.12. <<t1p1s2>>-early   doQgi   bujEU   du   hjEQtA zuQesE ...
break index tier: 2   2   2-   1   3-
                   'motivation providing-POSS two types among ...'
                   -> 'Among two types which provide motivation,'

Ex. 13 <<t1p2s8-1m>>   sEQzaQhago iNnIN gEsi   saraiNnIN gEsida
break index tier: 1m   2   1   3
                   'to grow-prog.   is   to live-prog.'
                   -> 'Growing means that it is alive'

Ex. 14. <<gazEQgyosa>> nanIN   siRryEGiNnIN zibaNU gazEQgyosarIR maNnaTTa.
break index tier: 2   2-   2   2-   3
                   'I-TOP powerful   family's tutor-ACC.   met'
                   -> 'I met the tutor of a powerful family'

Ex. 15. <<tlpls2>>-late iRbaNzEgiN kEsIn waNzEnhwa,
break index tier: 1   3   3
                         'general-rel thing-TOP completenes
   -> '(Among two types which provide motivation,) the general thing is completeness'

Ex 16.. <<break-L8C3>> azumEninga   ENze maNdIrEjo?
break index tier: 2   1   3
                         'madam-NOM when   make-Q'
                         -> 'When is Madam making (it)?'

Ex. 17. <<tlp2s6>> zIG, saNhonIN saraiSImjE aMsEgIN zugEiNnIn gEsida
break index tier: 3   2   3-   2-   1   3
              'That is, coral-TOP alive and rock-TOP dead-progressive rel.marker to be'
              -> 'That is, coral is alive and rock is dead'

Ex. 18. <<tlp2s10>> igEsIN uridIR maIMU segyeedo hAdaQdweNda.
break index tier: 3-   2   2   2   3
                    'This   our   mind   world too apply to'
                    -> 'This also applies to inside our mind'

Ex. 19. <<tlp2s5>>-early
              gIrEna, gatIN hjENmigyEQe sanho zogagIR noko bomyEN
break index tier: 3-   2   3   1   2-   1   3
                    'but, same microscope-LOC coral piece-ACC to put and see if'
                    -> 'But, if you see a piece of coral under the same microscope,...'

Ex. 20. <<tlp2s5>>-late
              sanhoga sEQzaQhamyENsE byENhwahago iDTanIN gEsIR aR Su iDTa.
break index tier: 2   2   2   0   2   0 0   3
                    'coral-nom. growing   change-prog.-rel. thing-ACC   to see'
                    -> 'We can see that coral is changing while it's growing'

Ex. 21. <<coQgaG-HLH%>>
        Tak zikigo iNniN sarami nuguNgohani zERmIN coQgaK ANSoni pakiNsImnida
BI tier: 3-   1   2   2   2m   2p   1   3
        'firmly guard-PROG man   who-is young   bachelor Anthony Parkinson-be'
        -> 'The man who is guarding firmly is the young bachelor, Anthony Parkinson'

3.5 A miscellaneous tier

The miscellaneous tier will be used for any comments or markings (e.g., silence, audible breaths, laughter, disfluencies, and so on) desired by particular transcription groups. The only conventions K-ToBI specifies for this tier are that events that cover some clearly specifiable interval (such as breaths, silence or laughter) be labeled at both their temporal beginnings and ends, using label pairs below, so that the interval is delimited by the < .... > pair.

laughter<	beginning of interval of laughter
laughter>	end of a period of laughter

Examples showing all tiers are shown below. PL refers to a phonological tone tier and PT refers to a phonetic tone tier. Break index is abbreviated as 'BI'.

Ex. 17. <<t1p2s6>> zIG, saNhonIN   saraiSImyE̊   aMsEgIN   zugEiNnIN gEsida

PL tone:		L%		LHa		L%		LHa			L%
PT tone:		H L%	H+H	Ha	H+H	L%	L	Ha	L+H		L%
BI:		3		2		3		2-		0	3
misc:									<Vdev>		

'i.e., coral-TOP alive and rock-TOP dead-progressive rel.marker to be'
-> 'That is, a coral is alive and a rock is dead'

Ex. 21. <<coQgaG-HLH%>>

TaG zikigo iNniN sarami nuguNgohani zERmIN coQgaG ANSoni pakiNsImnida

PL tone:	LHa		LHa		LHa		LHa			HLH%
PT tone:	LHa	L+H	L+Ha	L+H	L+Ha	L+H	L+	Ha	L+H	L+	HLH%
BI:	3-		1	2		2	2m	2p	1		3
misc:	<Vdev>							<sil>			

