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THE PHONETIC ELEMENTS OF THE NORTHERN PAIUTE LANGUAGE

BY
T. T. WATERMAN

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CONTENTS

INTRODUCTION

The following notes on the phonetic system of the Paiute Indian language were obtained in August and September, 1910, with the help of a full blood, middle-aged Paiute named Dick Mahwee. This informant lived during his childhood in the vicinity of Long Valley, California, near Honey Lake. He now belongs to the group of people who live on Pyramid Lake Reservation, Nevada, but he spends the summers in Reno and elsewhere. His dialect seems to be almost identical with the Paiute language spoken in Oregon, except that it differs phonetically

in minor points, particularly in the occasional substitution of ty for ts.

There are two "Paiute" languages, both spoken in the Great Basin area and constituting part of the Shoshonean family. The southern or "true" Paiutes inhabit a large territory including southern Nevada, southwestern Utah, and northwestern Arizona. Their dialect belongs to the Ute type, being almost identical in structure with Ute and Chemehuevi. An outline of the phonetics and morphology of Ute has been published by Dr. E. Sapir.[1] The northern Paiute, who do not admit that this is their name, and employ the term only as they have learned it from the whites, live in northwestern Nevada, the border of California east of the Sierra Nevada, and in southeastern Oregon. The term Paviotso has sometimes been applied to them, though this is no more their own tribal name than the former is. Their language is practically identical with that of the Bannock of southern Idaho, and is very similar to the speech of the Mono, who live on the high western slopes of the Sierra Nevada. The present "Paiute" dialect belongs therefore to what has been described as the Mono-Paviotso or Mono-Bannock division of the Shoshonean family, and is not to be confounded with the "Paiute" as spoken by the Ute-Chemehuevi people.[2]

The apparatus used in analyzing the sounds consisted of a recording cylinder of a diameter of 13.3 cm., described elsewhere in this series of publications.[3] The cylinder was used in conjunction with tambours and recording needles of the usual type, and was driven at a uniform rate of seven revolutions per minute. The records illustrated below consist of double tracings, one from the lips and the other from the glottis. The lip-positions for various vowel sounds are represented by photographs. The information embodied in the present paper was obtained while working in collaboration with Dr. W. L. Marsden, of Burns, Oregon, who speaks the Paiute language and has recorded much information about it.

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[1] Science, n.s. xxxi (1910), 350-352.

[2] Univ. Calif. Publ. Am. Arch. Ethn., iv, 97, 1907; Am. Anthr., n.s. xi, 267, 1909.

[3] P. E. Goddard, in Univ. Calif. Publ. Am. Arch. Ethn., v, 2, 1907; also in Boas Memorial Volume (1906), 137.

The sounds of Paiute may be represented tabularly as follows:

Vowels

u, ü, o, a, e, i

Diphthongs

ai

Consonants

	Stop			Fricative		Affricative		Nasal
	Surd	Sonant	Doubled	Surd	Sonant	Surd	Sonant	
Labial	p	b	p:					m
Dental	t	d	t:			ts,(ty)	dz	n
Alveolar				s	z			
Palatal	k	g	k:	(x)				ñ
Labialized palatal	kw	(gw)	(kw:)					
	y,w,h,'							

THE INDIVIDUAL SOUNDS

VOWELS

u

The vowel represented by this symbol has something of the quality of oo in English book, but the lip position is more open pl. 1, fig. 1). At times the sound seems almost to approach ū (as in English boot), but this seems to be due to the effect on the ear of the lack of opening, combined with occasional actual looseness or variability of lip-positon. In duration (pl. 4, fig. 6) it is noticeably short.

o

The symbol o represents the sound of aw in English law, produced with the slight lip movement noted below as a prominent characteristic of all Paiute vowels. The lips (pl. 1, fig. 2) are more open and less rounded than in u. In duration o is usually short compared to English o, but is at times (for example, po, pl. 4, fig. 8) as long as the preceding sound.

a

This sound, to employ a well-worn figure, has approximately the quality of a in father. It is the most open of all the vowel sounds in the language, showing (pl. 1, fig. 3) considerable more opening than e (fig. 4), i (fig. 5), or ü (fig. 6). While not as brief on the whole as o usually is, it is comparable (pl. 2, fig. 5)

to the English sound of a in father[4] in being at times of very brief duration.

e

In quality the sound represented by this symbol approaches e in met. Occasionally it is heard as having almost the closeness of e in they. It is however normally open (as in pl. 1, fig. 4), more open as a matter of fact than any vowel with the exception of a. In duration, e (as illustrated in pl. 3, fig. 7) is decidedly brief, showing rather less than half the length of ü wherever tracings of the two have been compared. The sound is rare.

i

This symbol represents a vowel of similarly open lip-position, having something of the quality of i in pin. The lip-positions for this and the preceding vowel are as a matter of fact (pl. 1, figs. 4 and 5) almost identical. In duration also (pl. 4, fig. 3) it bears a close analogy to e.

ü

This is an obscured vowel sound, produced with the lips in position for an i-sound and the tongue in position approximately for u (pl. 1, fig. 6). It has to the ear in spite of its other characteristics a rather definite ū quality and for that reason can hardly be called indeterminate or neutral. That the vowel quality is obscured is due to an elevation in the back part of the tongue, so that friction is produced by the passage of the breath between the tongue and the back of the palate. If this elevation were more pronounced, a soft velar r or g continuant would result. In actual fact, however, the tongue is raised only enough to obscure or thicken the sound slightly, and its vocalic timbre is maintained throughout. The larynx during the process of speaking this sound is lowered, as shown by the action of the exterior throat muscles. This results in an increased resonancy. It is of course hard to specify exactly what takes place in producing this sound, or any sound of its general type, for the phenomena involved do not lend themselves to investigation by

[4] E. W. Scripture, Elements of Experimental Phonetics (New York, 1902), 489 ff.

graphic methods. The above, however, seem to be its chief characteristics. In the matter of duration (pl. 2, fig. 1), ü seems to be quite anomalous, having noticeably greater length than either u or i (pl. 4, figs. 3 and 6), which it most nearly resembles.

