

PARADIGMATIC INITIATION OF A  
SOUND CHANGE IN HADIYYA

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A sound change \*l > r/V\_\_V in Hadiyya left original \*ll unaffected with the result that modern Hadiyya has alternations in verbs between r in intervocalic environments but ll (often < \*l-n) when certain inflectional suffixes are added. This alternation has spread to roots which had original \*r/\*rr, and moreover \*rr has changed to ll outside the verb paradigms. The extension of the r/ll alternations to all verbs followed by the eventual creation of a regular sound change by extension of the originally paradigmatically conditioned \*rr > ll change to all instances of \*rr is explained by Peirce's notion of abductive inference.

1. Introduction

Among the "pressing problems" for diachronic linguistics which a few years ago Yakov Malkiel identified as needing attention was the possibility of "the paradigm as a stimulus for a sound change". His article proposed that the Spanish sound change of (palatalized)  $\acute{g} > z$  in the environment after l, r, n, and related developments was due to extension of the alternation found in a single verb paradigm. "Every scrap of evidence," he said, "points to the powerful analogical influence exerted, in the two moods of the present tense, by  $\bar{D}\bar{I}\bar{C}\bar{O}$ , ERE, a verb whose paradigm is characterized by the neatly patterned interchange of -g- and -z-: (ind.) digo, dice(s)..., (subj.) diga(s) " [Malkiel 1968:41].

It does seem entirely reasonable that analogical pressures created by an alternation in common and frequent words could lead, under the right conditions, to spread of the alternation as a sound change. Completion of the sound change would then make internal reconstruction of the alternation which brought it about quite difficult.

The first purpose of the present paper is to present another case in which an alternation of verb paradigms seems to have been extended to eventually effect a general sound change. Owing to the clarity of the comparative evidence, however, the present case constitutes a more

convincing example, perhaps, than that presented by Malkiel [1968]. A second purpose of the paper is to exemplify the little recognized but important psychological process involved in such linguistic change: abduction, or abductive reasoning.<sup>1</sup> The language is Hadiyya, a Highland East Cushitic language spoken in central Ethiopia, and the paradigmatically initiated sound change is \*rr > ll.

## 2. Initiation of the sound change.

Besides the change \*rr > ll there was another, certainly related sound change in Hadiyya, about which discussion must begin: \*l > r/V\_\_V. Following in (1) is a short selection of basic-word cognates in the five Highland East Cushitic languages. Notice the comparison of Hadiyya r with l in the other languages in most of the items. In 'fire', 'butter', and 'long', in which original r can be reconstructed all have r.

| (1)      | <u>Burji</u> | <u>Darasa</u> | <u>Hadiyya</u> | <u>Kambata</u> | <u>Sidamo</u> |
|----------|--------------|---------------|----------------|----------------|---------------|
| 'butter' | --           | buuro         | buuro          | buuru          | buuro         |
| 'cattle' | lali         | --            | laro           | lalu           | --            |
| 'claw'   | t'unga       | --            | t'uranka       | t'ulankata     | č'ulunk'a     |
| 'fire'   | jiira        | giira         | giira          | giirata        | giira         |
| 'four'   | foola        | šoole         | sooro          | šolo           | šoole         |
| 'liver'  | afala        | --            | afare          | afalita        | afale         |
| 'long'   | --           | k'eerra       | k'eera?la      | k'eerrarru     | --            |
| 'meat'   | maala        | maala         | maara          | maala          | maala         |
| 'seven'  | lamala       | --            | lamara         | lamala         | lamala        |
| 'smoke'  | hilla        | wiilla        | wuriira        | wiillita       | wiille        |

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<sup>1</sup>Data for this paper derive from field-work in 1972-73 made possible by the Foreign Area Fellowship Program. The paper was presented orally at the Sixth Conference on African Linguistics, Ohio State University, April 1975. I wish to acknowledge important criticisms received on an earlier version from Robert Hetzron and Raimo Anttila. Professor Anttila, it should be noted, has no responsibility for my idiosyncratic application here of the notion abductive inference. For a generally reliable grammatical sketch of Hadiyya, see Plazikowsky-Brauner [1960], and for a descriptive-comparative survey of the Highland East Cushitic languages, see Hudson [in press].