'firmly guard-PROG man   who-is young   bachelor Anthony Parkinson-be'
-> 'The man who is guarding firmly is the young bachelor, Anthony Parkinson'

Ex. 22. <<millennium>>-early

yozIM gIrEN gyohwega i- icENnyENi miRreniEmi

PL:		LHa	LHa		LHa			LHa		H%
PT:	L	Ha	L	Ha	L	L+Ha	L+H	L+La	L+H	L+H%
BI:		2		2		2		2		3-
misc:						<disfl>				

'Thesedays that church-NOM, eh., Year 2000-NOM millennium-NOM'
-> 'Thesedays, that kind of church, eh, Year 2000, millennium....'

Ex.23.   <<millennium>>-middle

ize nAnyENbutE   um   sizagi   dwegu

PL:		LHa		LH%			LHa		HL%
PT:	H	X?a	L+H	LH%		H	Ha	L	HL%
BI:		1m		3			2-		3
misc:				<other spkr>					

'now   next year-from yes beginning-NOM   become'
-> 'Now, it will start from next year ...'

Ex. 24 <<millennium>>-final

	usEN		manIN		gyohwe(do)	ceiNziga	dweNda	gIreyo.	ne
PL:		LHa		LHa		LHa				HL%
PT:	L	Ha	L	Ha	L	La	H+H		L+	HL%
BI:		2-		2-		2	1	1	3	
misc:									<other spkr>	

'First of all many church (too) change-NOM become they say'
-> 'They say, first of all many churches will change too'

4. ONLINES DATA FILES AND FUTURE VERSIONS

All examples (sound file, Fo track, and labels) shown in this manual can be accessed in the SUN workstation in Phonetics Lab, Linguistics department, UCLA. This directory includes more examples, some labeled and some not, for labelers to practice transcribing the K-ToBI system. As more speech data become available, this labeling guidelines may be refined further. To get speech files and label files, contact jun@humnet.ucla.edu. Texts of this and earlier K-ToBI manual are in Phonetics Lab Web site: http://www.humnet.ucla.edu/humnet/linguistics/faciliti/facilities/k_tobi.html.

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Appendix A   Romanization Convention

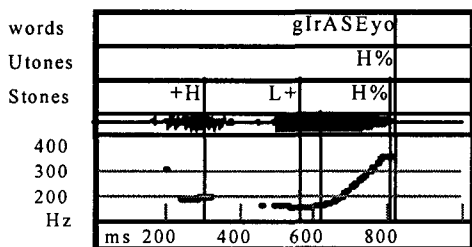| 1. Consonants			2. Vowels	
Hangul [IPA]	**Roman letters**		**Hangul [IPA]**	**Roman letters**
	Onset	Coda		
ㅂ [p]	b	B	아 [ɑ]	a
ㄷ [t]	d	D	어 [ə]	E
ㄱ [k]	g	G	오 [o]	o
ㅈ [ʧ]	z	D	우 [u]	u
ㅍ [pʰ]	p	B	으 [ɨ]	I
ㅌ [tʰ]	t	D	이 [i]	i
ㅋ [kʰ]	k	G	에 [e/ɛ]	e
ㅊ [ʧʰ]	c	D	애 [ɛ]	A
ㅃ [p']	P	B	의 [ɯi]	U
ㄸ [t']	T	D	야 [ja]	ya
ㄲ [k']	K	G	여 [jə]	yE
ㅉ [ʧ']	C	D	요 [jo]	yo
ㅅ [s]	s	D	유 [ju]	yu
ㅆ [s']	S	D	예 [je/jɛ]	ye
ㅎ [h]	h	–	얘 [jɛ]	yA
ㄹ [l]	r	R	와 [wa]	wa
ㅁ [m]	m	M	워 [wə]	wE
ㄴ [n]	n	N	외 [we/wE]	we
ㅇ [ŋ]	–	Q	왜 [wE]	wA
			위 [wi]	wi

Appendix B

Pitch tracks and labels are made using PitchWorks. A word tier is labelled as 'words', a phonological tone tier as 'Utones' and a phonetic tone tier as 'Stones', a break index tier as 'break', and a miscellaneous tier as 'misc'. The number given in each graph matches that in the main text.
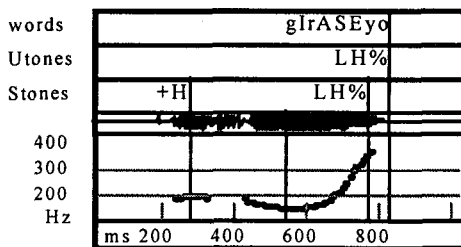
1. Examples of Tone tiers: Phonological and Phonetic tone tier

In figures #1-4 below, the vertical line marking the beginning of the last syllable, '-yo' [jo], is drawn before the line marking the boundary tone or '>'. This is to show the difference in Fo rise timing between H% and LH% and between HL% and LHL%.

