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Author(s): Joe Salmons

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From Tone to Stress: Mechanisms and Motivations¹

Joe Salmons
Purdue University

0. Introduction

Tonogenesis has established itself as a standard topic among historical linguists working with tone languages.² The other side of the same coin, i.e. how tonal systems become stress-accent (or intermediately, pitch-accent) systems, has barely been treated, although numerous scholars have expressed interest in this issue, and a few have treated specific instances of tone-to-stress shift, including Goldsmith, Li, and others. Beckman (1986: 32) is perhaps most explicit about it: "There are as yet no theories of the genesis of accent so well substantiated as is the now standard theory of tonogenesis."

Examples of such tone loss and accentual genesis are well attested across southeast Asia, East and West Africa and in numerous contact languages from around the world. This paper briefly treats structural as well as sociolinguistic and language-contact aspects of tonal loss. Only a holistic explanation, namely one including both well-developed language-internal and language-external arguments, can comfortably account for this cross-linguistically very common tendency. In particular, I focus on the crucial transitional stage away from tone to stress, especially the more specific problem of pitch-to-stress shift, and note some possible external motivations for such a transition. The internal mechanisms by which the shift takes place must be understood, but the motivations must be sought language-externally. The crucial argument here is that tone-to-stress shifts around the world show profound parallels and that the differences among such developments are at least sometimes illusory or superficial. The link between internal and external considerations is the role of intonation in word-level accentuation and accentual change.

The recognition of a combination of both internal and external considerations as absolutely necessary for a complete understanding of change has become commonplace among theoreticians of language change. This basic tenet is, for example, agreed on by scholars with such diverse theoretical perspectives as Kiparsky (e.g. 1984, 1988), Thomason and Kaufman (1988), and Anttila (1989).³ As Kiparsky has argued (1988: 375), a theory of language change is not an autonomous theory, but must incorporate a broad range of other considerations. While this is recognized in theoretical treatises, such integrated explanations remain relatively rarer in specific case studies. In the case at hand, internal and external motivations both contribute to a particular type of language change. The changes treated represent simplification within the linguistic system and these changes also tend to take place under sociocultural circumstances favoring language change in general and accentual change in particular. This article tries to bridge the internal-external gap in practice, although limitations of data and frameworks leave matters vague or speculative on several crucial points. In that sense, this piece tries to point to some areas where further work is needed.

1. Internal aspects

The developmental path toward stress appears often to involve a series of steps, including these three:

- (1) Tone
- (2) Pitch accent
- (3) Stress (fixed)

This sequence of changes can be precisely and concisely described using nonlinear frameworks, and recent work in phonetics lends empirical support to nonlinear descriptions. See for example Beckman (1986), who, however, proposes a single fundamental distinction between stress and non-stress accent.⁴

Of these three classical accentual types, the first and last have been relatively straightforwardly distinguished in numerous handbooks. One of the most interesting points of contrast, one developed below, is Beckman's claim that tone functions more like a distinctive feature—being, for example, susceptible to neutralization in certain contexts—while accent functions more as an "organizational feature" (1986: 2). That is, accent creates a focus within a string of speech, by giving prominence to certain areas and denying it to others.

Pitch accent is where the action is, since it covers a broad continuum of specific accentual systems, as noted by van der Hulst and Smith (1988: ix). The clarification of the nature of pitch accent is indispensable for an understanding of its role as a transitional stage in tone-to-stress shift. While the role of stress in pure tone languages is at best unclear, and while pure stress languages can be described without reference to tone, both tone and stress are necessary elements in understanding a pitch-accent system. Along these lines, three types of pitch accent are distinguished by Inkelas and Zec (1988), based on the interaction between tone and stress:⁵

- (1) only tone needs to be marked in the lexicon and stress can be predicted from tone, e.g., Serbo-Croatian;
- (2) only stress needs to be marked to predict tone, for example in Norwegian;
- (3) both tone and stress must be marked and they function independently, as in Japanese.

In this paper, I divide pitch-accent systems into those three categories: languages in which stress is basic (with tone predictable from it), those languages in which tone is basic (and stress is predictable from it), and those languages in which both seem to be required underlyingly.⁶ Such a distinction is necessary to make sense of the extremely broad notion of "pitch-accent systems".