The change in Hadiyya of \*l to r between vowels created an alternation in verb paradigms. Intervocalic stem-final secondary r of most forms alternated with original l which remained in geminate clusters resulting from the assimilation by stem-final l of following suffix-initial n in the 1st pl. (of four conjugations) and of an unreconstructable suffix-initial segment in the imperative pl. This is seen in the two conjugations of (2). The stem-final intervocalic r of 'go out' is secondary, coming from l; 'cut', however, has original r.

|               |            |               |           |                              |
|---------------|------------|---------------|-----------|------------------------------|
| (2)           | Imperfect  |               |           |                              |
|               | 'go out'   |               |           | 'cut'                        |
| 1st sing.     | firoommo   | < *filoommo   |           | muroommo                     |
| 3rd. m. sing. | firookko   | < *filookko   |           | murookko                     |
| 3rd. pl.      | firaakkamo | < *filaakkamo |           | muraakkamo                   |
| 1st pl.       | filloommo  | < *filnoommo  | mulloommo | < *murroommo<br>< *murnoommo |
|               | Imperative |               |           |                              |
| 2nd sing.     | fire       | < *file       |           | mure                         |
| 2nd pl.       | fillehe    | < *fil-Xehe   | mullehe   | < *murrehe<br>< *mur-Xehe    |

The suffix-initial n of the 1st pl. is seen in e.g. waaččinoommo 'we swim' (stem waačč-), and yinoommo 'we say' (stem y-), with epenthesis of i between stem and suffix. Judging from the comparative evidence, one might guess the suffix-initial segment of the imperative pl. to be \*h, or \*y. These considerations are unessential here, however, where the reconstruction of the forms with rr is sufficient, and relatively uncontroversial.

The interesting words in (2) are mulloommo 'we cut', and mullehe 'cut! (pl.)'. That this morpheme has etymological stem-final r is clear from its cognates in Highland East Cushitic, which have r: cf. Kambata murraammi, Sidamo murreemmo 'we cut'; K. murre, S. murre 'cut! (pl.)'. Cognates of 'go out' have l: K. fullaammi, S. fulleemmo, 'we go out'.

The alternation of *r* and *l* existing today in Hadiyya verbs such as 'cut' can be reasonably explained as resulting from analogical extension of the alternation in the more frequent verbs, those with original intervocalic stem-final *l*, into the paradigms of the less numerous class, those with original intervocalic stem-final *r*. That verbs with original *l* were more numerous than those with original *r* seems apparent. Of forty verbs in my Hadiyya word-list which have stem-final *r* (i.e., *r* before the vowel-initial suffixes), seven are probably late borrowings from Amharic, the Ethiopian lingua franca (makkar- 'advise', karaar- 'be bitter', šaar- 'demote', barar- 'fly', wak'ar- 'pound', ĵammar- 'begin', masakkar- 'testify'); thirteen are of uncertain reconstruction, lacking cognates in the other languages (war- 'bring', atorar- 'converse', t'or- 'escape', kar- 'tie', sibaar- 'be hungry', tiir- 'remember', haraar- 'stir', naar- 'pile up', gomar- 'be ripe (corn)', geer- 'run', šišir- 'have leprosy', diriir- 'go to sleep', ĵar- 'be worse'); thirteen can unquestionably be reconstructed with *l* on the basis of their cognates in the other Highland East Cushitic languages (kur- 'tell', dabar- 'answer', sar- 'cook', waar- 'come', fir- 'go out', č'ir- 'defecate', hoor- 'forbid', k'ar- 'give birth', gar- 'pass the night', inkiir- 'pour', afuur- 'sit', allaar- 'watch cattle', osar- 'laugh'), and only seven can be reconstructed with original *r* (giir- 'burn', mur- 'cut', mar- 'go', tiir- 'untie', haar- 'scratch', ur- 'leave (vt.)', eger- 'wait'). Verbs with original \**l* include such household and fundamental morphemes as 'tell', 'come', 'go out', 'cook', 'bake', and 'sit', and those with original \**r* only 'go' with a presumably similar frequency of occurrence. The basic-word list sample in (1) seems representative, with original intervocalic *l*'s outnumbering *r*'s by something less than two to one, wherever cognates in the sister languages to Hadiyya make reconstruction clear.

In Hadiyya's close sister language Kambata, which has not seen the sound changes \**l* > *r*/V\_\_V and \**rr* > *ll*, my word list shows twenty-five verb stems with final *l* and twenty-one with final *r*. Again those in final *l* include such basic meanings as 'tell', 'sit', 'give

birth', etc., and those in final *r* markedly fewer such basic meanings. Such meaning/frequency relationships are, of course, difficult to speculate about with confidence. However, a very large frequency difference between the two original stem-final consonants in Hadiyya is not required. Recall Malkiel's argument, in which an alternation in a single verb is said to have been the model for a sound change. We are here also considering a sound change that must have taken several centuries for completion, and all that is required for the argument to be effective is sufficient weight on the side of stem-final *\*l* to push the very delicate evolutionary balance in its favor.

