2.4 Other full intonational phrase boundary tone combinations: H-L% and L-H%

So far, we've introduced just two intonational phrase boundary tone contours: H-H% and L-L%. We deliberately chose these contours to maximally contrast with the pitch accents that we were introducing (L* and H* respectively). Two other combinations are possible and both occur frequently: L-H% and H-L%. These boundary tone sequences, like L-L% and H-H%, can occur with any final pitch accent (e.g. L*, H*). Again, it is sometimes easier to distinguish which part of the f0 contour corresponds to the final pitch accent, the phrase tone and the boundary tone when the phrase tone contrasts with both the preceding nuclear pitch accent and the following boundary tone (e.g. as in the sequence H* L-H%), so we'll consider examples of these first.

2.4.1 Illustrative Examples: H* L-H% and L* H-L%

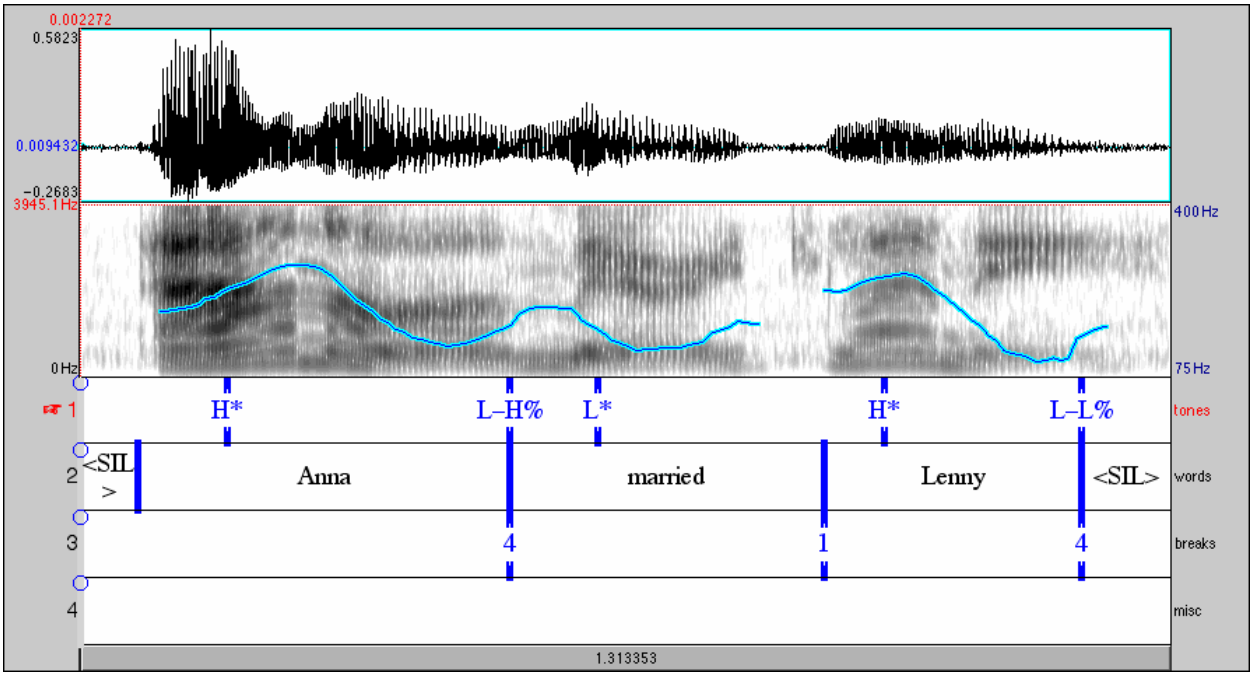

Figure 2.4.1 Example of H*L-H% <anna1>

In the example <annal>, the high pitch accent (H*) on *An-* in *Anna* is followed by a low phrase tone (L-) that rises again into a high boundary tone (H%). Even though the f0 is smooth across the word boundary, the changes in f0 and the lengthening of *–na* give the perceptual impression of a boundary between *Anna* and *married*. Notice that the second intonational phrase in this utterance is the now familiar L*H*L-L% (compare example <mother>). As we have seen, the Intonational Phrases are separated by the 4 Break Index. The juncture between *married* and *Lenny* is the default phrase-medial inter-word boundary and is labelled with a Break Index 1.

