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AUTHOR Armagost, James L.; McLaughlin, John E.
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ABSTRACT

Virtually all scholars working on Numic languages have called [r] a spirant or listed it, without comment, as resulting from spirantization. However, Central Numic shows that [r] results from an early rule of tap formation applying to /t/, with subsequent application of spirantization then affecting other stops. When this analysis is extended to Western and Southern Numic, the result is that in no Numic language has [r] ever belonged to a series of spirants. (Contains 20 references.) (Author)

Numic [r] Is Not a Spirant

James L. Armagost
Kansas State University

John E. McLaughlin
University of California, Santa Barbara

Abstract: Virtually all scholars working on Numic languages have called [r] a spirant or listed it, without comment, as resulting from spirantization. However, Central Numic shows that [r] results from an early rule of tap formation applying to /t/, with subsequent application of spirantization then affecting other stops. When we extend this analysis to Western and Southern Numic, the result is that in no Numic language has [r] ever belonged to a series of spirants.

In this paper we discuss languages in the Numic branch of Uto-Aztecan with regard to one facet of the consonant gradations found there.[1] Specifically, we focus on what is usually referred to as the spirantized series, arguing that one supposed member of this series, the alveolar tap (or flap) [r], is not now and never has been a spirant in any of these languages, and in fact has nothing to do with a process of spirantization. To anyone unfamiliar with Numic languages we may seem to be taking an obvious position, perhaps comparable to arguing that the earth is not flat. Therefore, we first present data from Panamint to show why it has become general usage among Numicists to speak of [r] as resulting from spirantization. We briefly summarize corresponding data in other Central Numic languages and propose an alternative, and we think superior, analysis. We then extend our analysis historically to Western and Southern Numic, and finally to Proto Numic. Our concluding remarks are based on some additional crosslinguistic data.

The underlying consonant and vowel system of Panamint is shown in (1).[2] We will be concerned with the oral stops, which exhibit gradation patterns when they occur phrase medially. One such pattern is illustrated in (2), where we see a four-way alternation involving the initial stop of the postposition /pa?an/ 'on'. The first column in (2) gives the citation form

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of four nouns, while the second column shows each noun in a phonological phrase with the postposition, whose initial consonant follows the space.[3]

(1)	p	t	ts		k	kw	
		s					
	m	n			ŋ	ŋw	
				j		w	h,ʔ
				i	y	u	
				e		o	
					a		

(2)		
	taße 'sun'	taße ßaʔə 'on the sun'
	muumbittšI 'owl'	muumbittši ɸaʔa 'on the owl'
	tyßa 'pine nut'	tyßap paʔa 'on the pine nut'
	hunna 'badger'	hunnam baʔa 'on the badger'

Any nonverbal stem in Panamint falls into one of the four classes illustratd in (2) with respect to the effect on a following stop. In this paper we are concerned with the so-called spirantizing stems such as 'sun', all of which have a final vowel in underlying representation. The forms in (3) show how such spirantizing stems affect a following syllable onset stop. The affected consonant again follows the space.

(3) Panamint spirant series

/p/:	ny ßuha 'my power'
/t/:	siðyhi ðyhyja 'these (dl. acc.) deer'
	ny rama 'my tooth'
/ts/:	ny zoʔo 'my great grandparent'
/k/:	ny ɣassa 'my wing'
/kw/:	ny ɣwassi 'my tail'

In general, the spirantizing stems cause following stop onsets to become voiced fricatives (i.e. spirants), all nonstrident except for [z], which preserves the stridency of underlying /ts/.[4] For /t/, however, we have two allophones: following a front vowel /t/ is spirantized to [ð], while after a back vowel /t/ surfaces as [r].

Given the overall pattern in (3), then, it should be obvious why Numic scholarship, commencing with Sapir (1930), has consistently included [r] with the spirants.[5] As seen in Panamint, underlying /t/ participates in spirantization, and the distribution of [ð] and [r] taken together matches exactly the distribution of the phones resulting from spirantization of the other stops.