Given pitch accent as a transitional stage from tone to stress, an uncontroversial point to my knowledge, the question becomes one of transitions between types of pitch-accent systems. That is, do languages progress uniformly from one to another of these three types of pitch accent on their way toward stress? Van der Hulst and Smith argue that there is no universal path of development from pitch accent toward stress. They contrast the developments posited for Bantu with those in Otomanguean languages, summarizing a number of studies contained in their volume (1988: xxi-xxii). In Bantu, trends include restrictions on tone patterns that can occur, replacement of the H-L distinction with H-Ø (i.e. the development of a privative distinction between tone and no tone), and development of metrical structure with the designated element corresponding to H. Such stages would appear to fall within the tone-based pitch-accent system in the taxonomy above. In Otomanguean, they suggest, following Hollenbach (1988), that a word stress system leads to reduction of tonal possibilities in unstressed syllables and, sometimes, to a shift of the tone pattern onto the stressed syllable. This would appear to represent a stress-based pitch-accent type.

However, this distinction seems illusory for a number of reasons. As noted above, pitch-accent systems, like the two examples just mentioned, must be described with reference to both tone and stress. In the case of Bantu languages, van der Hulst and Smith describe the evolution with reference to tone, and in the case of Otomanguean, they trace the role of stress. This would seem to imply that tone remains basic longer in Bantu during tone loss, while in Otomanguean stress becomes basic earlier in the process. In fact, although they assign the rise of metrical structure a late role in Bantu, it is unclear how the tonal reductions would take place without interaction with metrical prominence. In order for the Bantu account to differ significantly from the Otomanguean, the relative chronology

sketched for Bantu would have to imply that a H-L contrast might be lost in a given position without any reference to metrical prominence (or stress, to keep the more specific formulation).⁷ Likewise, it would imply that a H-L contrast might, at the same time, be maintained in a position that would not be prominent. However, Goldsmith (1987a) specifically ascribes tonal developments in Kirundi and Kinyarwanda to the "rise of rhythmic structure" in those languages, something to which we will return below. But more directly contradictory evidence is also available from Bantu.

At least some Bantu languages had various kinds of fixed-stress systems. A stress shift in such a language can apparently lead to tone shift, as argued for Kikuyu by Clements and Ford (1979). In this case, Kikuyu has shifted stress one syllable to the right and stress has essentially taken the H with it, rather than spreading rightward as in a system like that of Kikamba:

Proto-Bantu	Kikuyu	Kikamba/Tharaka	
*-yéne	-ēné	-éne	'to belong to someone else'
/		/	
/		/	
∨		∨	
H H	L H	H H	

That is, stress is implied to be basic within the pitch-accent system at the point when stress-shift takes place, as the H assignment is based on stress. This Bantu example is thus not at all in conflict with the chronology of Hollenbach (1988) for Otomanguean, nor are other instances of tone-to-stress change that I know of. At most, the difference between the Otomanguean example and the Bantu examples might be a difference in how metrical prominence is realized, *viz.* stress versus pitch. We would see then a general tendency for metrical prominence to creep into tonal systems, eventually eroding them in favor of a stress-accent system.

A very brief look at Bantu lends support to this as a general underlying principle in Bantu accentual development. Carter (1973) gives an overview of Bantu tone which can, for present purposes, be reduced to a typology consisting of four categories: (1) loss of tonal distinction outside of stem-initial syllables, (2) loss of tonal distinction within stem-initial syllables, (3) "various limits on tonal distinctions in stems", and (4) tone loss. This taxonomy can be understood as reflecting several diachronic layers in the development away from the Proto-Bantu two-tone system. The first two types show, respectively, a H-L distinction in the first syllable of stems (with loss of distinction in the second) and loss of distinction in first syllables in stems, e.g. Herero, which maintains first syllable tone distinction and Nyankore, which loses it in first syllables.⁸ In short, these would reflect a single more general process and the sole significant difference rests on whether the first or second syllable of the verbal stem becomes metrically prominent, in line with Goldsmith's (1987a and elsewhere) arguments that an alternating metrical prominence has brought about shift of H tones to associate with such metrically prominent positions. The fourth type is complete tonal loss, found particularly in the eastern Bantu area, and would represent a stage of further development, i.e. tonal reduction, from the two just-mentioned types. That leaves only the very vague category of "various limits on tonal distinctions in stems", at least some of which I think can be dealt with in similar terms, although space does not permit discussion here.