The next example of H*L-H% occurs on a single word intonational phrase <dan>. Note the rise in f0 on the vowel of *Dan* (H*) followed by a fall (L-) that ends in a small rise (H%).

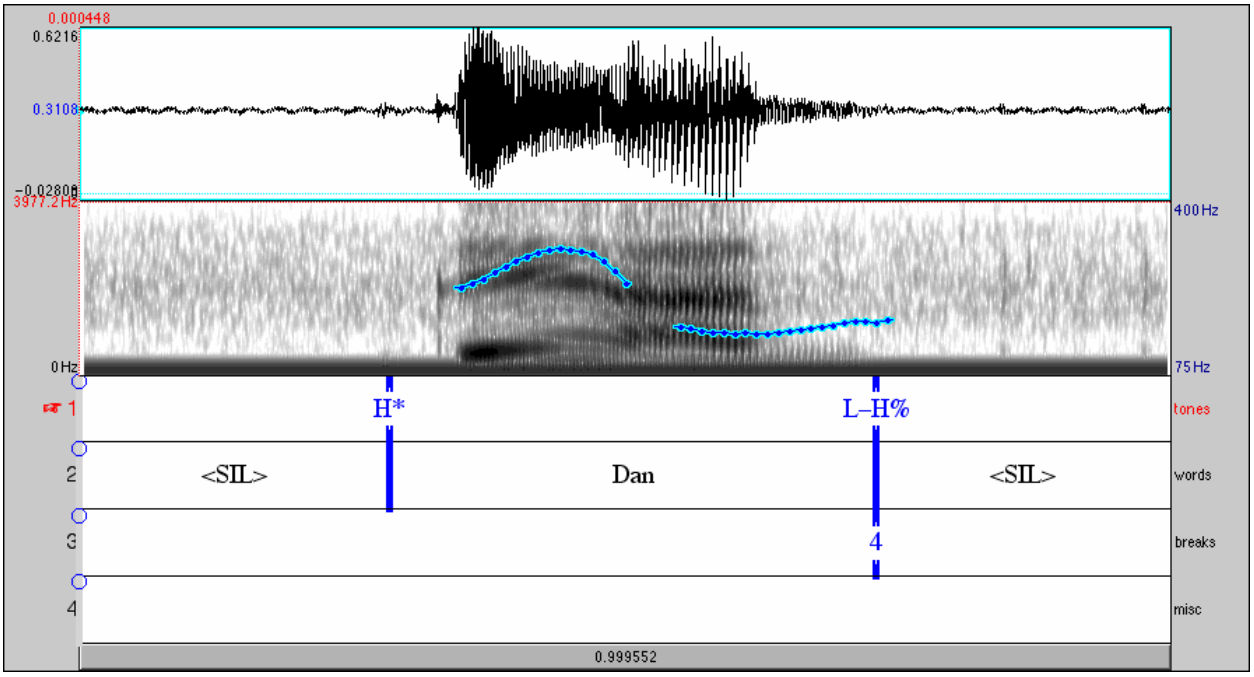

Figure 2.4.1 Example of H*L-H% on *Dan* <dan>

Often, mixed phrase tone/boundary tone combinations (e.g. L-H% as shown in these two examples above, or H-L% described below) do not end in the more extreme high or low levels that are typical of H-H% or L-L% respectively. In this example, the L- makes it unlikely that the H% will rise to the top of the speaker's range. Without the extreme f0 excursions, other boundary cues, like the lengthening at the end of the last syllable in the intonational phrase, becomes more important for identifying the occurrence of the phrase boundary.