Diphthongs

ai

This sound, having the quality of ai in aisle, is extremely long in quantity, having as great or greater duration than the ü described above. The appended tracing (pl. 4, fig. 1), representing the word kai, no, illustrates its extreme length.

Consonants

Labials

p

The sound represented by this symbol is a stop consonant of very weak and short occlusion, involving at the same time very much less aspiration than the p in English words as spoken by Americans. The sonancy begins approximately at the same moment as the explosion. In this respect the sound is of course markedly different from American English p (pl. 2, fig. 2), in which the sonancy is strongly postplosive. It differs from b as used by Americans in speaking English (fig. 3), in that in this latter sound the sonancy antedates the explosion by a considerable period. The results obtained by analyzing the Paiute sound graphically are not entirely consistent. There seems to be some uncertainty in the usage of the informant. For instance in fig. 1, pl. 3, the sonancy of p in puni, to see, begins considerably in advance of the explosion. In the following tracing of the same sound (fig. 2), the sonancy and the explosion are quite synchronous. In the third figure, finally (fig. 3), the sonancy follows the explosion after a short but well-marked interval. A number of tracings were taken of this sound in the course of the experiments, and such variabilty was found to persist throughout. The sonancy even where preplosive, however, is not as strong nor as long continued as in the corresponding sound of

American English. The main characteristics of the labial stop as it occurs in Paiute are therefore three in number—first, a brief, normally surd occlusion, second, an explosion of slight aspiration, and third, some lack of uniformity as regards the point where sonancy begins. The sound occurs only initially in words.

b

The labial stop just described assumes a somewhat different character when occurring medially. Under these conditions it becomes fully voiced (pl. 3, fig. 4). This full and complete sonancy is perhaps its essential characteristic and is a striking instance of Paiute laziness in speech.[5] The fact of sonancy is however attended by other changes. The mere presence of vocalization in the sound tends according to the well-recognized law to weaken the explosion, and this in turn involves a lessening of the lip pressure in occlusion. We have already seen that the most essential character of the initial stop, from which the present sound seems to be a derivative, is a relatively weak explosion as compared with that of English lip surds. When the sound is still further weakened as the result of sonancy due to medial position in a word, the occlusion becomes so abbreviated and the actual contact of the lips so light that the stop verges toward a continuant. It has as an actual fact often been recorded as a bilabial v.[6] Graphic analysis shows however that the occlusion, while brief, never actually disappears. For purposes of comparison a fairly representative tracing of "pabanaki," the plural of panaki, "Bannock" (pl. 3, fig. 4), is set alongside of a tracing of a bilabial v (fig. 5), as made by Dr. Marsden, who was assisting in the experiment. With these should be compared also the b of English "boy" (fig. 3). It will be observed that the curve which represents the explosive period of the Paiute b articulation is sharper than that for the continuant bilabial v, but not so abrupt or of such marked amplitude as that of the more strongly occluded English b. The occlusion in the Paiute medial sound

[5] Scripture, *op. cit.*, 360.

[6] See James Mooney, Ann. Rep. Bur. Am. Ethn., XIV, pt. 2, pp. 10, 53 ff, 1896.

under discussion is however undeniably brief and light, and under certain circumstances the native Paiute informant probably slips over into a real continuant sound. The study of fourteen tracings of this sound, all of which resemble in character figure 4, seem to offer convincing evidence that the sound is organically a stop.

p:

Another labial consonant is a stop of double length, represented by p:, which however never occurs initially. It is uncertain whether or not this sound in process of word-building ever stands for the initial p described above. All that can be said is that the labial stops occurring medially are of two types, either fully sonant as just described, or purely surd with a double length of occlusion, as is the case with the sound now under discussion. Whether these two sounds are primary in the language, or both alike derived from the p as an effect of composition, can only be stated when the morphology is completely understood. The second of the two sounds is quite analogous to the sound described by Dr. Sapir in Yana[7] and Ute[8] and written by him p+ and pp. The tracing in pl. 2, fig. 4, reflects clearly its main characteristics —a double length of occlusion and a complete absence of vocalization. The extraordinary length of occlusion is clearly reflected in this tracing of the Paiute word kap:a, bed, as compared with that of an ordinary undoubled medial surd, such as the p in English tipping (pl. 3, fig. 7), which of course is "doubled" only typographically. The Paiute sound is therefore seen to be a really doubled consonant, in the sense in which the expression is employed regularly in phonetic discussions, although "lengthened consonant" seems on the whole the better term.[9] That the length of occlusion is attended by a correspondingly vigorous explosion is shown by the fact that the breath curve is very much higher for the medial than for the initial type of p. Compare pl. 2, figs. 1 and 5.

[7] Univ. Calif. Publ. Am. Arch. Ethn., IX, 5, 1910.

[8] Science, *loc. cit.*

[9] Scripture, *op. cit.*, p. 466; Scholle and Smith, Elementary Phonetics (London, 1903), p. 142.

m

This sound, represented in pl. 2, fig. 5, seems to offer few features of note, except that it is possibly of somewhat shorter duration than English m. In this of course it merely shares the briefness of occlusion characteristic in general of Paiute consonants.

Dentals

t

The chief characteristic of the sounds of the dental series, namely t, d, t:, ts, dz, and n (but not s and z, which in Paiute are alveolars) is that they are formed with the tongue against the teeth. This lends them a semi-aspirate effect (see the amplitude of explosion, pl. 4, fig. 2), due to the fact that the greater part of the blade of the tongue is in contact with the gum just before release. The effect of the release is therefore quite noticeable. This is particularly striking, owing quite probably to the contrast offered to the other Paiute consonants which are pronounced without marked aspiration. It seems unlikely on the whole that the Paiute sounds are formed with any greater muscular effort than are the English sounds. The difference probably lies in the different surfaces approximated in the two types of enunciation. In the matter of sonancy the sound represented by t is closely analogous to the p discussed above.