If this general path of tone-to-stress evolution is accepted, at least for the moment, the real question then becomes exactly where the transition from a pitch-accent system to a stress-accent system takes place within this evolution.⁹ A number of possibilities present themselves, for instance:

- (1) A limit of one H per word;
- (2) Development of a prominence system (an "organizational" function);
- (3) Loss of distinctions outside of the one crucial syllable.

Shih (1985) seems to suggest that steps 2 and 3 follow from what Shih calls a High Pitch Constraint (like 1) in Fuzhou, limiting words to a single high tone per word. That is, once a word can have only one high tone, that syllable automatically becomes prominent. That prominence is already an accentual rather than tonal characteristic. This is in line with Beckman's understanding of accent, noted above, where it functions as an organizing principle, marking place in various domains, from the word (or even smaller units) to the phrase and beyond. The development of metrical prominence would also then lead to the reduction of contrasts elsewhere, since prominence is by definition relative.

Along similar lines, Goldsmith (1987a: 76-77) suggests the development of prosody based on H tone—"an inherently prominent syllable"—becoming an "anchor" for metrical structure. He goes on to find two factors likely to play a "causal" role in the rise of metrical structure, either a limit of one H per word, presumably by creating a possible anchor for metrical structure, or the rhythm established in languages like Kirundi by a tonal pattern of HLHL in verbs with two objects attached. The system Goldsmith treats would clearly be a pitch-accent system with tone underlying, i.e. with H anchoring the prominence. Returning now for a moment to the question of precisely defining where the transition from pitch to stress comes, one might hypothesize that the loss of Goldsmith's "anchor" would define that shift to stress. When the anchoring of metrical prominence in terms of a tone is lost, the system would be describable purely in terms of stress.

In a different formulation of matters, Goldsmith (1988: 87) sees the location of metrical prominence within the word as determining the syllable to which the H is attracted. That is, final prominence would pull a H to final position, as opposed to what Goldsmith calls "middle prominence" in Kirundi, which results in H tones in the middle of words. This would imply the reverse order—rather than the position of a single H allowing for or inducing the rise of metrical structure, here metrical structure would determine where the H occurs. These formulations seem to be at odds with one another, since the second would have to involve prior development of metrical prominence conflicting with the placement of the inherently prominent syllable, namely the syllable bearing a high tone. This must presume coexisting but independent stress and tone patterns at an earlier stage of Bantu. Otherwise, we again have the problem noted above of how a metrical structure could *arise* in conflict with H tones, i.e. inherently prominent syllables. If we go back to assuming a preexisting pattern of metrical prominence, this would leave us back with Clements and Ford's Kikuyu situation, where a shift of stress mandates a shift of tone. Within the context of Bantu, Goldsmith's second treatment of matters—with Hs being attracted into metrically prominent positions—would seem a more likely secondary development, rather than an original motivation for tonal structure.

Another way of looking at this transition can be developed. Yip (1988) argues that the Obligatory Contour Principle—forbidding underlying sequences of the same melodic feature and mandating spread in the case of tone—is at work in stress-accent systems as well as in pitch or tone systems. But the concrete manifestations of the OCP would be different in the two systems. Namely, spreading is by its very nature absent in stress-accent systems, in which the OCP is used instead to avoid "stress clash" (Prince 1983), rather than resulting in tone spread.

When the OCP functions to avoid stress clash rather than to bring about tone spreading, the transition from pitch to stress would seem necessarily complete. Presumably, for example, Serbo-Croatian would be considered a kind of stress-accent language if there were no tone spreading.¹⁰ This would seem to be the latest stage at which tone could play a significant role; that is, it would still be possible for tone to be lost, taking spreading with it.