This suggested account of the rise of the *l ~ r* alternation and its extension into other verbs is shown in the three-stage chronology of (3).

| (3)       | Stem-final, inter-<br>vocalic segment | Cluster in 1st pl.<br>and pl. imperative    |
|-----------|---------------------------------------|---|
| Stage I   | <i>r</i><br><i>*l</i>                 | <i>*r-n &gt; *rr</i><br><i>*l-n &gt; ll</i> |
| Stage II  | <i>r</i><br><i>*l &gt; r</i>          | <i>*rr</i><br><i>ll</i>                     |
| Stage III | <i>r</i><br><i>r</i>                  | <i>*rr &gt; ll</i><br><i>ll</i>             |

In Stage I suffix-initial segments of the 1st pl. and pl. imperative suffixes are assimilated to stem-final *r* and *l* yielding *rr* and *ll* respectively. In Stage II the change of intervocalic *l* to *r* takes place producing the alternation of *r* and *l* in verbs with original stem-final *l*. Finally, in Stage III the irregularity but not the alternation is regularized, by the change of the minority *rr* clusters of verbs with stem-final *r* to *ll*. In contrast with leveling of the alternation, this spread of the alternation at least had the advantage of regularization of a useful sort, creating then complete predictability in both directions: intervocalic *r* implied 1st pl. and pl. imperative *ll*, and vice versa.

The change of *\*rr* to *ll* has occurred not only in the stem-final segment of verbs such as 'cut' in (2), as a regularization of verb paradigms, but as a general Hadiyya sound change, as seen in the list of

Highland East Cushitic cognates of (4). In (4) we have comparisons of Hadiyya ll with rr in four other Highland East Cushitic languages. (The fifth, Burji, tends to be too divergent to show useful cognates here.)

| (4)                | <u>Darasa</u> | <u>Hadiyya</u> | <u>Kambata</u> | <u>Sidamo</u> |
|--------------------|---------------|----------------|----------------|---------------|
| 'he chased'        | šorre         | hollukko       | šarro          | sorrí         |
| 'he stood'         | urre          | ullukko        | urro           | urrí          |
| 'he descended'     | dirre         | dillukko       | --             | --            |
| 'day'              | barra         | balla          | bari           | baarra        |
| 'donkey'           | harre         | halliččo       | --             | harriččo      |
| 'tongue'           | arrabo        | allabo         | arrabita       | arrabo        |
| 'he learned'       | --            | losukko        | rosso          | rosí          |
| 'he cooked, fried' | raʔisse       | liʔissukko     | reʔiso         | raʔisí        |
| 'he died'          | ree           | lehukko        | reho           | reí           |
| 'corpse'           | renša         | leešša         | reeša          | reeša         |

The last four items in (4) are examples of initial \*r > l/#\_\_\_. These are included on the hypothesis that they are also instances of \*rr > ll, based on the observation that initial r is commonly [rr] (e.g. in Spanish and Amharic) and that in Hadiyya's sister languages initial [rr] and [r] are in free variation. But in the word-initial environment ll is necessarily replaced by l (this is discussed further in the context of rule (10), below). Note that the first three items in (4), the verbs 'chased', 'stood', and 'descended', do not show ll and rr clusters resulting from assimilations in suffixing. Rather they have stem-final clusters. The 1st plurals of these verbs have epenthesis before suffixes with initial n, e.g. urrinenne, ullinummo, urrinoommi, and urrinummo 'we stood' in Darasa, Hadiyya, Kambata, and Sidamo respectively. Comparisons such as these in (4) offer evidence of a general sound change in Hadiyya \*rr > ll. That is, the change takes place not only in the two grammatical environments, as seen in (2), but everywhere.

Indeed, the two sound changes led to the merger of the r and l phonemes. The contrast of r and l was thereby lost in all positions. This seems likely since there are no final consonants in the language

(with a few modern exceptions), if the few existing cases today of *r* and *l* in clusters are assumed to be relatively recent innovations, and if  $*rr > ll$  is understood to include initial  $*r > l$ . Some words that show the cluster position as contrastive in modern-day Hadiyya are *t'uibe* 'ball', *girda* 'chaff', *ilkollo* 'face' (lit. 'eye-area'), *hurbaata* 'grain, crop', *malte?ukko* 'he lied', and *marte?ukko* 'he chose'. But such cases are few, and it seems clear that a basically CV syllable structure with only geminate clusters is not an extremely archaic state for Hadiyya. In the modern language verb stem-final *r*'s in contact with suffix-initial *t*'s are assimilated: e.g. *matto?o* <  $*mar-to?o$  'she went', *mattamo* 'she will go' <  $*mar-tamo$ , *fitto?o* 'she went out' (stem *fir-* <  $*fil-$ ), *fittamo* 'she will go out'.

But if there was such complete, grammatically unconditioned sound change, then the explanation I have given above of verb paradigm regularization in alternating  $r \sim l$  as the result of analogical change is perhaps unnecessary, since the change of  $*rr$  to  $ll$  in 1st pl. and pl. imperatives of verbs with etymological stem-final *r* could be just a part of the sound changes which led to the merger of *r* and *l*.