1. <<boundary-H%>> 'Is that so?'

words	gIrASEyo
Utones	H%
Stones	+H L+ H%

```
400
300
200
Hz
ms 200   400   600   800
```

2. <<boundary-LH%>> 'Is that so?'

words	gIrASEyo
Utones	LH%
Stones	+H LH%

```
400
300
200
Hz
ms 200   400   600   800
```

3. <<boundary-HL%>> 'Is that so?'

words	gIRASEyo
Utones	HL%
Stones	L +H L+ >HL%

```
400
300
200
Hz
ms  150   300   450   600
```

4. <<boundary-LHL%>> 'Is that so?'

words	gIRASEyo
Utones	LHL%
Stones	H H LHL%

```
400
300
200
Hz
ms 150   300   450   600   750
```

5. <<J3A2-HLH%>> 'Who is eating tonight?'

words	onIR	zEnyEge	nuga	mEgEyo
Utones		LHa		HLH%
Stones	L	L+ Ha	L +H	L+ > HLH%
break	1	2	1	3

```
200
150
100
Hz
ms        250        500        750        1000        1250
```
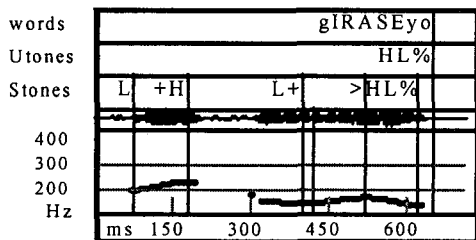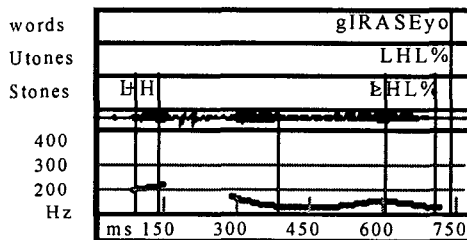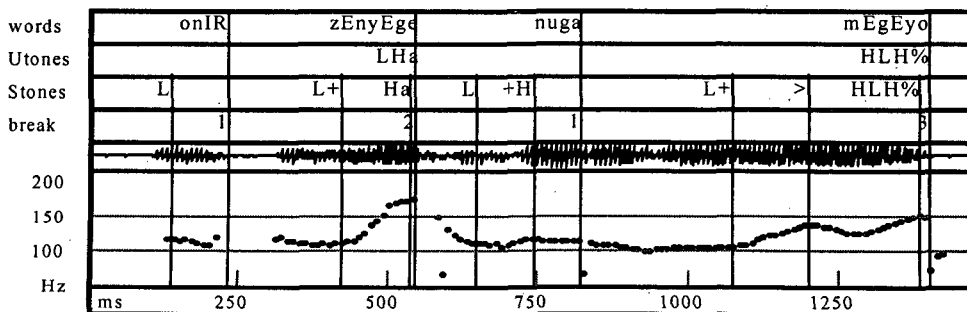
6. <<IPboundary-HL%>> 'Wind and the Sun'   7. <<IPboundary-LH%>> 'Second,'

words	baraMgwa	hANnimi
Utones	L'Ha	HL%
Stones	L Ha H L+ >HL%	

200
150
100
Hz
ms 200 400 600 800 1000

words	dubENCA
Utones	LH%
Stones	L +H LH%

ms 150   300   450   600   750
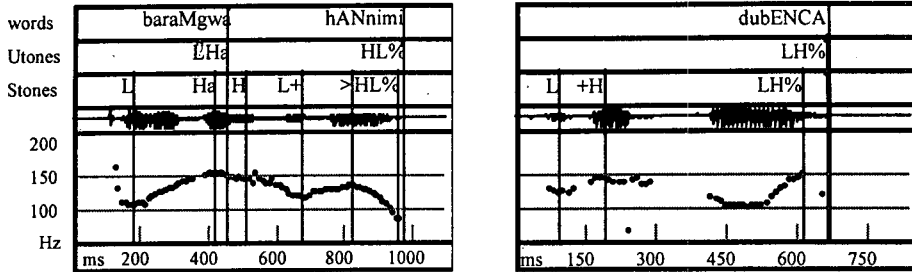
8. <<2syllAP-LHa>> 'I hate Younga'

words	nanIN	yEQarIR	mewEhAyo
Utones	L H a	L H a	L %
Stones	L Ha L L+ Ha L +H L+ L%		