The rise of a stress-like pattern of prominence might prove a crucial step before that one.¹¹ Since the OCP (which was originally used for tone languages) has been extended by Yip and others to stress-accent systems, it is worth asking whether the OCP can be applied productively to the understanding of pitch-accent systems. I would argue that it can be, in the following way. The OCP avoids underlying sequences of the same tone on the

one hand and prevents "stress clash" on the other. Tone and stress are understood as subcategories of a more general category, accentual *prominence* (Prince 1983: 88-89). While stress-accent and tone languages utilize one or the other type of prominence in a fundamentally more significant way than the other, pitch-accent languages utilize both in important ways. So, we might expect some preference for avoiding prominence clash, which would be one level more abstract than sequences of identical tone or stress clash. That is, the OCP would avoid the occurrence of sequences of prominent syllables. For this reason, changes like Goldsmith's "tone-accent attraction condition" (1987b) become understandable in a broader framework.

So far, I have suggested some places where one could draw distinctions among tone, pitch and stress as stages in tone-to-stress shifts and have shown that the paths away from tone toward stress show profound similarities across a number of languages and families in Middle America, East Africa and Asia. The above suggests a generally uniform path from tone to stress accent, one which captures diachronic processes from diverse languages within a single description. The differences are superficial here, e.g. whether the first or second syllable of a stem occupies the metrically prominent position and thus attracts the H, retains tonal distinction, and ultimately in some languages develops stress.

How can this change be motivated internally? The traditional approach is to show that a change from tone to stress represents simplification, since, for example, rather than requiring the marking of each syllable for a particular tone in the lexicon, a stress language needs at most one syllable per word marked for primary stress. See Clements and Goldsmith (1984) and Salmons (in press) for more detailed arguments on simplification. In the transitional stage, a pitch-accent system, the issue of simplification can become clouded. A rule restricting words to no more than one H might, under certain circumstances, move the language from being a tone language to being a pitch-accent language and it would simplify the underlying representation. However, if both tone and stress must be understood independently, the rise of stress would represent a clear complication of a previously tonal system. Generally, though, the changes can be understood as simplification, so I will not pursue the matter here.

2. External aspects

Internal descriptions, however formally elegant, leave us with incomplete motivations for the change from tone to stress. Clements and Goldsmith ask why some languages remain tonal over millennia while other related languages become stress-accent languages. This seems to imply that such explanations could be sought language-internally without consideration to external factors. This implication means that their question ultimately proves ill-formulated from a historical linguist's point of view. That is, the underlying causes of language change are not to be found purely within the language, but rather in language use by a community. Kiparsky (1988: 375) gives us a formulation of the matter even more directly relevant to Clements and Goldsmith's question (noted above): "what needs to be explained by social factors is not why language changes but why change is sometimes impeded." Our understanding of the role of social factors in language change is obviously not well enough developed to do that with precision for an area as complex and ill-understood as tone and accent. Still, it appears that we have little choice but to try. Goldsmith (1987a: 77-78) uses "cause" in a restricted way, dealing with motivations that can perhaps explain why change takes place but not why it is impeded. But I would like to suggest in the rest of this paper that Goldsmith's solution to the problem of Bantu accentuation, namely the role of prosody and/or metrical prominence, fits very neatly with external motivations for language change in attested settings. That is, prosody is particularly susceptible to sociolinguistic pressure.

A powerful correlation exists between tone-to-stress restructuring and both language-contact change and *Sprachbund*-phenomena, as argued at considerable length in Salmons (in press), where detailed bibliography is also provided for the cases noted only in passing here. Perhaps the most notable attempt to place accentual change into a general theory of language-contact change is that of Thomason and Kaufman (1988: 74-75). They assign the

borrowing of "stress rules" to category 3 of their scale of language-contact related change, as part of the category of "slight structural borrowing". Their examples of such settings are immigrant languages in the United States and some Spanish-American Indian contact settings in Mexico. While most instances of accentual change appear to fall into this category, accentual change can also occur with little other structural borrowing, i.e. at or near the beginning of structural borrowing.

Language contact with tone-to-stress shift is attested in many pidgins and creoles and many African contact languages, areas of research where this has virtually become a cliché. But the evidence extends to other parts of the world with far less intense contact than found in pidginization and creolization settings. For example, Scandinavian pitch-accent systems have regularly become stress systems in relatively moderate contact settings, e.g. in Swedish dialects spoken in Finland as well as Scandinavian languages in the United States. The development of areal accentual patterns has been shown for several regions of Eurasia and Africa. Tonal areas are, of course, well established for both West Africa and Southeast Asia, with the tonal versus non-tonal isoglosses cutting in both cases directly across several language families. That is, tonal areas exist in those areas including languages of diverse genetic affiliation where related languages outside the tonal area are non-tonal. There are also indications of areal distribution of particular (sub-)types of tone systems within those more general tonal areas (cf. especially Weidert 1981: 216-219).

