How surface is surface?

Conventional methods for description of tone (e.g., Snider 2014) treat (morpho)phonological phenomena as a mapping between two levels of representation: a deeper lexical level, and a more surface phonological level. But in some cases, the details of how strictly these levels can be differentiated is unclear. For example, should the levels at which allotones and tone sandhi appear be differentiated? Conventional analysis suggests that the surface form does not need to indicate categorical distinction (Hyman 2014)—but how should these differences be represented? How do they relate to one another? And how does this relate to phonetic effects, such as tonal coarticulation (cf. Xu 1997)?

This paper applies these questions to Dinka, a Nilo-Saharan language spoken in South Sudan. Dinka has a highly complex and unusual suprasegmental system, with independently contrastive three-level vowel length, phonation, and tone; all of these suprasegmental elements are both lexical and grammatical, and are responsible for much of the language's morphology (Andersen 1987, Remijsen & Gilley 2008, Remijsen & Ladd 2008, Remijsen 2014, Blum 2020). Dialects of Dinka have either three or four tones, and can differ considerably with regards to tonal phenomena and realization. As such, tonal realizations and tonal phenomena must be examined separately in each dialect.

For example, in the Ngok dialect of Dinka, the Low tone is realized as a fall in fundamental frequency (f0) when it follows a High tone. This can be seen in Figure 1, and is transcribed in (1a). Note that this is not the utterance-final Fall tone noted in some Bantu languages (Hyman /////); if an utterance-final Low tone is preceded by a Low tone, it is realized with level fundamental frequency; this can be seen in Figure 2, and is transcribed in (1b). These two realizations—the Low$^{\text{FALL}}$ and Low$^{\text{LEVEL}}$ realizations—have been referred to as *allotones* (Remijsen & Ladd 2008).[1,2]

(1) a. ă-cí̠   ràaan   máaan   b. ă-màan   ràaan
     DECL.SG-PRF person hate\NF   DECL.SG-hate person
     'S/he hated the person.'   'S/he hates the person.'
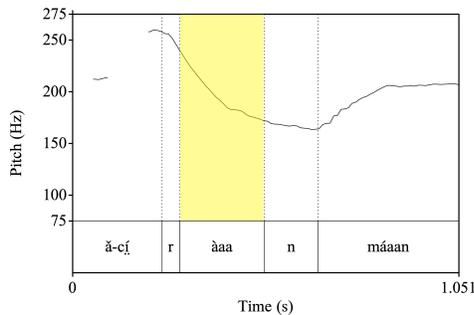
*Figure 1. Falling realization of the Low tone.*
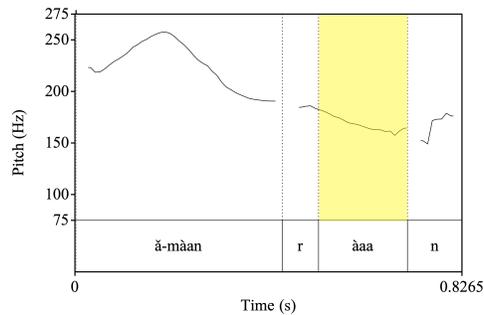
Figure 2. Level realization of the Low tone.

If the surface form does not necessitate categorical distinction, the Low$^{\text{LEVEL}}$ and Low$^{\text{FALL}}$ allotones may be differentiated in the surface phonology. But these allotones can be differentiated from the behavior of tone sandhi, which is dependent on categorical distinctions, and is not on the level of the Low$^{\text{LEVEL}}$ and Low$^{\text{FALL}}$ allotones. An example of this can be seen in

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[1] Abbreviations: DECL = declarative, NF = non-finite, PRF = perfect, SG = singular
[2] Transcriptions represent underlying form.

Figures 3 and 4, transcribed in (2). One sees that the underlyingly High-toned 'gazelle' is realized as a Low tone—or, more precisely, as the Low$^{\text{FALL}}$ allotone; the second of two High tones is realized as a Low tone would be in that context.

(2) a. ă-cí̠   **ŋɛ́ɛɛr**   máaan   b. ă-màan   **ŋɛ́ɛɛr**
      DECL.SG-PRF gazelle.SG hate\NF   DECL.SG-hate   gazelle.SG
      'S/he hated the gazelle.'   'S/he hates the gazelle.'
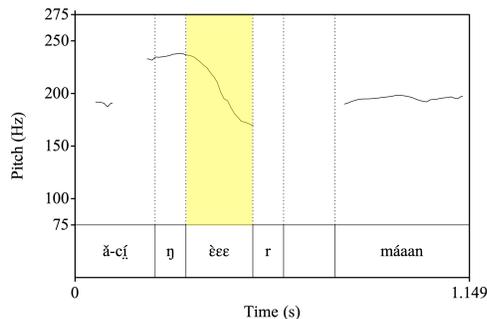
Figure 3. High-toned ŋéɛɛr realized as a phonetic fall when it follows another High tone.
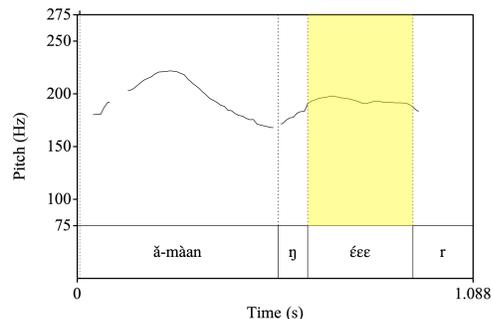

Figure 4. Level realization of the High tone.

How can these two different types of tonal interaction be reconciled? Which should be the surface layer? It is important to recognize the differentiation between tone sandhi and allotony. Intuitively, this suggests postulating *three* layers of representation, which is problematic in the scope of theory for a variety of reasons. Moreover, because transcription already represents an analysis, it is important that it be useful in differentiating important distinctions. Ultimately, I conclude that for Dinka, postulating more than two levels of representation may be necessary.

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