Yet it is a striking fact about Hadiyya that both sound changes occurred:  $*l > r/V\_V$ , and, as well,  $*rr > ll$ . Rather than being explanations of the rise and spread of  $r \sim l$  alternations in the verb system, the pair of sound changes of more or less opposite effect themselves require explanation. This point deserves emphasis. "Sound change leading to merger" does not constitute explanation of the Hadiyya phenomenon. I can think of no coherent account in terms of complementary phonetic changes, presumably physiologically motivated, which can explain why laterals became taps in one position (intervocalic), and taps became laterals in another (geminate), changes which could be expressed  $*l$  and  $*r > R$ , where *R* is [l] when long or word initial, and [r] otherwise (alternatively: *R* is [r] short between vowels and [l] otherwise). The question remains: why *R*?

Now the change  $*rr > ll$  will offer no suggestions toward explanation of a consequent change  $*l > r/V\_V$ . This is so since in the verb paradigms which are the environments for inducing analogical change, the

geminate clusters occur in forms semantically more marked and less frequent (the 1st pl. and pl. imperative) than the stem-final, single intervocalic consonant, which appears in the most common 1st and masc. 3rd sing. and other forms (cf. (2)). Without the preceding change  $*l > r/V\_V$ , secondary  $ll$  clusters from  $*rr$  would have stood defenseless against analogical pressures in their verb paradigms to revert to  $rr$ . This is apparent in (5), where the results of the two possible sequences of the two sound changes are compared:

(5) a. Initial change  $*rr > ll$

|                      | Primary, frequent<br>categories<br>(Stem-final intervocalic<br>consonant is:) | Secondary, infrequent<br>categories<br>(Cluster in 1st pl. and<br>pl. imperative is:) |
|----------------------|---|---|
| Frequent verbs:      | l   | ll  |
| Less frequent verbs: | r   | $*rr > ll$  |

b. Initial change  $*l > r/V\_V$

|                      | Primary, frequent<br>categories | Secondary, infrequent<br>categories |
|----------------------|---------------------------------|-------------------------------------|
| Frequent verbs:      | $*l > r$                        | ll                                  |
| Less frequent verbs: | r                               | rr                                  |

Analogical pressures for change are in the lower right-hand quadrant in both sequences: on  $ll$  in (5a), and on  $rr$  in (5b). With the hypothesis of (5a) the initial sound change  $*rr > ll$  produces an alternation in which the secondary alternate occurs in the less frequent verb morphemes, and in the semantically secondary, infrequent verb forms or allomorphs. Analogical pressures are therefore focused on the result of the sound change in (5a). With the hypothesis of (5b), however, we get an opposite result. The sound change  $*l > r/V\_V$  produces an alternation in which the secondary alternate (in terms of the overall paradigm) occurs in the frequent verbs, and in the semantically primary, frequent verb allomorphs. Analogical pressures are focused on  $rr$  clusters in (5b).

Therefore the hypothesis of (5b), an initial change of  $*l > r/V\_V$  provides an explanation of the change  $*rr > ll$  as subsequent. Further-

more, the sound change of  $*l > r/V\_V$  also occurred in the Western Gurage languages, a Semitic group in intense contact with Hadiyya, so this change can itself have been initiated by borrowing from these languages.<sup>2</sup> The Hadiyya sound change  $*rr > ll$  seems likely to have been initiated by alternations in verb paradigms. The change of  $rr$  clusters to  $ll$ , begun in order to regularize these verb paradigms, was apparently then generalized to extend throughout the lexicon. Generalized as a context-free rule,  $*rr > ll$  affected even word-initial  $r$ , phonetically  $[rr]$ , for which, in the absence in this position of  $ll$  distinct from  $l$ , simply  $l$  was substituted. It remains to discuss the process psychologically, and in terms of grammar change.

### 3. Abduction in the sound change

I wish now to describe from a different perspective how this result may have been obtained by Hadiyya grammar, relying on the notion abductive inference of Charles Sanders Peirce (cf. Peirce [1955:150-156]), and its linguistic application abductive change, following discussions by Raimo Anttila [1972:196-202] and Henning Andersen [1973].