Turning to a statement of spirantization itself, we can almost account for the Panamint data with rule (4), which assimilates syllable onset stops to the feature [+continuant] of a preceding vowel. For expository purposes we include in (4) an assimilation to the voicing of this vowel, though we believe that spirant voicing results from a separate rule.

(4) Spirantization

If (4) were to apply to /t/, as it would in our formulation of the rule, the result would be [ð] regardless of the quality of the preceding vowel. What we will call the *assumed account* of Numic [r], that is, the account that is apparently widely assumed in the field, would then entail a low level adjustment or shift of Panamint [ð] to [r] following a back vowel. We must stress, however, that we find no statements in the literature concerning such an adjustment. What we do find is spirantization described in an either/or fashion, without formal rules or claims about ordering. For example, Dayley (1989a:407) writes of Panamint that "[f]ollowing nonfront vowels, t̲ is an unchecked flap (rather than a fricative). . . . Following front vowels, t̲ is an interdental fricative. . ." Also discussing Panamint, McLaughlin (1987:72-73) states than "in medial position, the simple oral stops undergo spirantization which also voices them. After a front vowel, /t/ is fronted, voiced, and spirantized to [ð] . . . . After other vowels, /t/ is voiced and lenited to the tap [r]." Throughout the Numic literature one finds references to both [ð] and [r] as "spirants" or as "spirantized forms of /t/," but while no one has explicitly claimed an [ð] to [r] shift, neither has anyone attempted to clarify the relationship between [r] and spirantization, which is our goal.

We will briefly discuss what we are calling the assumed account, then turn to an overview of work in other Central Numic languages to show that it appears to be widely held. Finally, we argue for an alternative analysis throughout Numic, one that avoids the problems inherent in the assumed account.

The assumed account appears to entail a late rule shifting [ð] to [r] when a back vowel precedes. What exactly does this rule say? The Panamint [r] is a

voiced alveolar tap (sometimes called a flap), virtually identical to the English [r] found in *meaty, needy*, etc. We are unprepared to defend any particular distinctive feature account of [r], as there is lack of agreement among phoneticians and phonologists on the exact articulatory-perceptual features of this phone. However, the rapidity of the articulatory gesture is clearly important. Among many others, Ladefoged (1975: 147), Smalley (1968:247) and Chomsky and Halle (1968: 318) all comment on this, the last also referring to a lack of vocal tract tenseness. Ladefoged (264) suggests that a relevant ". . .physical scale is the rate of movement of an articulator. . .," while Catford (1988:75) formally characterizes taps as "momentary (non-prolongable)" sounds.

Borrowing Catford's term "momentary" as a mnemonic for whatever features may be involved in [r], and taking dentals to be distributed and [r] to be nondistributed, the assumed account therefore seems to entail rule (5), which follows spirantization.

(5) [ð] to [r] shift

$$\begin{bmatrix}+\text{cont}\\+\text{cor}\\+\text{distr}\end{bmatrix} \rightarrow \begin{bmatrix}-\text{distr}\\+\text{momt}\end{bmatrix} \;/\; [+\text{back}]\;\_\_\_\_$$

Intuitively, however, there seems to be little or no reason for this change to take place. One might seek support for (5) from the variety of English having [r] where other speakers have [ð] in words like *mother, father*, etc., but here the [r] is clearly mediated by phonemic /d/ and results from a familiar rule applying to the two alveolar stops (*maddest, needy, batter, fittest*, etc.). This might suggest that after Panamint /t/ spirantizes to [ð], [ð] then reverts back to the stop [d] so as to mediate a shift to [r], but this would clearly be counterintuitive and costly, and no Numicist has ever suggested such an analysis.