The last phrase tone/boundary tone sequence we'll discuss here is H-L%, which we show preceded by an L* (H* H-L% sequences occur as well). In the example <alejna1>, the L* on *–le-* (*Alejna* is pronounced 'uh-LAY-na') is followed by a non-pitch-accent-lending f0 movement up to an H- that is then followed by a slight fall (L%). Other examples of H-L%, including <banana2> below, do not end in a falling f0; although the phrase tone/boundary tone sequence is also an H-L%, the final f0 is nearly flat in a middle range. This pattern is more typical of an H-L% than a slight fall is.

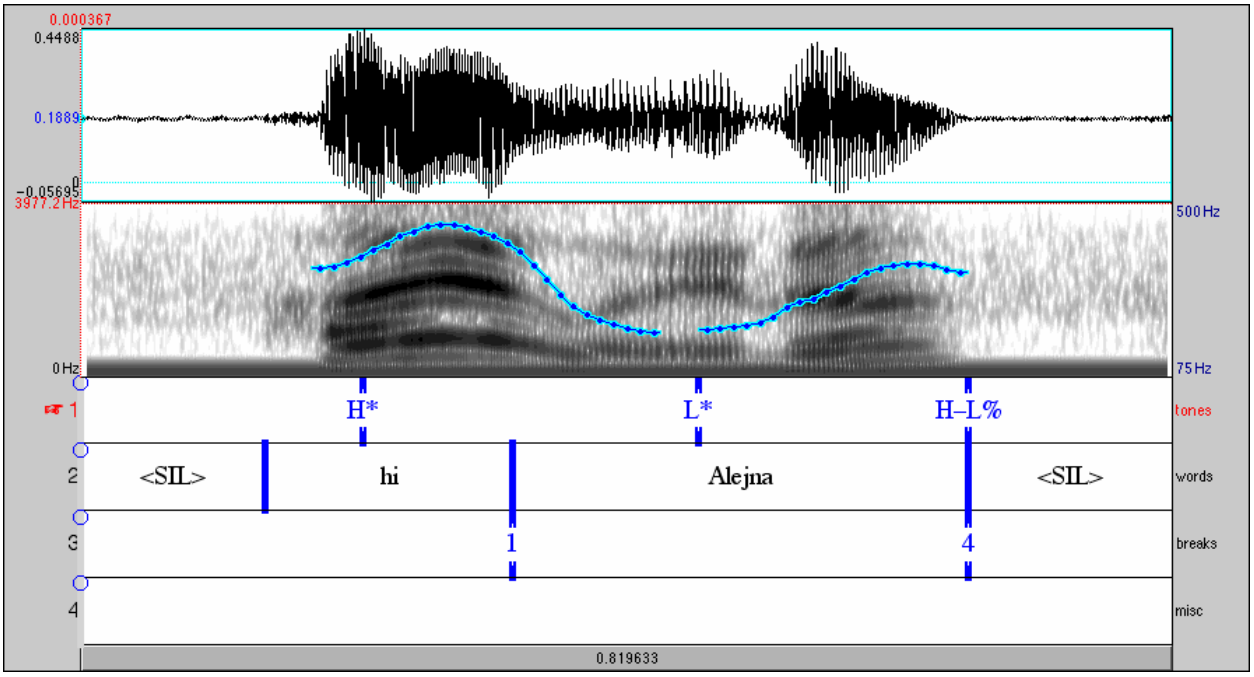

Figure 2.4.2 Example of L* H-L%: <alejna1>

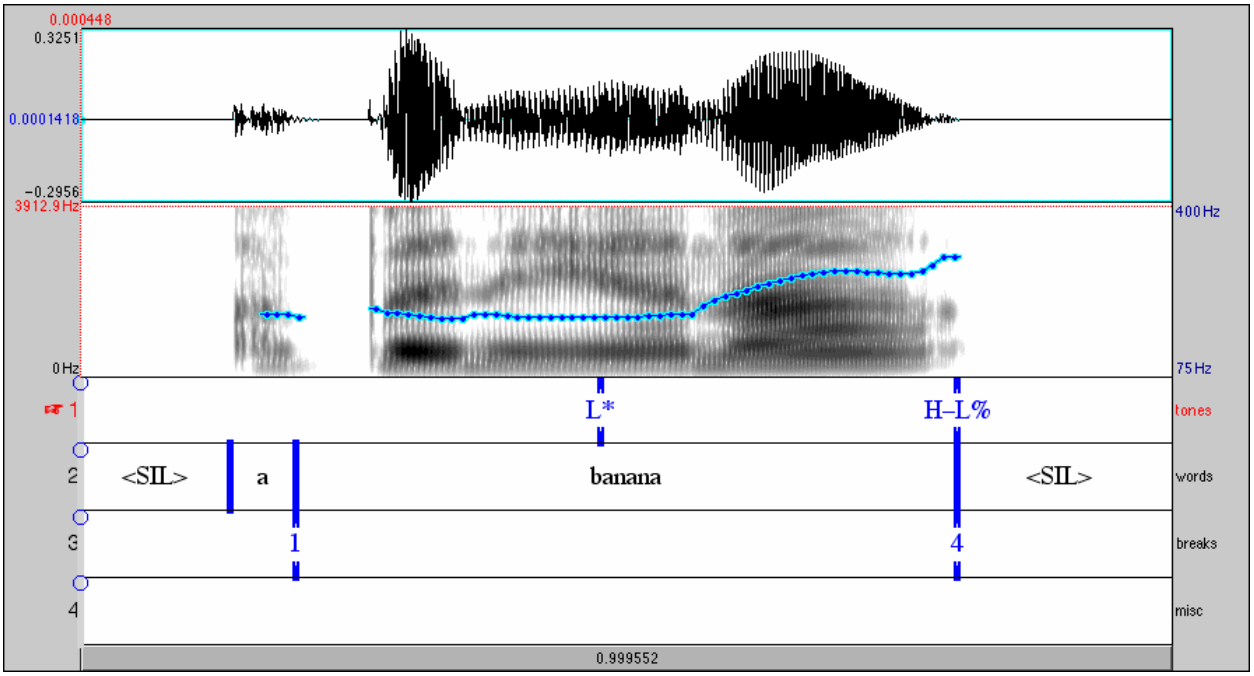

Figure 2.4.3 Example of L* H-L%: <banana2>

Because the two tones (in these H-L% and L-H% examples) are being realized over a potentially short duration, sometimes only over the end of the final syllable, it is often difficult to see the short realizations of the final boundary tone. However, sometimes a labeler will get a perceptual impression even if it isn't visible in the F0 track, or can hear that it is not another category even if she can't hear or see a clear rise and fall.

The next example is cautionary: the pitch tracking software indicates a rise in f0 at the end of the utterance. However, the pitch periods have become irregular, which often happens as a speaker ends an utterance, causing a recurring spurious small second peak in the waveform. The software that calculates the f0 mistakes this small peak for a pitch period and determines the pitch period to be shorter; as a result, the f0 frequency is calculated as higher than it should be. The best test in cases like this is to compare f0 from earlier in the utterance with the end of the utterance by listening carefully for which sounds lower. The most reliable measuring tool in these cases is the listener's auditory system: listen carefully to whether it sounds as if the speaker's pitch were intended to go up at the end (specifying an H%) or to stay low (specifying an L%).