d

This symbol represents the sonant corresponding to t, and like b, the sonant form of p, occurs only medially. The remarks already made concerning b apply with equal force to the dental sonant d. The occlusion, namely, is very brief, so brief in fact that it often seems to be completely lacking (pl. 2, fig. 6). The sound was at first heard by the present writer as a briefly trilled r. The tongue as a matter of fact, in producing this sound, is not pressed against the palate, but merely flicked against it. The only difference between this sound and a weakly trilled r is that the r consists of a succession of rapidly repeated "flaps," while in the present sound there is only one.

t:

Closely analogous to p: in its general characteristics, the dental surd represented by the present symbol differs in involving as a rule rather more explosive force, marked by an increase in aspiration (pl. 4, fig. 4, as compared with p: of pl. 2, fig. 4). In this feature of course the sound resembles t, as described above.

ts

There occurs among the dental sounds an affricative, i.e., a stop with a surd occlusion, followed by a continuant release (pl. 4, fig. 3). Like the surd t, it occurs only initially, being replaced in medial position by dz. It is noticeable that the present informant alters the character of the affricative consonant which occurs in the Paiute spoken in the Malheur Lake region of Oregon. That is to say, he rarely articulates ts, substituting for it in most instances ty, replacing by a glide the sibilant release of northern Paiute. The two sounds are however closely related as regards tongue position, and it is moreover not at all certain that this shift is not an individual habit.

dz

This symbol, as already mentioned, represents a sonant, occurring medially, corresponding to a ts occurring in intial position (pl. 5, fig. 7). No noteworthy features were brought out by the present study, beyond those already discussed as generally typical of medial sonants.

n

The nasal sound of the dental series (pl. 4, fig. 5) is rather closely similar to the corresponding sound of English, with the exception that, like the Paiute m noted above, it is, as concerns its duration, rather brief.

ty

The dental stops are occasionally modified by the substitution of a y-glide at the close of the regular dental articulation. This

would seem to constitute a consonantal cluster, were it not for the fact that the sound occurs as a variant of ts, which is of course a simple sound. In the speech of other localities, this ty is replaced by ts uniformly.

Alveolars

s

The only alveolar sounds in Paiute are, as already noted, s and its corresponding sonant z (pl. 5, figs. 2 and 5). The first of these sounds is formed by an approximation of the tip of the tongue to the alveolar ridge. The fact that the breath escapes around a point instead of through a restricted passage between the tongue and the front wall of the palate, as in the sh of English "show," for instance, removes from the sound the thick quality which characterizes the English sound, which the Paiute sound would otherwise resemble. In addition, the lips are retracted instead of protruded as in English sh, and the opening between them is not perceptibly narrowed. This fact still further prevents friction of the escaping air and tends to render the Paiute sound clearer in quality and correspondingly shorter in duration than English sh. It is certain that the tongue as a whole is further retracted into the mouth cavity than in English sh, and that the surface is somewhat concave instead of convex.[10] Perhaps the most obvious difference of all is that there is a wide opening between the upper and lower teeth. That there is only one organic sound in Paiute is rendered almost certain by the fact that the informant is unable to distinguish s and sh in English, pronouncing such English words as "boys" and "face" somewhat as though they were spelled boysh and fashe.

z

This symbol has the value approximately of z in azure. It is the sonant form of s, just described, and is probably made in closely similar positon. It therefore at times sounds like z in zone. There is no reason, however, for supposing that there are really two sounds.

[10] A similar sound in other languages has sometimes been described as "between s and sh." The tongue however is more nearly in position for r than for either of these sounds.

Palatals

k

There seems at first acquaintance to be rather more variability in this sound than in the corresponding English palatal. That is to say, k before a back vowel gives the effect of velar q. For instance, kaiba, mountain, was at first written qaiba. This seems to be due in part to the psychological effect on the listener of the fact that real velars are absent from the language;—a fact tending to give the post-palatal k a correspondingly exaggerated value. It is doubtful in any case whether there is more variation in the k than in English. The point of contact for the k of the latter language wanders of course all over the palate, from a pre-palatal positon for the k in "kit" to an extreme post-palatal position for the k in "come." The post-palatal k in Paiute seems to be, in similar fashion, purely the result of association with such back vowels as a and o. As usual in palatal consonants, the explosion of k, for example in kimahu, come (pl. 2, fig. 5) is weaker than for that of p and t. It is noticeable, however, that the explosion of the back-palatal k in kai, no (pl. 4, fig. 1) is on the other hand more vigorous than for p and t.

g

The sonant corresponding to k, represented by g, has few or no features worthy of comment. In the matter of the time and character of sonancy it is closely parallel to b and d, except that the g-occlusion (pl. 4, fig. 5) does not permit from its very nature of the marked acceleration that characterizes Paiute b and d.

k:

The doubled consonant of the k series is closely analogous in most of its features to the other doubled consonants. Its general character is exhibited in the appended tracing of tik:a, to eat (pl. 4, fig. 7).

ñ

This symbol represents the palatal equivalent of the dental n, the sound which occurs finally in English sing. Other than

long duration, which is rather irregular in Paiute (pl. 2, fig. 4), it presents no striking differences from its counterpart in English.

Labialized palatal

kw

There is reason to believe that all of the palatal sounds occur also in labialized form. That is to say, we ought to find kw, gw, and kw:. As a matter of fact, only the first of them (pl. 4, fig. 4) has been so far encountered. Additional material would in all probability bring the others to light. There is no reason for supposing that this is other than a simple sound, such as is often met in American languages. That is to say, the rounding of the lips accompanies the tongue contact for the k. The symbol represents a modified k, not a consonantal cluster.