We are left with Panamint rule (5) as an integral part of the assumed account, then, and despite the counterintuitive nature of the rule, something like it appears necessary for virtually all Numicists who claim that [r] is a member of the spirant series. As another example, we note that Miller's description of Shoshoni, the language most closely related to Panamint, says that "spirantized . . . forms of /t/ are interdental after a front vowel, a flap after other vowels" (1972:12; see also 1975). Representative forms are shown in (6).

(6) Shoshoni spirant series

/p/:	ny ßoha 'my power'
/t/:	siðɣhi ðyhyja 'these (dl. acc.) deer'
	ny rama 'my tooth'
/ts/:	ny zoo[6] 'my great grandparent/-child'
/k/:	ny ɣassa 'my wing'
/kw/:	ny ɣwaissi 'my tail'

Comanche, the third Central Numic language, shows a very restricted version of the pattern illustrated above, since only /p,t/ are involved and /t/ does not participate fully. Note in (7) that while Comanche [ß] lines up with Panamint and Shoshoni [ß], Comanche has [t] where the other languages have [ð].[7]

(7) Comanche spirant series

/p/:	ny ßuha 'my power'
/t/:	sitɣhi tyhyja 'these (dl. acc.) horses'
	ny rama 'my tooth'
/ts/:	ny tsoo? 'my great grandparent/-child'
/k/:	ny kasa 'my wing'
/kw/:	ny kwasi 'my tail'

In early work on Comanche carried out in the forties under the auspices of the Summer Institute of Linguistics, [ß] and [r] were assigned to autonomous phonemes /ß/ and /r/. In a typical treatment, Riggs (1949:229) notes two conditions under which morphophonemic alternations are phonologically defined: in utterance initial position /ß/ and /r/ are replaced by /p/ and /t/ respectively, and /r/ is replaced by /t/ following a front vowel.[8] Riggs presents alternate analyses of the Comanche consonant system, preferring that in which [ß] and [r] are taken to be voiced continuants, a class that also includes certain nasals and glides. Given the theoretical perspective of the period, and the brevity of Rigg's discussion, it is difficult to judge the exact extent to which the [p]/[ß] and [t]/[r] alternations are viewed as phonologically parallel. However, judging by the staement of phonologically conditioned alternation and the parallel classification of these sounds as oral stops and voiced continuants, we feel reasonably confident in believing that Riggs would subscribe to some version of the assumed account.

The more recent work in Comanche is virtually all uniform with the analyses of Panamint and Shoshoni as seen above, except for the severe restrictions on spirantization seen in (7). Miller's 1973 discussion

of Comanche historical phonology expresses the same analytical perspective as his synchronic Shoshoni work, so need not be illustrated here. The same is true of the historical work of McLaughlin 1992. Armagost 1988a,b, Charney 1989, Robinson and Armagost 1990, all again treat [ß] and [r] as spirantized forms of /p/ and /t/.

The one exception to this general picture that we are aware of is proposed in Armagost 1989, which rejects the assumed account of Comanche spirantization.[9] Rather than a shift from [ð] to [r], Armagost suggests an early rule of tap formation applying to intervocalic /t/ when the first vowel is [+back]. We state this rule as (8), in which the right edge environment blocks application to intervocalic /ts/.[10]

8) $\begin{bmatrix}-\text{cont}\\-\text{son}\\+\text{cor}\end{bmatrix} \rightarrow \begin{bmatrix}+\text{momt}\\+\text{voice}\end{bmatrix} \quad / \quad [+\text{back}] \_\_\_\_\_ [+\text{syll}]$

The apparent effect of (8) is to bleed from the domain of spirantization just those instances of /t/ that surface as [r]. In one sense then these are exceptions to spirantization. But what is the domain of spirantization in Comanche? As can be seen in (7), from the perspective proposed here not a single /t/ undergoes the rule. Comanche spirantization is thus even more severely restricted than the assumed account portrays since only /p/ is affected, as in (9):