250
200
150
Hz
m s   300   600   900   1200   1500
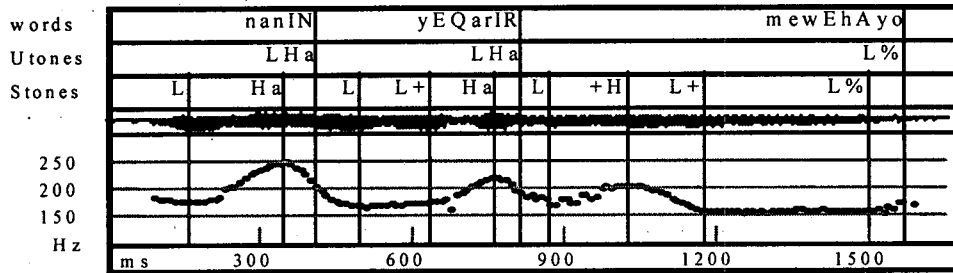
9. <<5syllAP-LHLHa>> 'Youngmi's family hates Younga'

words	yEQmaninenIN	yEQarIR	miwEhAyo
Utones	L H a	L H a	L %
Stones	L +H L+ Ha L L+ Ha L +H L+ L%		

250
200
150
Hz
m s   350   700   1050   1400   1750
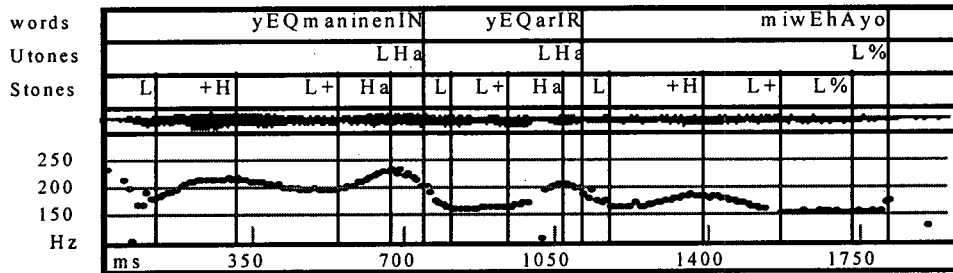
10. <<6syllAP-LHLHa>> 'Youngi's mom hates Younga'

words	yEQi	EmEninIN	yEQarIR	miwEhAyo
Utones		L H a	L H a	L %
Stones	L +H L+ Ha L L+ Ha L +H L+ L%			

250
200
150
Hz
m s   400   800   1200   1600   2000
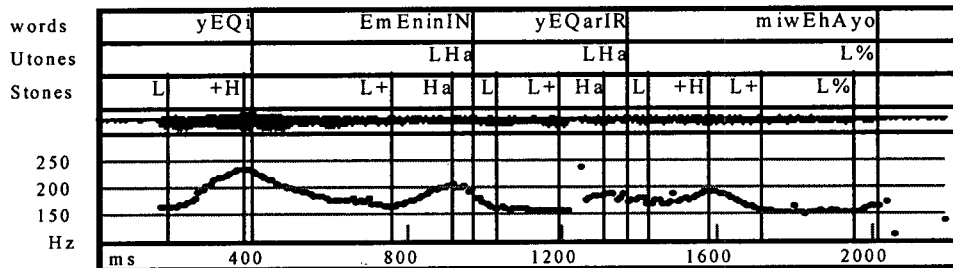
11. <<5syllAP-HHLHa>> 'Hyungmin's family hates Younga'

words	hyEQmininenIN	yEQarIR	miwEhAyo
Utones	LHa	LHa	L%
Stones	H +H L+ Ha L	Ha L	+H + L%