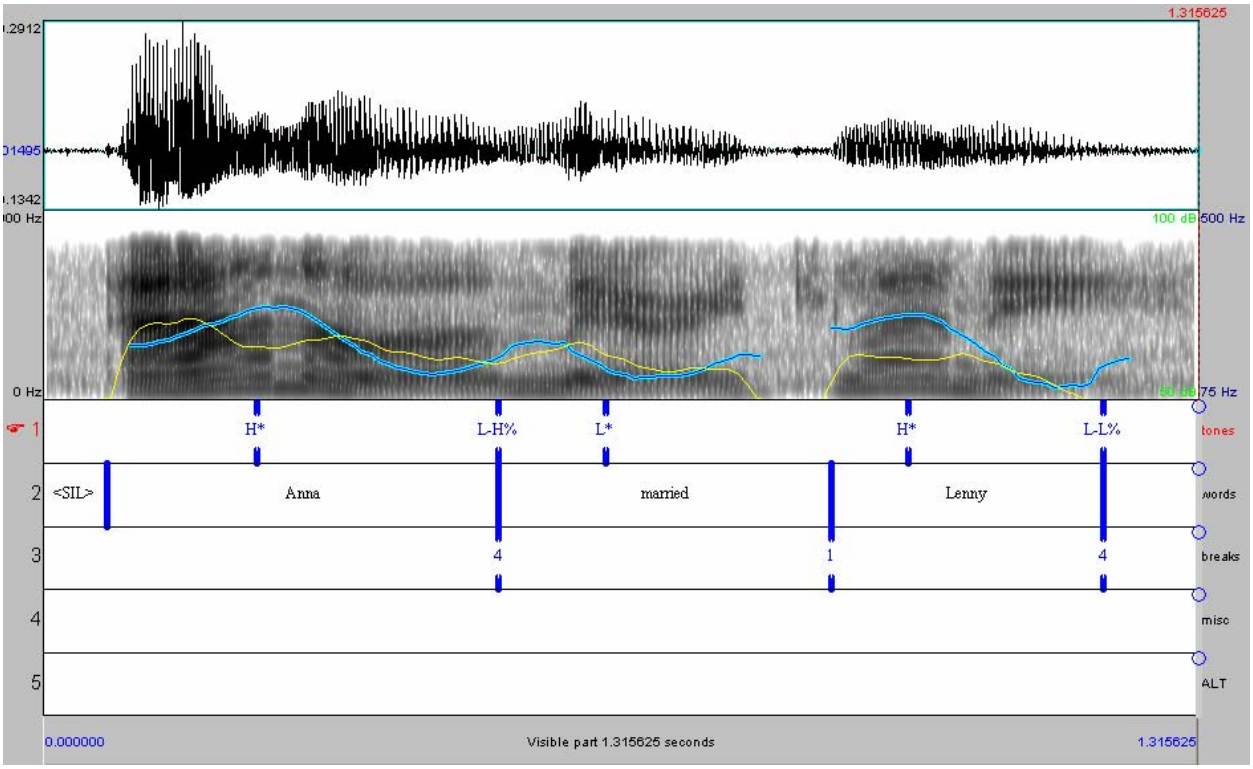

Figure 2.4.4 Example of H* L-L% with a spurious rise at the end Excerpt of <anna1>

Like the boundary tones introduced earlier, there is no constraint on what pitch accent can precede which of these boundary tones, so that more challenging sequences like L*L-H% or H* H-L% are also possible. The examples above, H* L-H% and L* H-L%, were introduced first in this tutorial because they are maximally contrastive, so it is easier to see the two different tones in the final sequence. Next, we'll show examples where the pitch accent choice does not provide maximal contrast.

2.4.2 Other combinations: L* L-H% and H* H-L%

L* and H* accents can be combined freely with various <phrase tone + boundary tone> sequences. For example, the contour produced on *banana* in the file <banana3> is L* L-H%.