(9) $\begin{bmatrix}\text{Onset}\\|\\+\text{lab}\\-\text{round}\\-\text{son}\end{bmatrix} \rightarrow \begin{bmatrix}+\text{cont}\\+\text{voice}\end{bmatrix} \quad / \quad \begin{bmatrix}+\text{cont}\\+\text{voice}\end{bmatrix} \_\_\_\_\_$

Comparing the assumed and alternative accounts of the Comanche data, we believe the latter is clearly preferable in avoiding an unnatural [ð] to [r] rule. At the same time, tap formation rule (8) is perfectly straightforward even though the vowel must be restricted as [+back]. The grammar must certainly pay for this restricted environment in some way, and it seems more natural to limit the domain of tap formation than to restrict spirantization so that it would apply to all instances of /p/ but only those instances of /t/ that are preceded by a back vowel. Finally, this alternative account claims that tap formation and spirantization apply in overlapping environments, and

while there is nothing unnatural about either, each must still be stated. Such unavoidable repetition seems to us much less objectionable than the unnatural status of the dual aspects of the assumed account of Comanche--spirantization that applies to all instances of intervocalic /p/ but only to /t/ when preceded by a back vowel, and an unstated [ð] to [r] rule along the lines of (5).

Assuming the correctness of this alternative account of Comanche, what is the implication for Central Numic as a whole? Every language invariably shows [r] from /t/ after a back vowel, and this we would attribute to the existence in their grammars of something like tap rule (8). In Panamint and Shoshoni, tap formation bleeds spirantization, formulated along the lines of (4). The result of spirantization is therefore surface [ß,ð,z,ɣ,ɣw], with [ð] only after front vowels. Spirantization is obligatory in Panamint and Western Shoshoni, but in Northern Shoshoni it is gradually becoming optional and remains obligatory only for /p/ (Miller n.d.). Thus, for Proto Central Numic we reconstruct tap rule (8) followed by spirantization rule (4). These rules remain, in that order, in most modern dialects. Spirantization in Northern Shoshoni is obligatory for /p/ but optional elsewhere, while in Comanche it has been lost entirely except for /p/.

The situation in the Western and Southern branches of Numic is similar to that in Proto Central Numic. In (10) we summarize for intervocalic /t/.

(10)

intervocalic /t/...	[-back] _____	[+back] _____
Western Numic		
Western Mono	[ð]	[r]
Eastern Mono	[d]	[r]
Northern Paiute	[d,r]	[d,r]
Southern Numic[11]	[r]	[r]

Considering the data of Central, Western, and Southern Numic, we believe the best overall historical account would be as follows. The Western Numic data suggest a historically fairly early rule voicing the stops /p,t,ts,k,kw/ when intervocalic. We assume that at least as far back as Pre-Proto Numic there was a lenition rule along the lines of (11), which we refer to as Lenition I.

(11) Lenition I

$$\text{Onset} \\ | \\ [-\text{cont}] \rightarrow [+\text{voice}] \; / \; \begin{bmatrix} +\text{cont} \\ +\text{voice} \end{bmatrix} \_\_\_\_$$

Lenition I fed a tap formation rule that was added to the language simultaneously with Lenition I or at a later time. We give this rule as (12), formulated to pick out the [d] produced by Lenition I, but we do not know the exact details.

(12) Tap Formation

$$\begin{bmatrix} -\text{son} \\ +\text{voice} \\ +\text{cor} \end{bmatrix} \rightarrow [+\text{momt}] \; / \; ?? \; [+\text{back}] \_\_\_\_ \; [+\text{syll}]$$

If taps were originally sensitive to the front-back quality of vowels, as is currently true of Central and Western Numic, then this sensitivity was eventually lost in Southern Numic. On the other hand, the rule may originally have applied without regard to vowel quality, with a restriction later added outside of Southern Numic. In either case, another weakening rule was ordered after (12) and bled by it. This last rule, formulated as Lenition II in (13), changed all remaining intervocalic voiced stops into fricatives.