Stress shows similar powerful tendencies to occur areally. To give only one example, Hyman (1977) has called attention to an extensive final stress area in westernmost Asia, including Armenian, several Iranian languages, and a number of Turkic languages. An areal diffusion of fixed initial-stress accent has also been argued for prehistoric northern Europe (cf. Salmons in press), involving several subgroups of Indo-European (Celtic, Germanic, probably Italic) as well as Finno-Ugric languages.¹² This tendency also includes areas characterized by pitch-accent systems, such as part of northern California, with Hokan, Athapaskan and Algonquian languages, although this case requires further exploration. Given this clear propensity toward areal diffusion and development in conjunction with language contact, accentual restructuring would be expected to correlate with some external motivation for change. I will return to pursue this in a moment.

In spite of such powerful crosslinguistic tendencies as those just noted, Clements and Goldsmith (1984) find tone loss across the Bantu languages "unlikely [to be] a regional or diffusional phenomenon". This claim is particularly surprising in light of the maps provided by Carter (1973) and Guthrie (1967-1971), showing clear geographical patterns of accentuation across the entire Bantu-speaking area. It rests, in part, on the assumption that the outcome of areal diffusion would be identical across all the languages to which a feature or system has spread. It would have to be shown that language-contact change implied development of identical systems. This is not necessarily the case and in fact runs against the grain of much recent work on language contact. The most probable immediate motivation of tone loss—the rise of a system of metrical prominence—could be the same across at least much of Bantu but could easily be realized in superficially different ways, as seen above. That is, many of the differences across Bantu accentual systems are probably attributable to a few variables, which, as Carter (1973) notes, were simply not obvious at the time. Again though, the broad areal patterns of retention, reduction, and loss of tone are clear from such maps.

Heine (1973) correlates lack of tone in many Bantu languages with language contact, either pidginization or partial pidginization. In light of the extremely complex language contact settings in Africa, however, individual cases are not always so easily explained. Polomé (p.c.) finds substratal influence the most likely cause of tone loss in Tumbuka and some other Bantu languages, but our knowledge of the prehistorical linguistic situation is severely limited. Presumably both social factors, such as ratio of substrate versus superstrate speakers, and purely linguistic factors, such as accentual differences in substrate languages, were important in the loss of tone in Tumbuka and in the preservation of tone in Zulu and Xhosa. The social factors that encourage or discourage language change in general are, if anything, more important in accentual change, for reasons

discussed below. Unfortunately, when the sociocultural and historical background cannot be established, the ways and means of accentual change are probably lost as well. There is, I think, nothing ad hoc about this explanation—in cases where we have the data, the explanation works well, but where we do not have the data, we do not have a firm explanation and are forced to reach for more speculative solutions or to forego answering such questions.

An external (or more specifically, a language-contact or areal) motivation would fit well with the often-expressed view that prosody can lead to the appearance of new accentual patterns, i.e. that sentence-level accent can lead to alteration of word-level accent. Hyman (1977, 1978), for example, conjectures that intonation can lead to new accentual systems. Similar views for other languages can be found as well, cf. e.g. Liberman on Scandinavian (1982: 124-128) as well as the discussion by Beckman (1986: 31-36). Prosody seems in fact to be relatively susceptible to Labovian-type prestige change (or for that matter, retention based on sociolinguistic considerations). Mackey (1962) long ago declared intonation particularly persistent and particularly subtle in interference. This has been argued at least as far back as Kent (1932: 66) who attributes a reintroduction of pitch accent into Latin to Greek influence on the most highly educated classes. But intonational interference can arise in other ways, for example as a substratal feature.