At Stage II, referring again to (3) above, after the sound change  $*l > r/V\_V$ , learners of Hadiyya--and this includes full-fledged adult speakers where unfamiliar and new words such as borrowings are

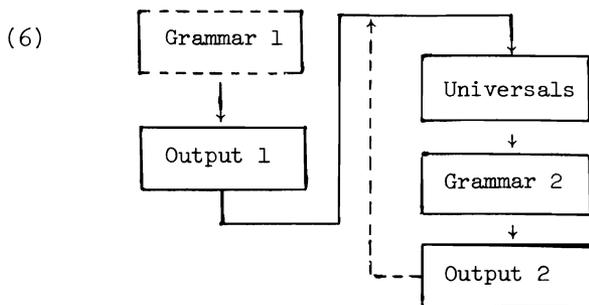
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<sup>2</sup>Sound changes in the Western Gurage languages are intriguingly similar to those in Hadiyya; not only did  $*l > r/V\_V$ , but in other positions  $*l$  and  $*r$  were merged as  $n$  [Leslau 1950:13; Hetzron 1972:83]. The fact that  $n$  figures in the Gurage merger shows that the two Hadiyya sound changes are not explainable, by reference to Gurage, as borrowings, or diffusion of an area feature. Rather we seem clearly to have parallel but partially independent developments in Gurage languages and Hadiyya. Furthermore, "diffusion of an area feature" no more constitutes an explanation of the Hadiyya sound changes than does "sound change leading to merger". The area feature itself needs an explanation. It appears to me that the Gurage sound changes are indeed explainable, along lines similar to those developed here, as involving paradigmatically initiated sound change. This argument, important as it would be for substantiating the present one, would carry us far afield, however, and it is sufficient for present purposes to simply reemphasize that the Hadiyya sound changes can certainly not be explained as simple borrowings from Gurage languages, the sound changes in which are themselves in need of explanation. I expect to deal with the Gurage situation in a future paper.

concerned--are faced with the necessity to accomplish the correct relationship between intervocalic stem-final r's and either ll or rr in 1st plurals and pl. imperatives. Here abduction is required.

As induction is making rules given cases and results, and deduction is producing results given cases and rules, abduction is providing cases given rules and results. Thus given the three statements (a) Socrates was a man; (b) Socrates was mortal; and (c) All men are mortal, reasoning (a) & (b)  $\therefore$  (c) is induction; reasoning (a) & (c)  $\therefore$  (b) is deduction; and reasoning (b) & (c)  $\therefore$  (a) is abduction. Obviously the latter is a very faulty way of reasoning. What is important is that in language learning abductive reasoning is often successful even when wrong, as we shall see in the case under discussion.

In the Hadiyya situation of Stage II in (3), the given results are numerous verbs which have the alternation  $r \sim l$ , and the rule is the universal tendency for "one form, one function", or "one form, one meaning" [Anttila 1972:100], termed "Humboldt's Universal" by Vennemann [1972:183]. Abduction will yield new cases of alternation. (If non-alternation is a possibility favored by the probabilities, abduction will of course lead to leveling of the alternation.) The learning model after Andersen [1973:778], is the diagram of (6):



The data which learners have are Output 1 in (6); they have no access to Grammar 1. Output 1 is filtered through the universals, at least and perhaps no more than general learning principles, especially what Peirce himself called "the one primary and fundamental law of mental action", "a tendency to generalization" [Peirce 1955:320]. The abductions and inductions of Grammar 2 are deductively tested as Output 2,

which tests constitute further results for processing. In morpho-phonology the tendency to generalization ordinarily means the one form, one function principle: irregularities should be regularized.

In (3) again, at Stage II, there are two possibilities: provide all 1st plural and plural imperative |'s (in geminate clusters) in alternation with r, or provide 1st plural and plural imperative r's (rr), leveling the alternation.

I have already suggested that the former course was favored due to the greater frequency of ||'s in relation to rr's in Output 1. Attempted regularizations in Output 2 in favor of rr would have too often been rebuffed, whereas || was more usually acceptable. The more successful abductive inference would thus have made perceived new cases of intervocalic stem-final r cases of alternation with |. Insofar as these abductions succeed (by deductive testing: a result with 1st pl. or pl. imperative || is pronounced), they suggest the rule, or induction (7), which makes | an exponent of the 1st pl. and pl. imperative. The rule neutralizes the contrast of r and | in this grammatical environment.<sup>3</sup>

$$(7) \quad \left\{ \begin{array}{l} \text{1st pl.} \\ \text{pl. imper.} \end{array} \right\} \rightarrow [+Lateral] / \left[ \begin{array}{l} +\text{Sonorant} \\ -\text{Nasal} \\ \hline \end{array} \right] \text{ V-stem}$$

Rule (7) affects only the verb stem-final segment, assuming that geminate | is then the product of a synchronic rule with the effect of assimilation (roughly, |n → ||).

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<sup>3</sup>Abduction may also be considered rule inference. In this interpretation the syllogistic rule is the one form, one function universal, the results the given alternations, and the abduced case is the linguistic rule, e.g. (7). Thus abduction can be considered a type of induction, imperfect induction that is, since it consists of overgeneralization (cf. Anttila [1975:268ff]). This more complex conception of abduction is that ordinarily intended by Peirce. In this paper I emphasize a simpler, but I think linguistically equally interesting interpretation of abduction, in which the abduced syllogistic case is also the linguistic 'case', or morpheme inferred to conform to an induced rule, the linguistic 'rule'.