260
210
160
Hz
ms   400   800   1200   1600   2000
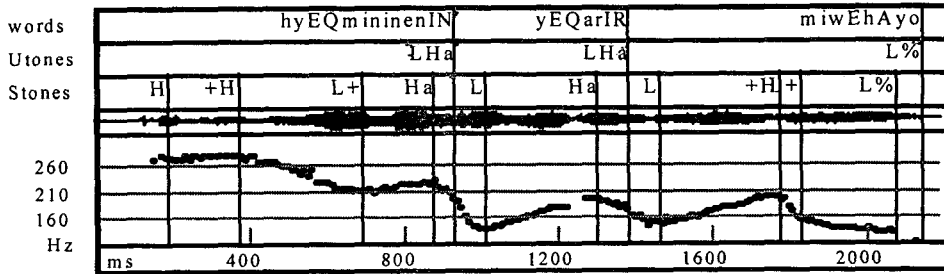
12. <<t1p1s2>>-early   'Among two types which provide motivation,'
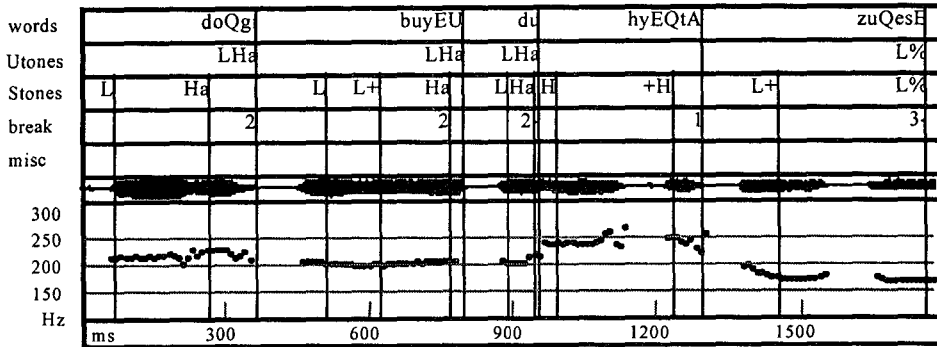
words	doQg	buyEU	du	hyEQtA	zuQesE
Utones	LHa	LHa	LHa		L%
Stones	L Ha	L L+ Ha	LHa H	+H L+	L%
break	2	2	2	1	3
misc					

300
250
200
150
Hz
ms   300   600   900   1200   1500

13. <<t1p2s8-1m>>   'Being growing means that it is alive'

words	sEQzaQhago	iNnINgEsi	saraiNnIN	gEsida
Utones	LHa	LHa		L%
Stones	H +H L+Ha L	L+ Ha	H+H L+	L%
break	1m	2	1	3

250
200
150
Hz
ms   400   800   1200   1600   2000

14. <<gazEQgyosa>>   'I met the tutor of a powerful family'

words	nanIN	siRryEGiNnIN	ziBanU	gazEQgyosarlR	manaTa
Utones	LHa	LHa	LHa	LHa	L%
Stones	L Ha	H +H Ha	L L+ Ha	L +H L+ Ha	L L%
break	2	1 m	1	2-	3
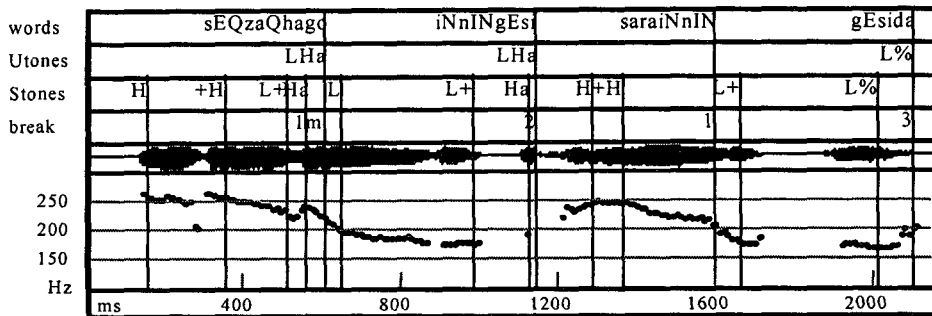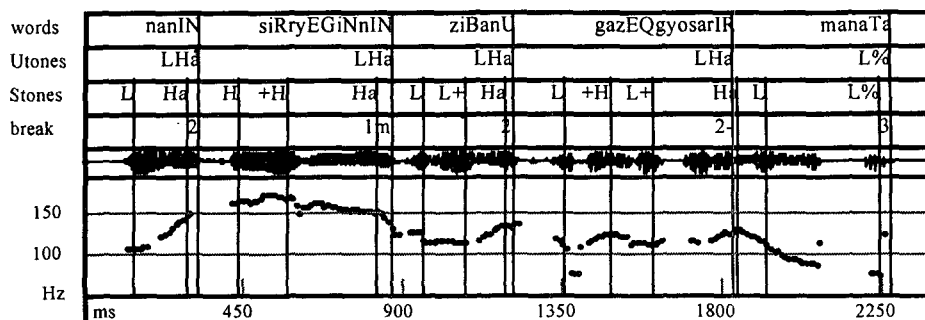
2. Examples of a Break Index tier

Also see #12-14 above.