Other Sounds

y, w, h, ', (x)

Of the remaining symbols, y (pl. 5, fig. 4) and w (pl. 2, fig. 7) represent sounds not markedly different apparently from the corresponding sounds of English, except that w is accompanied toward the end by a somewhat less rounding of the lips. Of the aspiration represented by h (pl. 5, fig. 1) as it occurs initially in syllables, it can only be said that in process of word composition it is sometimes obscured or thickened by movements of the tongue and lips which interfere with the escaping column of breath. Thus it often sounds like the soft velar fricative x. In the case of a word recorded by the writer as mauxu, however, it is worthy of particular notice that the friction is produced by the escaping column of air at the lips, and not by friction between the tongue and velum. The real velar fricative usually represented in orthography by x, does not occur then, organically. When it does occur at all it seems to be merely a by-product of the tongue adjustments which go on during the escape of the breath, in preparation for various consonants. The glottal stop (') (pl. 5, figs. 7 and 8), finally, is of distinctly weak character when compared with the stop in many American tongues. It is

rather a slow glottal stricture than a real glottal stop or catch. This "weakness" is reflected in the fact that there are in Paiute no whispered or echo vowels. Although the modified glottal stop is of very frequent occurrence in Paiute, it is doubtful if it ever has any etymological significance.

Aspirations

The vowels of northern Paiute have been found to be peculiar in this, that they contain more breath than English vowels. The appended tracing of the Paiute word po, to write (pl. 4, fig. 8) exhibits this character, especially when contrasted with the tracing of English "pay" (pl. 2, fig. 2). It will be observed that the o in po begins with the needle already at some altitude above the normal breath line, and mounts steadily, showing a continuous increase in the volume of escaping voiced breath. The vowel of English "pay," on the contrary, is almost level with the "line of rest" traced by the needle when no breath at all is escaping. It appears, therefore, that while the consonants of Paiute contain less breath than those of English, the vowels contain more. At the close of a Paiute word, the vocalization ceases some time before the rush of breath is checked. This results in a final aspiration at the end of most final syllables. At times there is even an augmented rush of breath at the close, as in the present case, indicated by the small rise in the breath tracing after the cessation of sonancy. This "rise" varies at times in amplitude, showing that the amount of aspiration is not always constant. It seems to be always the secondary effect of aspiration contained primarily in the vowel itself. In compounds it usually occurs in thickened form. For example, tuwai, to stop over night, when compounded with yak:wi, to do, gives tuwai-x-yak:wi, where the aspiration takes the form of a soft palatal fricative, owing to the fact that the tongue is raised from the ai position to the y position while the surd beneath is escaping. For that reason it has not been represented in the present paper by an additional symbol. Every final syllable in Paiute is in this sense closed either by a glottal stop or by "aspiration."

SUMMARY

To sum up, then, the principal features of the Paiute phonetic p:, t:, and k:, occur only medially. On the other hand, the weakly sonant stops, p, t, and k, occur only initially. All the other sounds occur in any position, with the possible exception of ñ. The language does not admit of consonantal clusters, either initially or medially, and every syllable is open except for ' and h final.

One other phonetic peculiarity of Paiute remains to be mentioned—that is, the occasional and seemingly arbitary substitution of w for m. There seems to be in the present instance no confusion of values between the two, but rather a clear-cut substitution of one type of consonant for the other. The informant is able to distinguish the two sounds without difficulty, and to articulate them correctly. It is possible of course that a Paiute who does not know English so well might have difficulty in so distinguishing them. It might be mentioned in passing, however, that the present writer has encountered a similar substitution in the Yurok language spoken along the Klamath river in northern California.

Several features of Paiute phonetics are worthy of mention in more detail, from the point of view of general interest.

GENERAL FEATURES

The absence from Paiute of several types of consonant strikes one at first acquaintance as perhaps its most impressive feature. There are for example in Paiute no lateral or velar consonants, as far as any records of it have been obtained, either graphically or in the form of texts. Although the informant from whom the present facts were secured articulates laterals in English words without difficulty, this facility seems to be the result of long association with whites. This leaves for the tongue a rather bare scheme of consonants. The impression of simplicity is strengthened by the fact that fortes and aspirated consonants seem equally with velars and laterals to be foreign to the genius

of the language. It is these facts which give the tongue the rather misleading effect of being phonetically simple.[11]

There are however in Paiute certain peculiarities which render the tongue anything but easy to transcribe. These peculiarities are of three sorts. There is in the first place a general lack of incisiveness in Paiute articulation. Besides this general looseness, or apparent carelessness in pronunciation, two wide points of difference between Paiute and English come out in the stop consonants. The sonants show a very much later vocalization, and the surds show on the whole very much less aspiration, than in English as spoken by ourselves. Both of these characteristics lead to considerable confusion between the various classes.

This absence of incisiveness, to take up the first point, is very marked in all of the various series of sounds in Paiute. The stop consonants, for example, both surd and sonant, are characterized by a very light closure, and except for the doubled stops by a relatively brief period of occlusion. This gives them a quality which is extremely baffling to the English ear. In the matter of position of tongue contact considerable variability is shown, although this shifting seems to be largely due to the effect of adjoining vowels. This last trait is on the whole more marked than in English, although as is well known there is in the latter tongue enormous variability. Paiute is however quite different from English in several other points, all more or less related. There is very much less lip movement than in English. When the lips are parted in an English word for the escape of a vowel, moreover, there is an accompanying movement of the lower jaw. This jaw movement is still more marked in French, to which fact is due in part the greater purity and clearness of French vowel sounds. In Paiute, however, the lower jaw is held almost rigid. That is to say, while on the whole there is less lip articulation than in English, there is proportionately still less movement of the jaw. This fact tends of course to obscure and render less pure the Paiute vowel sounds. A further curious tendency exists in the present Paiute informant, toward opening only one side

[11] Cf. E. Sapir, Science, *loc. cit.*

of the mouth in speaking.[12] Each of these tendencies has a very decided effect in confusing the student.

Consonants which owing to phonetic laws in word-building shift from surd to sonant offer in Paiute many interesting problems. Those which are surd or weakly sonant in initial position, take on a full sonant character when following a vowel. This phenomenon of course occurs at times in English, but seems to be in Paiute a law which applies everywhere except in the case of the doubled consonants. Sonancy tends as we have seen to weaken aspiration, and this again is accompanied by a very slight occlusion. An instance of the operation of this law in Paiute is the case of the labial stop represented in initial position by the symbol p, which becomes fully voiced when in medial position, and in that position is represented by b. Here the very weak occlusion which is indirectly due to sonancy, gives the sound at times an aural effect approaching bilabial v. This latter sound however seems never to occur actually in pure form. A similar lightness of occlusion affects the dental stop consonant represented in initial position by the symbol t, in medial position by d. In the case of this medial d, occlusion in the sense in which the term applies in English sounds can hardly be said to occur. The tongue, as we have seen, is merely flicked against the palate, producing at times on the ear the effect of a weakly trilled r. The sound is however manifestly an organic stop of the t series, replacing an initial surd t. Moreover, there is but one flap of the tongue instead of several successive flaps as in r proper. The fact that a dental sonant stop gives the aural effect of an r, while a sonant labial stop gives the effect occasionally of a bilabial v, illustrates the extreme lightness of occlusion.