(13) Lenition II

$$\begin{bmatrix} -\text{son} \\ +\text{voice} \end{bmatrix} \rightarrow [+\text{cont}] \; / \; [+\text{cont}] \_\_\_\_$$

Lenition II is "spirantization" in the strict sense. Both Lenition I and Lenition II state weakening processes, and Tap Formation itself is merely another way of weakening the voiced dental (or alveolar) stop created by Lenition I. While the three daughter branches of Proto Numic show varying effects of these early rules, our principal concern has been the unnaturalness of the assumed account of [r] and a more satisfying analysis of the languages exhibiting this phone. In contrast to the assumed account, in which [r] is thought of either as a member, or a modified member, of the spirantized series, our alternative with its early tap formation rule accounts for the facts in a straightforward and natural way. If our analysis is right, [r] is not a spirant and has never passed through a stage when it was a spirant in any Numic language.

In support of our view that tap formation is unrelated to Numic spirantization, we note that there appear to be no languages in which /t/ becomes [r] as part of a general system of spirantization or lenition. In Old Irish (Kelly 1978:45), for example, underlying stops give rise to fricatives as follows, with /t/ becoming [θ]:

(14) underlying: p t k b d g
surface: f θ x v ð ɣ

In Finnish (Kelly 1978:14), the lenition system gives [d] from /t/:

(15) underlying: p t k
surface: v d ø

In Biblical Hebrew, spirantization again gives [θ] from /t/:

(16) underlying: p t k b d g
surface: ɸ θ x β ð ɣ

Finally, in Inupiaq Eskimo (Jeff Leer, p.c.), every stop is spirantized to a homorganic fricative except for /t/, which is not spirantized. This evidence from four stocks in Europe, the Middle East, and North America strongly suggests that /t/ cannot become [r] as part of a system affecting several points of articulation. While /t/ to [θ], [ð], or [d] as one component of a general pattern of spirantization or lenition is very common, we do not find /t/ to [r] in such cases. Compare the familiar version of the English tap rule that stipulates for the two alveolar oral stops a change to [+momentary]. For some speakers the rule is apparently less constrained, affecting /t,d,n,l/ (Smalley 1968:247). But even here, it is a single point of articulation that is involved.

NOTES

[1] This paper is a slightly revised version of that presented at the 91st annual meeting of the American Anthropological Association, San Francisco. We thank those who commented at that time.

[2] Geminating forms, such as *tyßa* 'pine nut' in (2), require an underlying stem final oral stop unspecified for point of articulation.

[3] Panamint examples are from McLaughlin 1987 and Dayley 1989a,b. Throughout the paper we cite forms in a broad phonetic notation but do not include stress. We have retranscribed some forms from other sources. /kw/, /ŋw/, [ɣ̞w] are rounded velars, /j/ is a palatal glide, /y/ is a high back unrounded vowel, and [I] is the voiceless counterpart of [i].

[4] In an unrelated process, strident consonants are palatalized by a preceding front vowel. Thus underlying /ts/ surfaces as [ž] where both spirantization and palatalization apply.

[5] Sapir (1930:45-46) was himself careful to differentiate between the spirants and the "rolled" consonants although he attributed the development of both to the same process of spirantization.

[6] Gosiute Shoshoni has [ny ðoo]. For as yet unclear reasons, some surface realizations of Gosiute /ts/ are strident and some nonstrident.

[7] For discussion of the historical situation that could have led to such a restricted distribution of voiced spirants in Comanche, see McLaughlin 1992.

[8] Riggs mentions only /i/. Presumably analysis had not progressed to the point where it was recognized that /e/ also conditions [t].

[9] McLaughlin 1992 mentions the alternative about to be presented, but does not pursue it.

[10] Our formulation of (8) differs in minor respects from that originally proposed by Armagost. Voiceless tap data reported by Charney 1989 would require further minor modification of rule (8).

[11] In Kaibab Southern Paiute, /t/ is palatalized to [tš] by a preceding /i/.

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