15. <<tlpls2>>-late

'(Among two types which provide motivation,) the general thing is completeness'
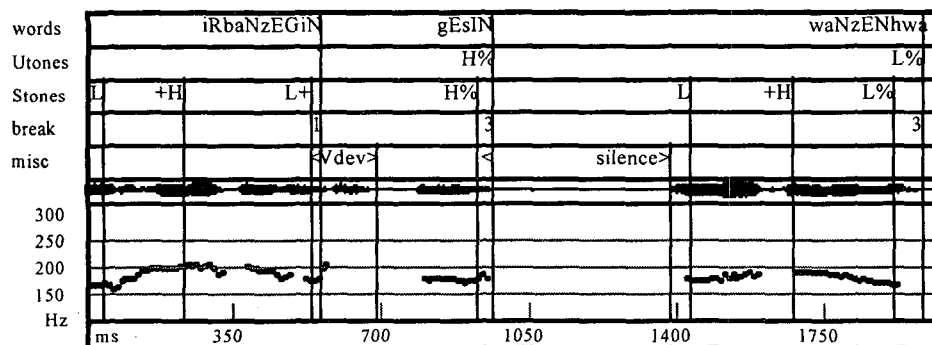
words	iRbaNzEGiN	gEslN	waNzENhwa
Utones		H%	L%
Stones	L +H L+	H%	L +H L%
break		1 3	3
misc	<Vdev>	< silence>	

16. <<break-L8c3>>   'When is Madam making (it)?'

words	azumEniga	Enze	mandIrEyo
Utones	LHa		H%
Stones	L +H L+ Ha	L +H	L+ H%
break	2	1	

17. <<t1p2s6>>   'That is, coral is alive and rock is dead'

words	zIG		saNhonIN			saraiSImyE	aMsEgIN		zugEiNnIN		gEsida	
Utones	L%		LHa				L%	LHa				L%	
Stones	HH%		H+H	Ha	H+H	L+	L% L	Ha		+H	L+	L%	
break	3			2			3	2-		1		3	
misc								<dev>					

18. <<t1p2s10>>   'This also applies to inside our mind'