Paiute speech therefore is characterized by considerable lack of vigor in making closures, by some indeterminateness of position, by absence of jaw movement in making openings for the passage of the voice, and certainly by lack of freedom in lip movement, which movement may even be limited chiefly to one side of the mouth aperture. These features would account in

[12] It seems hardly likely that this is a general tendency on the part of the speakers of Paiute. It certainly tends however to obscure the articulation of the present informant.

large part for the obscurity of Paiute enunciation. The two remaining factors, moreover, tend in the same direction. The first of them, the fact that Paiute stop consonants contain or involve very little "aspiration," is so marked that it becomes one of the important features in the language. The presence or absence of aspiration is of course particularly noticeable in connection with labial stops. For this reason two illustrations are appended showing graphically the composition of Paiute p compared with the similar sound in American English and French. The word chosen for analysis is the Paiute word "piza," good (pl. 5). The tracing was taken with Rousselot tambours, as described above, and represents the action of the breath at the lips, and the accompanying activity of the vocal cords. Consideration of the tracing, when compared with the corresponding sound in English, p in "pay" (pl. 2, fig. 2) as spoken by an American, makes the following points evident. In the first place, the altitude of the Paiute tracing is not nearly so high as that of p in "pay," showing that the expulsion of the breath is accomplished with much less force than in English. This absence of aspiration or breath is reflected in all the tracings taken of Paiute stops. It will be noted in the tracings, moreover, that the p curve in "pay," besides its greater amplitude or altitude, has quite a different outline from the p of the Paiute word. It is in general conformation very much sharper, or more pointed, and the whole curve is "hooked," with the point bent forward in the direction of revolution. The English vowel itself on the other hand, is traced at a lower level than the vowel of the Paiute word. That is to say, the return of the needle in the English word *after* the p, is carried to a much lower level than in Paiute, showing that the outrush of breath in English is very suddenly checked. These facts point to the conclusion that the English sound is accompanied by a sharp but not sustained expulsion or explosion of the breath. Otherwise the rebound of the needle could not be so sudden nor so complete. The characteristics of p in English "pay" are therefore the result in part of a firm closure and not purely the outcome of an expulsion of breath from the lungs. In other words, the closure of the lips is so firm and so complete that it checks and compresses the advancing

column of air in the mouth passage until it gathers considerable "head" and expands outward when released. Certainly an actually labored p, accompanied by a rush of breath from the lungs direct, does not give aurally or graphically the effect of the English p. In the light of this, therefore, the Paiute sound requires a different definition. Its characteristic quality is not so much the result of lack of aspiration (since there is little real aspiration in the American English sound), as it is of the absence of a firm closure and long occlusion.[18] This lack of "aspiration" or amplitude in the tracings of Paiute sounds, is therefore to be considered as a corollary of the lack of vigorous closure already described as a characteristic of Paiute phonology. It seems probable after some study, that much of the difficulty in hearing Paiute correctly comes from the absence of "aspiration" in the consonants.

The third difficulty of Paiute phonology, which adds not a little to its general obscurity, lies apart from the other two and concerns the question of sonancy. In general, the sonancy of Paiute voiced stop consonants begins late. The most obvious comparison is with English as it is spoken in California. On this basis, the Paiute stop consonants offer the following points of interest. The sonancy begins normally only with the explosion of the consonant—that is, with the release of the column of air at the lips. This at once sets the Paiute sounds in contrast to the ordinary spoken English, for in the latter tongue the sonancy begins of course some time before the explosion. (See the relative time of sonancy in the appended tracings, pl. 2, figs. 1, 2, 3.) All of the Paiute stops, therefore, are to the ear rather confusing, sounding at times like full sonants of the American English type and at other times like plain surds. Difficulty has been experienced in transcribing nearly every word in the Paiute tongue which begins with a stop consonant. All sorts of inconsistencies have crept into such material as was recorded. The phenomenon here is probably parallel to that of the familiar weak h in Cockney English, which as a matter of fact is always present before every

[18] For the latter point see the discussion of the lengthened or doubled Paiute p: above (pl. 2, fig. 4), where a long occlusion gives a tracing exactly similar to English p.

initial vowel, but which gives psychologically the effect of a complete absence of aspiration or of a full aspiration, according as the listener anticipates a full h or an unaspirated vowel. The appended illustration shows graphically the normal type of Paiute labial stop consonant in initial position, in which the sonancy begins with the explosion, and illustrates the difference between p in Paiute (pibodo, pl. 2, fig. 8) and the b in English (boy, as spoken by the writer, pl. 2, fig. 3). In addition to the presence of preplosive sonancy in our sound which is normally absent in Paiute, it will be noted in the tracing that the method of vocalizing is precisely the opposite with the Paiute and with ourselves. The Paiute word opens normally with very light vocalization, and the vibrations gradually take on greater and greater amplitude, reaching their maximum during the articulation of the vowel which follows the consonant. This progressive vocalization is perfectly characteristic of Paiute sounds, and occurs in this form in all of the tracings taken. In the English word of which a tracing is shown for comparison, however, spoken by an American, exactly the opposite is true, and the vibrations exhibit their greatest amplitude prior to the explosion of the breath at the lips. Whatever else may be true, the initial stops of Paiute offer therefore many points of contrast to those of California English. What has been said of the labial series has been found by experiment to apply also in the case of the dental and palatal stop consonants. The Paiute sound differs from the English surd in that there is less aspiration and earlier sonancy, and from the sonant in that in the Paiute sound the sonancy approaches its maximum intensity gradually, and begins on the whole later in point of time. That is to say, the Paiute sound is in each case intermediate between those English surds and sonants made in corresponding positon.