This induction, or rule, is in an important sense less 'instrumental' in bringing about the regularization than is the abduction, or positing of new cases. It is the abduction of new cases which constitutes language change, or at least apparent language change, and the success of these neologisms makes possible the eventual, general rules which appear in retrospect to describe a sound change. This is so since, even if the induction is wrong--and rule (7) is a wrong statement of the facts at Stage II--the abductions of new cases may often, in two sorts of cases, be accepted: (i) in neologisms for which the majority case of alternation is the model, and (ii) among learners, especially children, whose peers also favor the abductions even in verbs historically without the alternation, but also among adult or mature speakers of Hadiyya where the abductions are infrequent verbs not recognized by them as historically without alternation. In this way, the abductions of new cases of alternation whittle away at the inventory of non-alternating r's, and the language changes, even when (7) is inaccurate as a general rule, and not an adult rule of Hadiyya.

Rule (7) is true for most verbs with intervocalic stem-final r but not for those with etymological r in this position, and for this minority, (7) implies wrong results (i.e., wrong at Stage II in (3)): innovative mulloommo 'we cut', instead of original \*murroommo, etc. The older generation, by insisting on 1st pl. and pl. imperative in rr for these proved rule (7) a wrong induction, and the major rule (7) would have had to be replaced by learners with a rule with the effect of (8), which applies only to morphemes specifically marked for alternation, such as the verb 'go out', with a lexical representation effectively equivalent to (9).

$$(8) \quad \left[ \begin{array}{c} +\text{Tap} \\ +\text{Lateral} \end{array} \right] \rightarrow [+Lateral] / \text{---} \begin{array}{l} \text{1st pl.} \\ \text{pl. imper.} \end{array}$$

$$(9) \quad \left[ \begin{array}{c} +\text{Obstruent} \\ +\text{Continuant} \\ +\text{Labial} \end{array} \right] \left[ \begin{array}{c} +\text{Vocalic} \\ +\text{Front} \\ +\text{High} \end{array} \right] \left[ \begin{array}{c} +\text{Sonorant} \\ -\text{Nasal} \\ \left\{ \begin{array}{c} +\text{Tap} \\ +\text{Lateral} \end{array} \right\} \end{array} \right]$$

f                      i                       $\left\{ \begin{array}{c} r \\ l \end{array} \right\}$

Rule (8) is stated in an unorthodox manner, as a rule applying to suppletive representations, i.e. to segments such as the third in (9), in which both tap and lateral are specified. The ordinary way of handling such alternations in transformational-generative phonology is to derive one feature from the other. The argument for suppletive representation of all alternations is presented in Hudson [1975], and is unessential here, where my point is simply that when regularization in favor of alternation becomes impossible, the alternative is to set up two classes of verbs in stem-final *r*: those which alternate (marked in some way) and those which do not. Rule (8) and lexical representation (9) express this analysis of the facts clearly.<sup>4</sup>

But abduction based on (7) would have been the better analysis in terms of the one form, one function universal, since it would make the

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<sup>4</sup>The equivalent in standard transformational-generative phonology to the 'suppletion analysis' of (8) and (9) would be a 'minor' rule  $r \rightarrow l / \underline{\quad} n$  in the environment of a lexical diacritic (e.g. '+X'). This would be an adequate alternative to (8) and (9), as merely a description. I prefer not to use the minor rule formalism here, however, considering it inaccurate, unreal, or unexplanatory.

The three main arguments for suppletion of all alternations should perhaps therefore be summarized, but briefly. These are: (i) When formerly unexceptioned alternations begin to be leveled, the minor-rule, diacritic representation of the leveling requires spread of the diacritic. The situation is a simplifying, but the representation is a spread of marks, or complicating. (ii) The shift from major to minor rule notation (respectively absence or presence of diacritics) and vice versa, which certainly occurs in rule histories in standard transformational-generative phonologies (as the shift takes place from alternation via derivation from a basic form, where there are many cases, to suppletion, where there are a few, or one) cannot conceivably be determined in a principled way in that system of formalisms; the descriptive theory remains hopelessly vague at a crucial point. The simple principle that all alternations involve suppletion, on the other hand, solves the problem represented by this continuum, and is an accurate description of the usual case of alternation: markedness leading to leveling. (The exceptional case, spread of alternation, can still be accounted for as in this paper.) (iii) The uncontradicted and desirably strong descriptive principle of no extrinsic rule order requires suppletion of alternations, since the 'spelling rules', or statements of segmental composition of morphemes in the lexicon, unordered, imply that lexical entries must be true on the surface; alternating morphemes do have two or more surface forms, as accurately represented in suppletion of alternations.