Note how well this matches up with Goldsmith's several discussions of prosodic phenomena in Bantu and Hyman's attribution of stress development based on intonation. Goldsmith sees prosody as crucial to the evolution of non-tonal accentuation in Bantu. The susceptibility of prosody to sociolinguistic pressure would provide a language-external link in such changes. The "causal" factors discussed in Section 1 above still do not motivate tone-to-stress changes in some languages and cannot completely explain the retention of tone in others. Tracing the shift back to intonational considerations leaves unclear why intonation would have changed. More detailed understanding of how intonational change interacts with (word-level) accentual change is unfortunately virtually impossible given the current lack of data about intonational change. Hock's recent and extensive guide to the study of language change (1986), for example, does not deal with prosodic or intonational change in any significant way, reflecting a serious gap in the state of the art in historical linguistics today. Pierrehumbert and Beckman (1988: 239 and elsewhere) note that even the description of intonation in tone languages—something obviously very necessary for progress on the issues raised here—is still in its infancy.

3. Summary and conclusion

Tone-to-stress shift is a well attested pattern of linguistic change cross-linguistically, one which shows important parallels across many languages of the world. Even details of tone-to-stress change appear cross-linguistically consistent. While tone loss may represent simplification, internal motivations are clearly insufficient to trigger or to inhibit such a change. Such triggering and inhibiting factors must be sought elsewhere, in this case in language contact or areal diffusion. Thus, accentual change, a crosslinguistically very common type of language change, is one made especially complex because it rests not only on internal features, but also correlates clearly with external (socio-historical) considerations.

As noted at the outset, the attempt to integrate internal and external considerations into understanding language change is necessary and useful in case studies. For accentual change from tone to stress (or to some type of pitch accent as an intermediate stage), the internal and external factors both point in the same direction, simplification at work internally and features prone to sociolinguistically motivated change at work externally. This in no way constitutes any kind of attack on those who have concentrated on internal considerations (Goldsmith, Clements, Beckman, among others), but on the contrary merely attempts to put their work into a broader context. It is of course natural for those primarily interested in phonological theory not to dwell on the various external considerations necessary to understand language change; that presumably remains the work of the historical linguist. Purely internal motivations remain however ultimately incomplete

without connection to external considerations. This is true especially by omitting not simply motivations for change, but by omitting motivations for retention, following Kiparsky as cited in the introduction. Further progress in understanding the details of the role of intonation in accentual change will obviously be dependent on progress in understanding intonational change.

NOTES

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²These include for example the works by Hyman, Matisoff, and Weidert listed in the bibliography.

³There are notable exceptions here, such as Lightfoot (e.g., 1988), who essentially dismisses external considerations out of hand as at best uninteresting.

⁴I avoid the conflicts among the competing nonlinear theories and formalism as far as possible here, since such matters are tangential at best to the arguments I pursue here.

⁵A number of taxonomies and typologies of pitch accent have been proposed of late besides the one of Inkelas and Zec. Cf. a number of the contributions to van der Hulst and Smith (1988).

⁶I leave aside here traditional ways of distinguishing tone languages such as minimal pairs involving tone.

⁷The only situation I can imagine in which a single H per word could conflict with a developing prominence system would be a superstrate-substrate contact setting, where a rhythmic structure would be imposed onto a native tonal pattern. Language contact of course can and does lead to such systemic conflicts in some settings, but no one has, as far as I know, ever even speculated about such for the Bantu cases at hand here.

⁸Presumably the differences between types 1 and 2 could be reflected in stress placement, e.g. with type 1 showing stress on the first syllable of the stem, assuming a left-headed system for the moment.

⁹I consider the systems discussed in this section basically pitch-accent systems, i.e. Tonga (Goldsmith), Fuzhou (Shih), Kikuyu (Clements and Ford), rather than pure tone languages. The distinction between tone and pitch accent is a very different and perhaps more difficult topic.

¹⁰The result might be a non-fixed stress-accent system in the case of Serbo-Croatian. An interesting question not treated in this paper would differences in the rise of fixed versus non-fixed stress systems from pitch or tone systems.

¹¹In Japanese for instance, Prince (1983: 89) says that no pattern of metrical prominence (strong versus weak) exists, putting it a step farther from a stress-accent system than Serbo-Croatian.

¹²It might also be noted that other accent-like phonological features show areal distribution, such as stød in the Baltic, preaspiration in northernmost Europe and ejectives (often occurring in stressed positions) in some parts of North America.

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