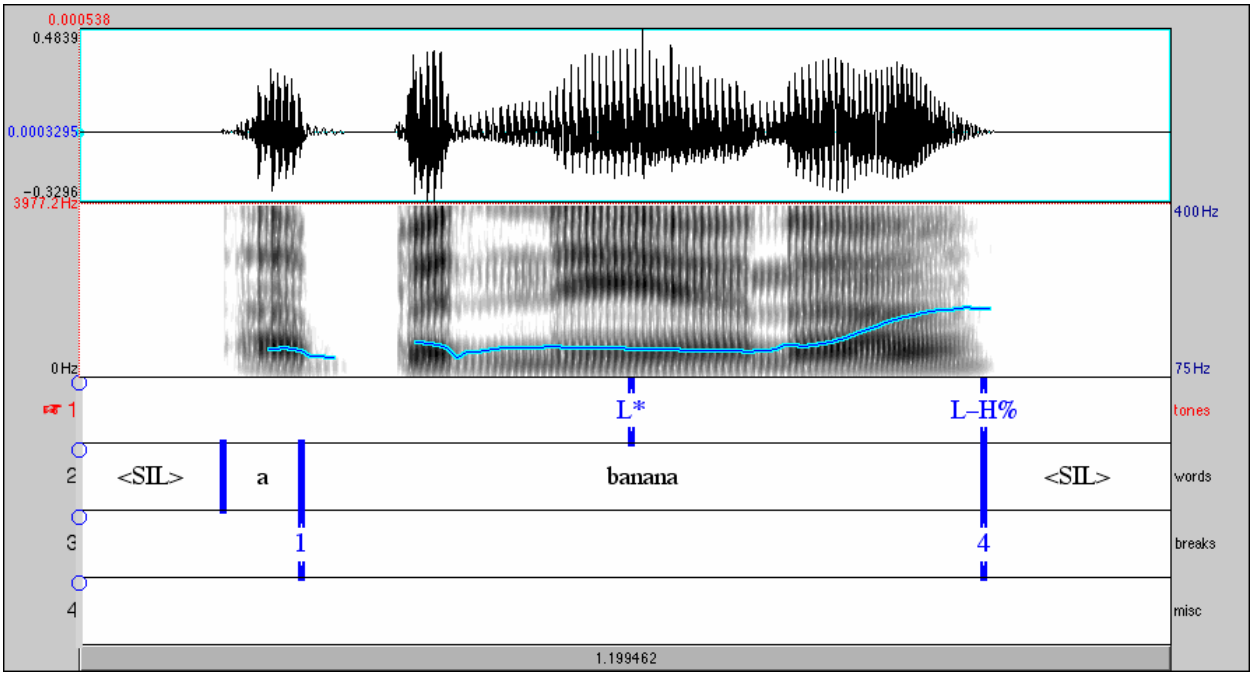

Figure 2.4.5 An example of L* L-H% <banana3>

Compare the L-H% contour in <banana3> to both the L-L% and the H-H% in the following three renditions of *Marianna's money*. In the first (left-most) phrase the f0 rises to produce the H* on *–anna*, then falls for the L- phrase tone on *–na's money* until it culminates in a rise for the H% boundary tone on *-ney*. The H% tone is clearly higher than, e.g. the f0 in the L-L% of the middle rendition. On the other hand, the H% in this L-H% combination does not rise as high as it does in the last (right-most) rendition of *Marianna's money*, where the L* is followed by an H-H%. Here, the f0 rises very high in the speaker's range, as is frequently seen in productions of H-H%. Understanding these interactions between phrase tones and boundary tones, as well as changes in voice quality at the end of phrase and their effects on the visible f0 track, is an important part of learning to use the ToBI system.