majority cases of alternation expressions of an obligatory grammatical function, and hence would lead to paradigm regularity and complete predictability of the alternation. Abductions based on (7) would continually be attempted by consecutive generations of Hadiyya learners, and before (7) is replaced by (8) in learners' grammars, the abductive inference of new alternations (the replacement by  $||$  of  $rr$  in 1st pl. and pl. imperatives) in the two sorts of situations mentioned above would have led to an increase of alternation at the expense of non-alternation. The abductions, that is, would have been repeatedly successful, even though the induction (7) was subsequently and repeatedly rejected. More and more verbs came to alternate, and eventually only very common verbs like 'cut' and 'go', with etymological  $r$ , remained without alternation. And finally, these too must have yielded to the spread alternation dictated by the persistent abductions by learners of new cases of alternation; \*murroommo > mulloommo 'we cut', \*marroommo > malloommo 'we go'. Thus (7) became unexceptioned at Stage III.

I have so far tried to describe the grammatical changes leading to regularization by generalization of the alternation of  $r \sim |$  in 1st pl. and pl. imperative verbs. It remains to describe how other  $rr$ -clusters were replaced by  $||$  outside these two verb environments, as a general sound change in Hadiyya. Once again abductive inference is involved, and once again the one form, one function universal is the important law of language which requires abductions crucial for explaining the spread of the alternation, not only in the verb system, but throughout the lexicon.

We need to refer again to the three stages of (3). After \* $| > r/$   $v\_v$  occurring at Stage II, learners of Hadiyya are required to learn the alternations of  $r$  and  $|$  in a large group of verbs. This output of the grammars of their elders is perceived in light of the one form, one function tendency, or universal, which disfavors alternation, and above I have suggested that the analysis of alternations which accomplishes the desired result is (7), a rule which treats the alternation as the expression of a grammatical function. An equally favored alternative, or perhaps even a superior one, since it treats the alternation as

owing to a phonetic constraint of the language, an "automatic alternation" [Hockett 1958:282], and not an alternation at all in this sense, is (10).

$$(10) \begin{bmatrix} +\text{Sonorant} \\ -\text{Nasal} \end{bmatrix} \rightarrow [+Lateral] / \begin{bmatrix} \text{---} \\ +\text{Long} \end{bmatrix}$$

Rule (10) is a segment structure rule: non-nasal sonorants, if long, are laterals. Alternatively, manner of articulation, the contrast of tap vs. lateral in non-nasal sonorants, is neutralized in geminates in favor of the latter. Again the rule is written to affect only the stem-final segment, assuming gemination to result then from a rule assimilating suffix-initial *n* to stem-final *r* (then by (10) *rr* → *ll*).<sup>5</sup>

We can imagine how, with the sound change \**l* > *r/V*\_\_\_*V*, learners of Hadiyya, finding *ll*-clusters in some verb forms (imperative and 1st plurals) where they expect to find *rr*, and perhaps having their occasional *rr*'s rebuffed in favor of *ll*'s, would begin to abductively change all geminate *r*'s to geminate *l*'s, a change consistent with analysis (10). Learners of Hadiyya, including adult native Hadiyyas who are unsure of themselves regarding a given verb form and its non-nasal sonorant geminate cluster, will not distinguish between such clusters which they may indeed have heard before in words which, however, they may not often use, e.g. in a noun such as 'tongue' (*allabo* < \**arrabo*), and those they in fact have not heard, e.g. in verbs for which they must hypothesize from a familiar stem-final intervocalic *r* the 1st pl. and pl. imperative in which the stem-final sonorant is geminated. But at the instant of articulation they will apply the one form, one function rule on the basis of the given results of alternation, and abduce cases of geminate *l*.

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<sup>5</sup>Standard TG phonology actually makes available several possible synchronic analyses of the situation: *r-n* → *rr* → *ll*; *r-n* → *l-n* → *ll*; or, where *L* is the archiphoneme of *r* and *l*, *r-n* → *LL* → *ll*; or *r-n* → *ll*, in one step. Fortunately, the apparently arbitrary choice among these alternatives is not necessary here. Rule (10) is intended to express the state of language when geminate *r* was precluded in favor of geminate *l* by a phonetic constraint, however this is to be expressed in synchronic grammar.

In modern-day Kambata, in Hadiyya's other sister languages, and commonly in languages with both *r* and *rr* but no contrast of these in initial position, initial *r* is commonly [rr]. Rule (10) will affect these cases of geminate *r* the same as intervocalic cases. But in these cases an adjustment is required, since, unlike long *r*, long *l* does not occur in initial position, or if it does, it is a free variant with short *l*. When applied to \*rehukko [r:ehuk:o] (10) yields lehukko, and in this way the sound change \*rr > ll would have affected initial as well as intervocalic cases of *rr*.