words	igEsIN	uridIR	malmU	segyeedo	hAdaQdweNda	
break	3-	2	2	2	3	
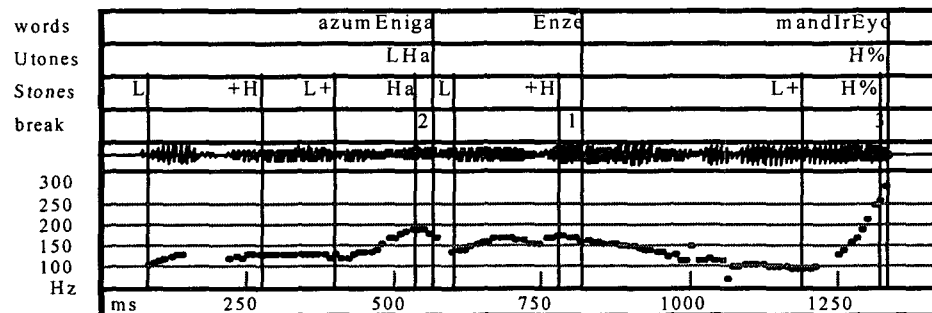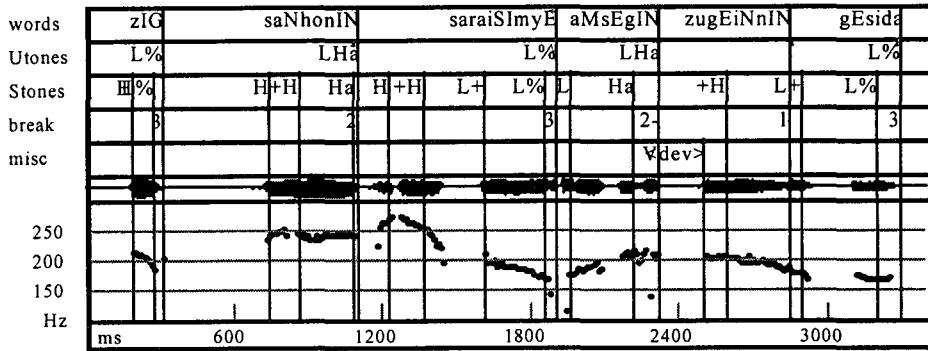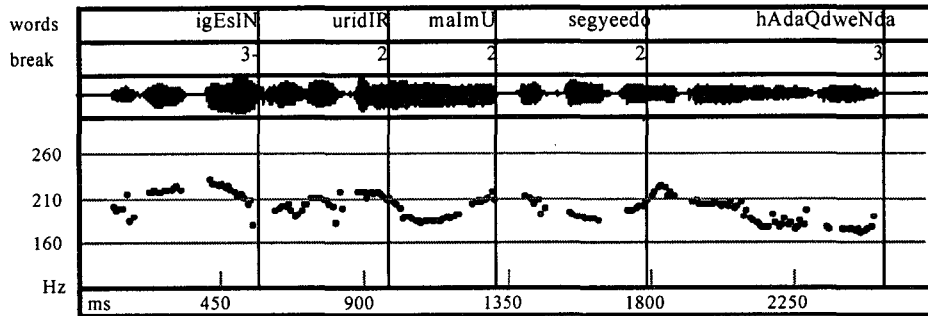
19. <<t1p2s5>>-early   'But, if you see a piece of coral under the same microscope,...'
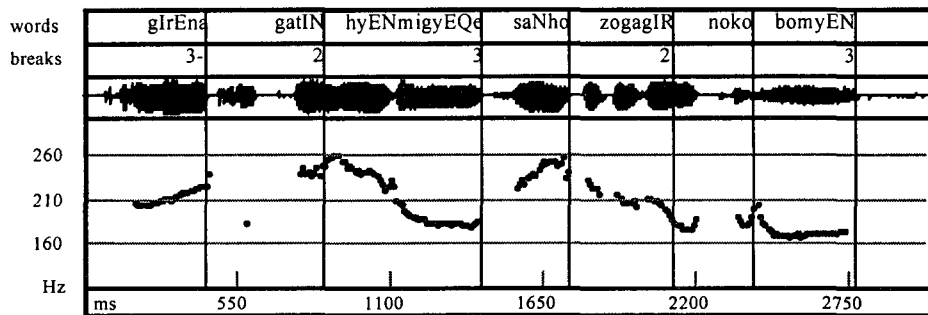
words	gIrEna	gatIN	hyENmigyEQe	saNho	zogagIR	noko	bomyEN	
breaks	3-	2	3			2	3	

20. <<tlp2s5>>-late　　　'We can see that coral is changing while it's growing'

words	sanhoka	sENcaNhamyEnsE	pyEnhwahako	iTtanIn	kEsIl	al	su	iTta
breaks	2	2	2	0	2	0	0	3


```
260
210
160
Hz
ms      550      1100      1650      2200      2750
```

21. <<coQgaG-HLH%>>

'The man who is guarding firmly is the young bachelor, Anthony Parkinson

words	TaG		zikigoiNnIN		saram		nuguNgohan	
Utones	H%				LHa		LHa	
Stones	L	H%	+H		L+	Ha	L	L+ Ha
break		3		1		2		2
misc		<	Vdev					


```
250
200
150
100
Hz
ms      450      900      1350      1800      2250
```
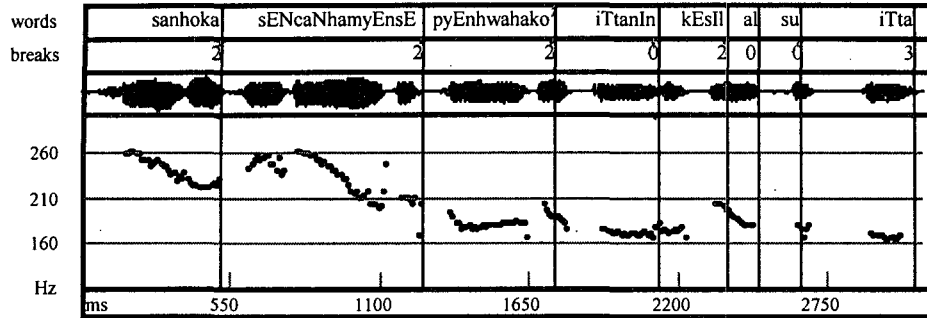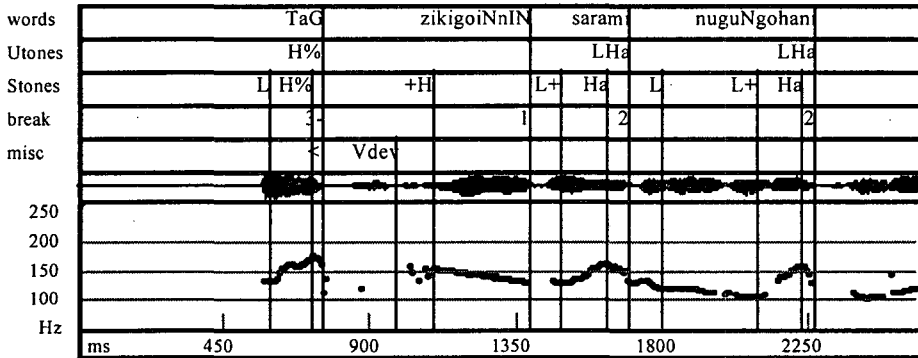
3. Examples of a Miscellaneous tier