The variability of the Paiute initial stops in the matter of sonancy has already been mentioned. To make the point clear a series of eight words were chosen arbitrarily, all beginning with labial stops and all of them causing confusion in transcription, owing to the fact that the initial consonant in each case could not be determined satisfactorily. From twenty-five to thirty-five tracings were taken of each word, and the results analyzed as

regards the time of sonancy merely. The outcome of this analysis may be represented in tabular form as follows:

TRACINGS CLASSIFIED ACCORDING TO THE TIME OF SONANCY IN THE INITIAL CONSONANTS.

Paiute words	No. of tracings	Sonancy preceding explosion	Sonancy accompanying explosion	Sonancy following explosion
1. puni, to see	34	22	9	3
2. po, to write	26	8	9	9
3. pua'a, a friend	27	17	....	10
4. pü, indef. pron.	28	1	15	12
5. piza, good	28	8	16	4
6. pühü, duck	28	....	10	18
7. po, trail	28	....	16	12
8. pubua'a, friends	27	....	24	3

The words of this tabulation show a degree of phonetic variability that is quite unlike anything so far brought to light in English. Even in the latter tongue, of course, variations do occur in considerable number. The same individual, whatever tongue he may speak, does not articulate a given word every time in exactly the same way. There may be observed in the tabulation of the Paiute words, however, a *complete* lack of uniformity. Two articulations of the same word, as in the case of puni (1) or pua'a (3), stand very often at opposite ends of the scale as regards the inception of sonancy. This uncertainty has been found by experimentation to extend to the palatal stops as well, and this fact would make it seem that variability in the time of the inception of sonancy is in general a characteristic of Paiute.

It will be seen therefore that in the matter of orthography we have few problems to face. There are of course three classes of sounds in the stop series to be represented typographically. There is in the first place, an inital consonant, of varying degrees of sonancy, with a tendency however away from sonancy of the preplosive type, and accompanied in very slight degree by aspiration. In the second place, we have a sound which at least in some cases stands in place of the p, when word composition would cause the p to follow a vowel. In this latter case, the sonancy is complete and of pronounced character while the

aspiration and the closure are lighter in character than in the former case. Finally, we have a type of consonant, occuring like the second in medial position, where the occlusion is of double length, the closure firm, and the explosion very marked.[14] These last named consonants are purely surd. The obvious course, and the one followed in this paper, is to represent the somewhat aspirated initial consonant by p, and the less strongly aspirated and more fully sonant medial consonant by b. The choice of a symbol for the remaining type of consonant is an arbitrary matter. Numerous devices have in the past been employed. Labial consonants of this type have been represented by p+ and by pp,[15] and might quite accurately be represented in other ways—for example by a macron over the consonant or by a consonant with a subscript numeral. The symbol p: has been adopted here. On the whole the matter of orthography in Paiute offers comparatively little difficulty.

There is in Paiute only one type of consonant which is characterized by a full and vigorous occlusion. These are the so-called "doubled" or "long" consonants mentioned above. Medial consonants in Paiute are of two types only, as already mentioned,—either sonant or surd with a double length of occlusion. The fact that the closure in these latter is very firm is evidenced by the fact that the explosion, as reflected in the movement of the recording needle, is very much more violent than in the initial stop of the same word (for example, pl. 2, fig. 4). The length of the occlusion is reflected in the breath curve by a straight horizontal line which immediately precedes the explosion. When the Paiute word kap:a is compared with English tipping, it will be seen that the occlusion of the medial consonant in Paiute is actually twice as long as the corresponding consonant in the English word. This Paiute sound is therefore a genuine doubled consonant, in the sense in which the term is ordinarily used,[16] and has no organic counterpart in spoken English. The contrast may be pointed by the fact that in the

[14] The precise interrelations of the doubled and sonant stops to the initial stops has, as noted above, not been rendered certain at the present time.

[15] See above, p. 19.

[16] See above, p. 19, note 9.

English word tipping the consonant which is typographically doubled is much weaker than the initial consonant, while in Paiute the "doubled" consonant has a double length of occlusion and a much more violent explosion. It is therefore the only consonant in Paiute which exhibits vigor of articulation.

Speaking in general terms, the simplest type of sound capable of articulation is the nasalized vowel consisting of vocalized breath passing freely through the mouth and nasal passages. Our English phonetic habit of closing the posterior nares as a preliminary of speech has become so fixed that the articulation of nasalized vowels now presents for us no little difficulty. Nasalizations occur however with considerable frequency in American tongues, a classical instance being the Siouan or Dakota, a group of languages, by the way, which seem phonetically to bear many points of analogy with Paiute. It is a matter of some surprise that they should not be present in Paiute, a language which otherwise shows a marked tendency toward phonetically simple sounds. The few cases in which a nasalizing disposition was thought to be present were however investigated by the aid of nasal olives and tambours, quite without result. No amount of coaxing would bring to light anything which could be called nasalization, although such sounds usually analyze to better advantage than any others. It seems likely then that nasalizations are lacking in Paiute, in spite of their presence in the related Ute language.

From what has been said, it becomes clear that there is in Paiute a tendency to apply as little effort as possible to articulation. We have seen that occlusions are light—so light that d sounds almost like r, and b like a continuant bilabial v. The only consonant in which closure is firm, is where an occlusion of double length gives ample opportunity for close contact to develop. We have seen that there is a minimum of lip and jaw movement. It is easy to multiply cases which demonstrate the indolence of the Paiute subject in articulation. The Paiute s, for instance, is a case in point. An s of the English type of course requires an extremely nice correlation between the tongue and the palate. The surface of the tongue for this sound is rounded, or made dome-shaped, and approached with consider-