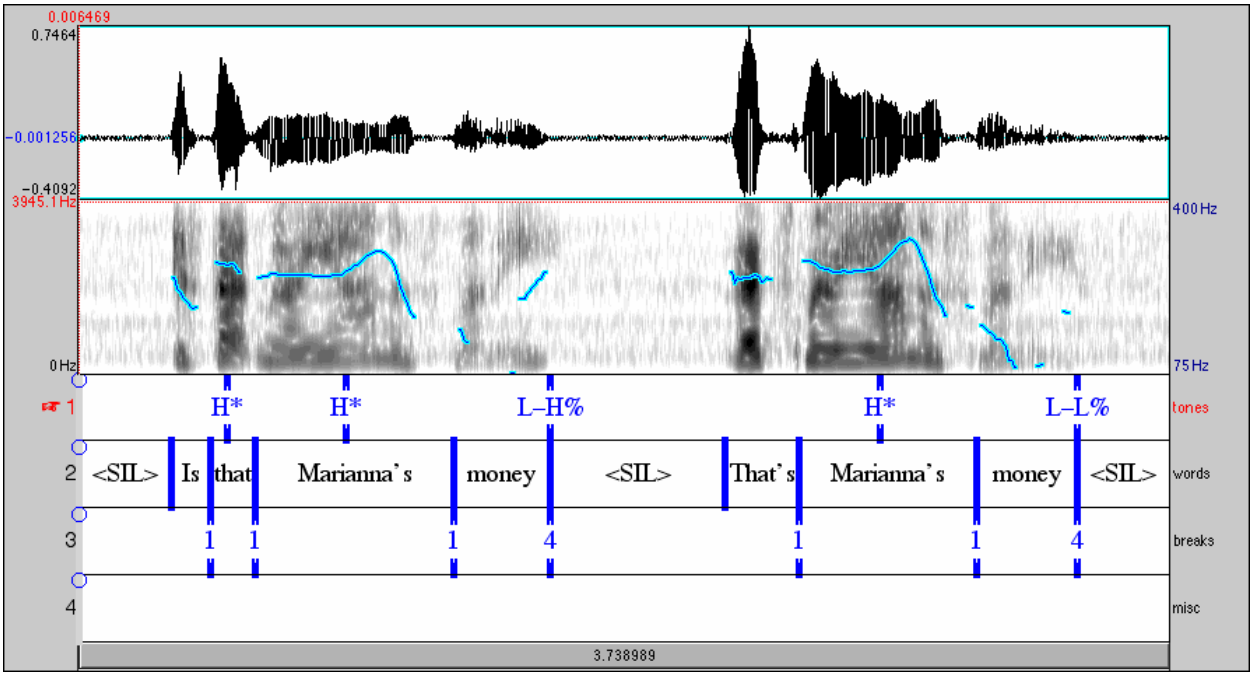

Figure 2.4.6 Examples of H* L-H% and H*L-L%, to contrast with H* H-L% in Figure 2.4.7 <money1>