Also see #17 and 21 above.

22. <<millennium>>-early

'Thesedays, that kind of church, eh, Year 2000, millennium....'

words	yozIM		gIrEN		gyohwega	i-	icENnyEN				miRreniEmi		ize	
Utones	LHa		LHa		LHa		LHa				H%	LHa		
Stones	L Ha	L	Ha	L	L+Ha	L	+H	L+ La	L	+H	L+	H%	H ?a	L +H
break		2		2		2			2			3	1m	
misc					disfl> flu>									


```
250
200
150
100
Hz
ms      450      900      1350      1800      2250
```
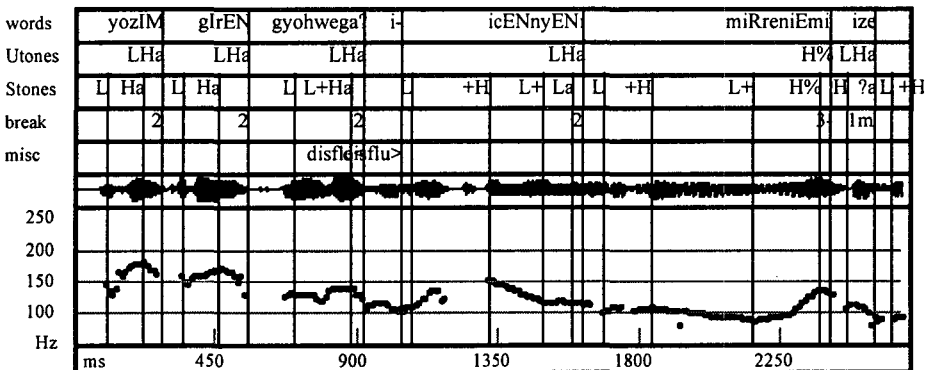
23. <<millennium>>-middle   'Now, it will start from next year ...'

words		ize			nAnyENbutE		um		sizagi			dwegu	
Utones		LHa			LH%				LHa			%	
Stones	H	?a L	+H		LH%			H	Ha	L	>HL%		L
break		1 m				3		2-				3	
misc					other spk<	other spk>							
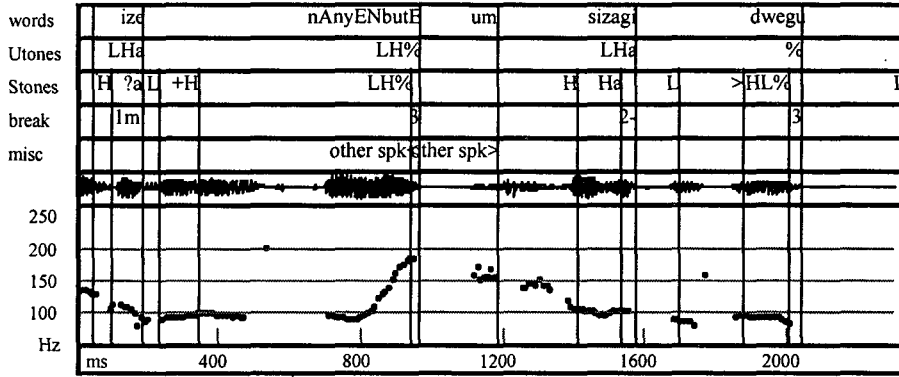
24. <<millennium>>-final   'They say, first of all many churches will change too'

words	usEN		manIN		gyohwe(do)			ceiNziga		dweNda		gIreyo		no
Utones	LHa		LHa		LHa							HL%		L%
Stones	L Ha		L Ha		L La			H+H			L+	>HL%	H	L%
break		2-		2-			2		1		1		3		3
misc												<other speaker>		