able, though unconscious, care to the front part of the palate, leaving a narrow passage. The care necessary in producing the sound is shown by the fact that in the careless and inexact speech of children the attempt is often abandoned completely, and the tongue allowed to slip forward until it rests against the palate. This gives "toap" for "soap" and similar mistakes. English sh, in which the tongue as a whole is retracted from its difficult position close to the palate, is much easier to articulate. A tipsy man accordingly, whose muscular correlations are obstructed by the presence of considerable quantities of alcohol in the system, uniformly substitutes sh for the more difficult s. The Paiute also has followed this simplifying tendency. The tongue is very much retracted, even more than in English sh, and is much less rounded. The tip, rather than the surface, is approached to the palate. This is one more instance, therefore, of the Paiute avoidance of difficult articulations. It is for this reason not a matter of surprise that no consonantal clusters exist in Paiute. In fact the Paiute speaker finds it difficult apparently not only to shift instantly from one consonant position to another, but even from a closure to a vowel position. Such shifts are often aided by the interpolation of glides. For example, in place of igahu, he enters, we occasionally find igyahu, where the glide has a very definite value to the ear. It probably arises in a slow and gradual release of the tongue muscles after the occlusion for the g, the vocalization being carried over from the vowel without interruption. Other examples are owixyu, he dies, which etymologically is the result of the combination owi-hū; and yudzixyū, from yudzi-hu. Not only, therefore, are occlusions light in Paiute, and easy positions preferred to hard ones, but the absence of consonantal clusters and the interpolation of glides betwen consonants and vowels prove the presence of a tendency to simplify phonetic processes still further. The articulation at least of the present informant shows a disposition to carry phonetic simplification to an extreme.

EXPLANATION OF PLATE 1.

Paiute lip positions.

Fig. 1.—u in puni, see.

Fig. 2.—o in po, trail.

Fig. 3.—a in piza, good.

Fig. 4.—e in ego, tongue.

Fig. 5.—i in piza, good.

Fig. 6.—ü in nümü, people.

1. u

2. o

3. a

4. e

5. i

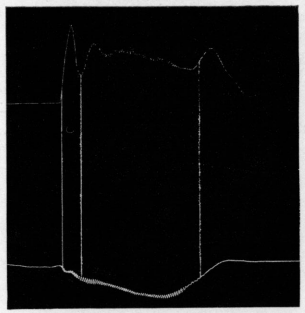
6. ü

PAIUTE LIP POSITIONS

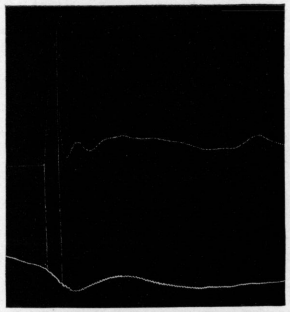
EXPLANATION OF PLATE 2.

Tracings of Paiute sounds, breath and glottis.

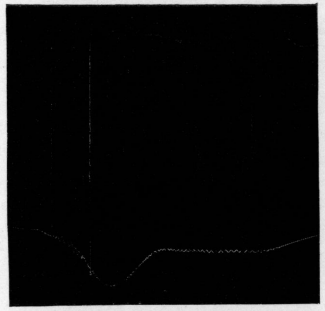
Fig. 1.—pü, duck.
Fig. 2.—English p in pay.
Fig. 3.—English b in boy.
Fig. 4.—dibiña, ask.
Fig. 5.—kap:a, bed.
Fig. 6.—kimahu, come.
Fig. 7.—wada, a kind of seed.
Fig. 8.—pobodo, road.



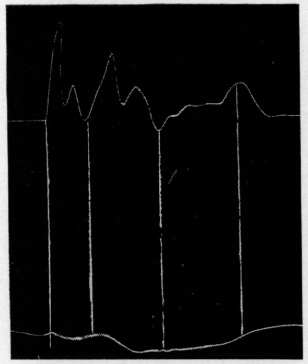
1. p ü



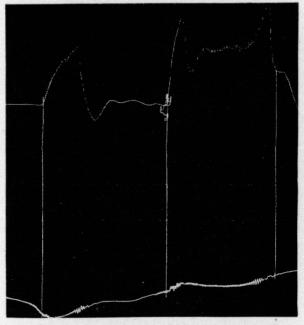
2. p ay



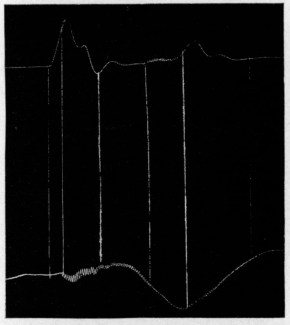
3. b oy



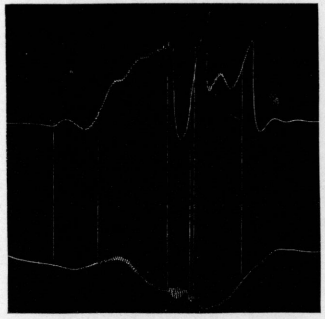
4. d i b i ñ a



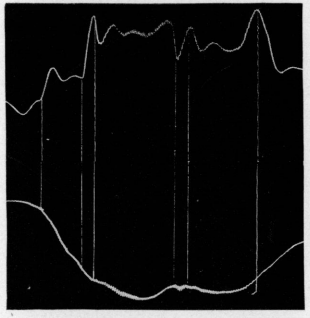
5. k a p: a



6. k i m a h u



7. w a d a



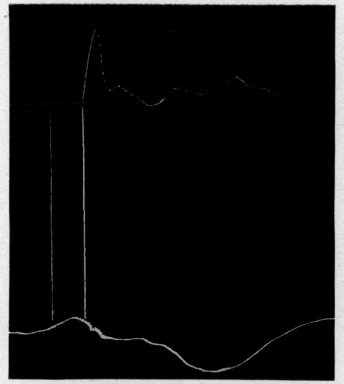
8. p o b o d o

TRACINGS OF PAIUTE WORDS

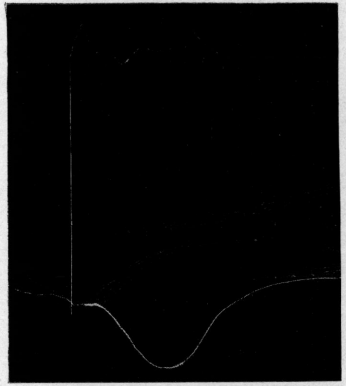
EXPLANATION OF PLATE 3.