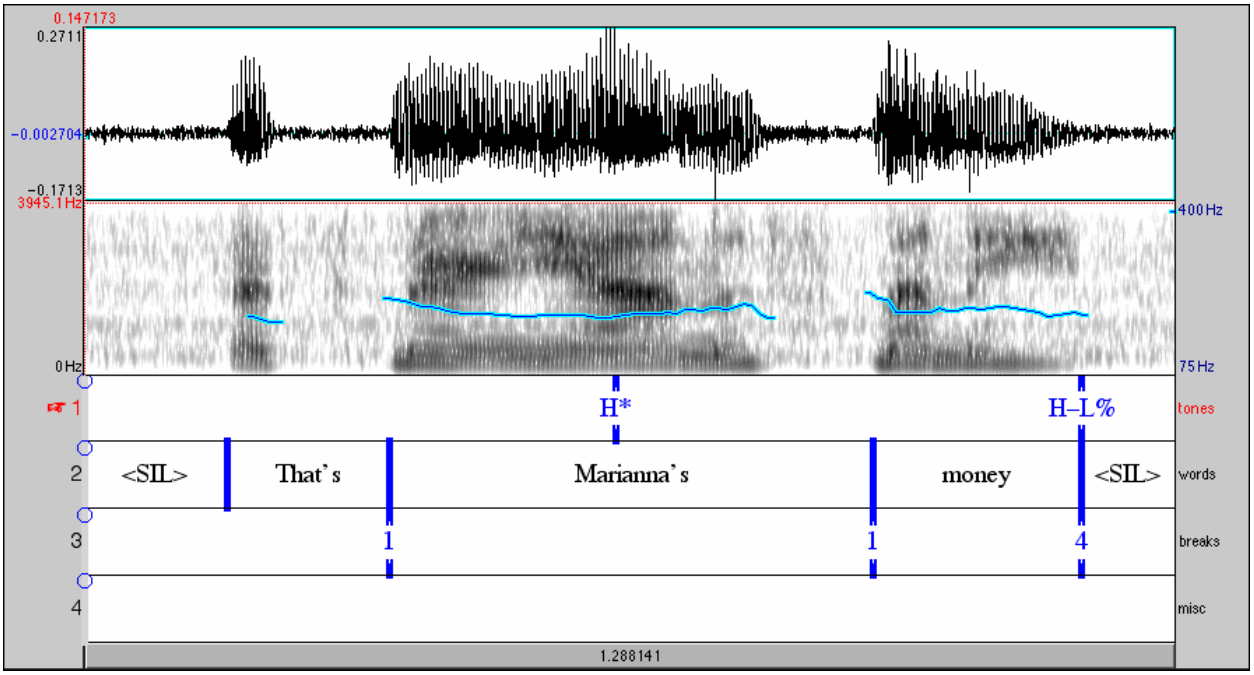

Figure 2.4.7 Example of H* H-L% <money2>

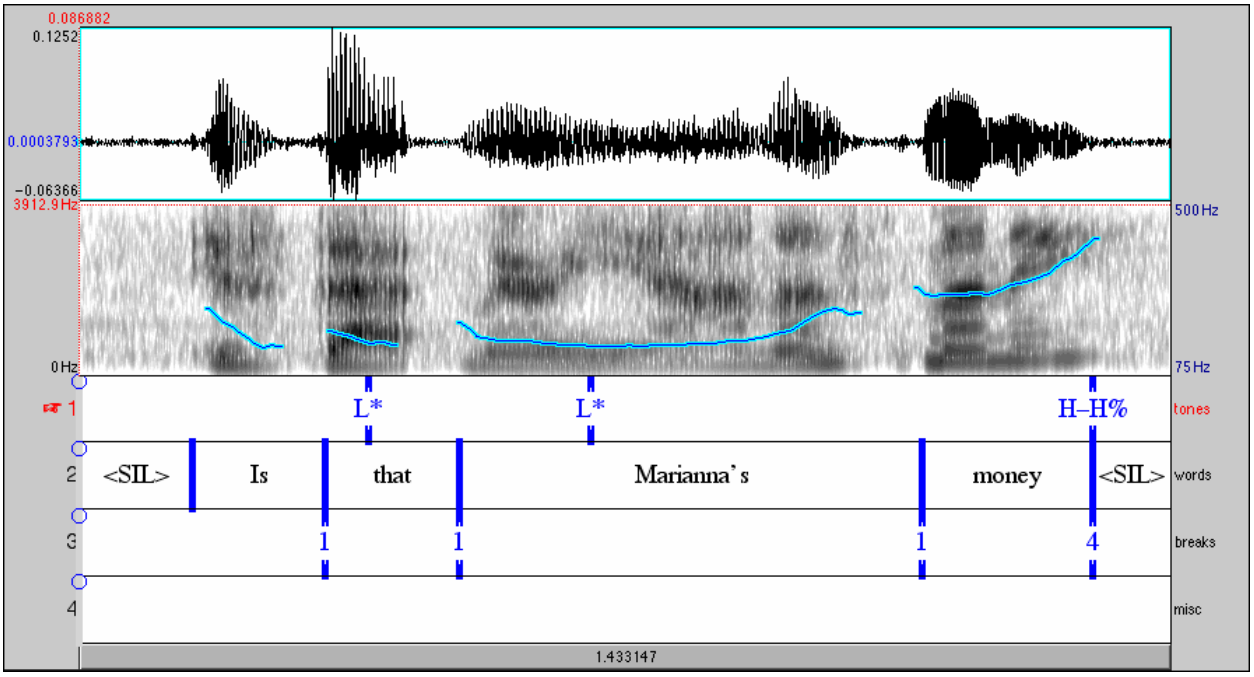

Figure 2.4.8 Example of L* L*H-H% <money3>

Summary of ToBI labels introduced so far:

Tones:
H* high pitch accent
L* low pitch accent
L-H% low phrase tone, high boundary tone
H-L% high phrase tone, low boundary tone
L-L% low phrase tone, low boundary tone
H-H% high phrase tone, high boundary tone

Break indices:
0: word boundary erased
1: typical inter-word disjuncture within a phrase
4: end of an intonational phrase