When abductions of new cases of geminate *l* in non-verbs are rejected or fail in common, everyday words such as 'day' (balla < \*barra) and 'he died' (lehukko < \*rehukko), which were ungrammatical with *l* at Stage II, (10) might still be replaced by (7), which applies only to the stem-final *l* of verbs, until (7) too leads to rejected abductions, e.g. mulloommo (< \*murroommo) 'we cut', wrong at Stage II. Yet as with innovative abducted verb forms consistent with (7), innovative abducted non-verbs and word-initial *l*'s consistent with (10) could have succeeded in the two cases already mentioned: (i) where the abduction is in a new word, and (ii) in merely unfamiliar items among peers, child or adult, who also favor the abduction. And even when rule (10) is given up, whether in favor of (7) or (8), these innovations would have remained with ll. With the continual increase of these innovative abductive ll-clusters, rr-clusters would at some point in time have remained only in a few frequent and common items. Perhaps non-verbs such as \*arrabo 'tongue' and \*barra 'day' survived after all such rr-clusters in 1st pl. and pl. imperative verbs had given way to ll, and rule (7) was an adult rule in Hadiyya. Anyway, with repeated generations repeatedly abducting new cases such as balla and allabo, these too eventually would have been accepted, as they are today, and segment structure rule (10) would have persisted to become a part of Hadiyya grammar.

Here again it should be emphasized that abduction in this way brings about language change even when the innovative induction (10) repeatedly fails to survive as an adult rule of Hadiyya. The one form, one function universal tendency or rule, plus the given results of numerous *l*'s in

alternation with *r* analyzed in terms of (10) justify the abduction of new cases of *ll*. The gradual persistence and acceptance of these abductions, over generations of Hadiyya speakers, makes (10) a description of the accomplished sound change; but rule (10) is not an adult rule of Hadiyya until the last abduction changes the last geminate *r* to geminate *l*.

#### 4. Conclusion.

The Hadiyya sound change  $*rr > ll$  can be understood as the result of over-generalized regularization of verb paradigm alternations which resulted from the prior sound change  $*l > r/V\_V$ . In such regularizations abduction, the inferring of new cases of a perceived regularity, brings about change gradually over generations by conforming morpheme after morpheme to the regularity, even though the regularity itself does not represent at any incomplete stage of the change a rule of the grammar of mature speakers.

It is noteworthy that in this conception of sound change, unlike in the standard conception of transformational-generative (TG) phonology, the rule which the sound change represents need not be posited as a synchronic rule of adult grammar. In TG phonology it is the existence of the sound change as a synchronic, major rule in the grammar which is supposed to explain the sound change, as item after item, exceptions to the major rule, lose their exceptional status. The above historical analysis of Hadiyya  $*rr > ll$  shows how such a change can be understood without recourse to the unnecessarily hypothetical positing of synchronic rules of alternation, as in standard TG phonology, to which numerous native-word exceptions exist. The detailed comparison of the two modes of analysis and the argumentation which should probably accompany the comparison cannot be broached here, where it would detract from the primary objectives: the presentation of an apparent case of paradigmatic initiation of a sound change, and its further explanation as abductive change.

The existence of at least one familiar Hadiyya lexical item with *rr*, *harra* 'silk' (< Amharic *harr* < Arabic *harir*), is sufficient to make rule (10) a poor analysis for modern Hadiyya, though this does not deny the likelihood that it is a part of the grammar of many Hadiyya speakers.

The existence of this word as a native-word of Hadiyya (as well as I can tell; note the nativized form, with final a), and the presence of Amharic and of Gurage languages with rr clusters as contact languages in the Hadiyya area clearly makes the revival of rr clusters favored. Furthermore there are today intervocalic l's in e.g. č'iila 'baby', salalo 'cheese', and even two verbs borrowed from Amharic with stem-final l: nakkalukko 'he uprooted' (Amh. nakkala), and sankaalukko 'he hobbled (a horse, mule)' (Amh. sanakkala).

Rule (7), by which alternation is perceived as the expression of the 1st pl. and imperative pl., can persist in Hadiyya grammar until, with the rise of rr clusters outside the verb system, it no longer is imposed on learners through the rejection of their persistent abductive innovations with rr in 1st pls. and imperative pls. A new generation will then account for r ~ l alternations by marked lexical representations such as the lexical entry for 'go out', (9), in which the features for tap and lateral are suppletive, and by a rule with the effect of (8). Then leveling of the alternation will begin, as marked lexical items are simplified by loss of the mark of alternation. We may then expect leveling in favor of r, as the alternate in the more basic and frequent allomorphs.

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