Tracings of Paiute sounds, breath and glottis.

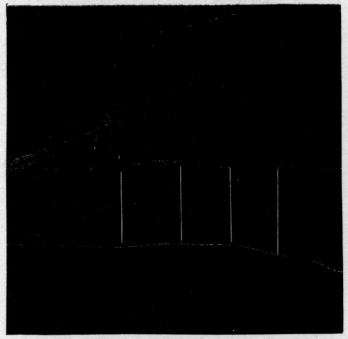
Fig. 1.—p in puni, see.
Fig. 2.—p in puni, see.
Fig. 3.—p in puni, see.
Fig. 4.—ego, tongue.
Fig. 5.—pabanaki, Bannocks.
Fig. 6.—bilabial v's in nivavi, artificial variation, by English-speaking subject, from Paiute nibabi, snow.
Fig. 7.—English tipping.
Fig. 8.—nümü, people.



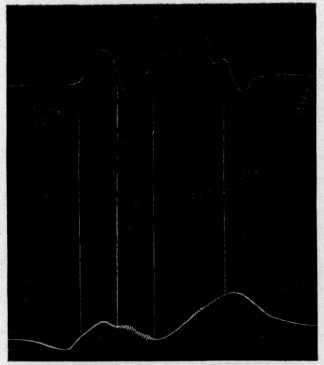
1. p of puni



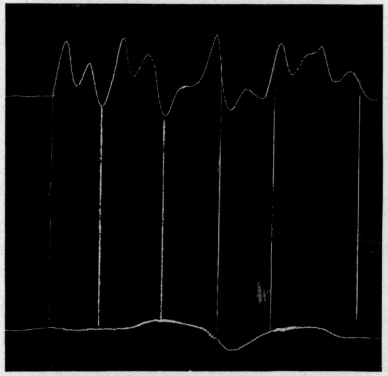
2. p of puni



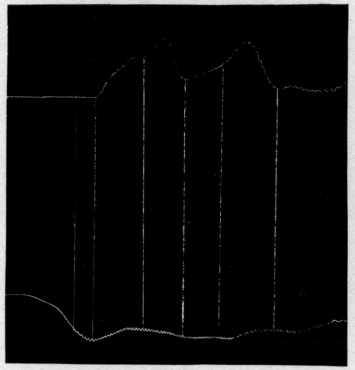
3. p of puni



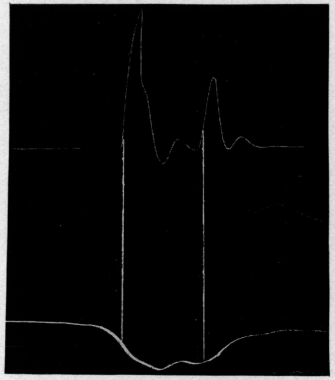
4. e g o



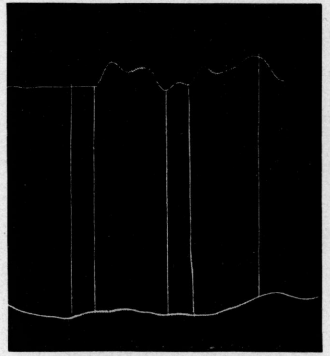
5. pa ba na k: i



6. n i v a v i



7. t i pp i ng



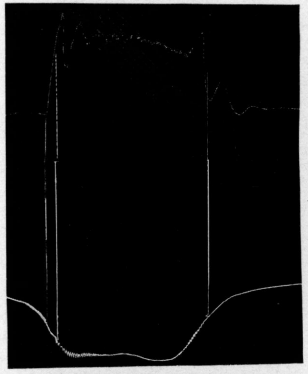
8. n ü m ü

TRACINGS OF PAIUTE WORDS

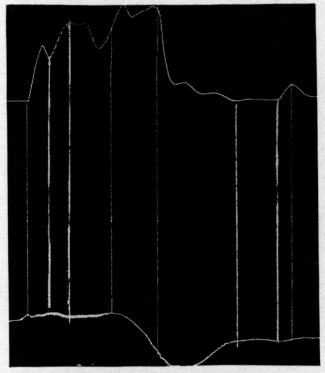
EXPLANATION OF PLATE 4.

Tracings of Paiute sounds, breath and glottis.

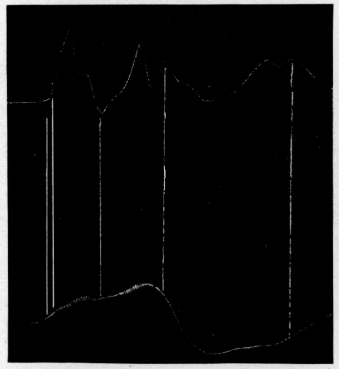
Fig. 1.—kai, no.
Fig. 2.—tibu(x)wainu, spy-glass.
Fig. 3.—tsidzi'a, girls.
Fig. 4.—kwat:i, shoot.
Fig. 5.—nüga, mine.
Fig. 6.—uhu, it is so.
Fig. 7.—tik:a, eat.
Fig. 8.—po, write.



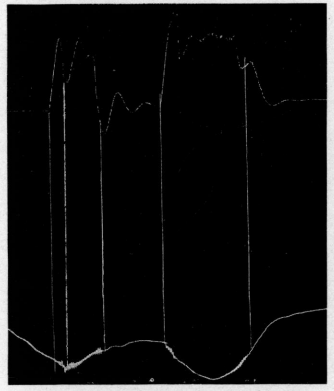
1. k a i



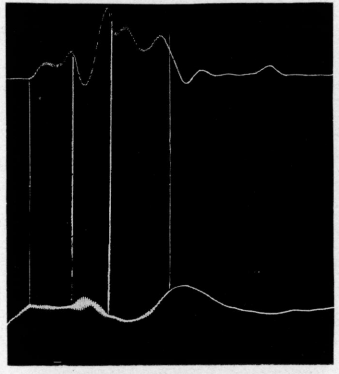
2. t i b u x w ai n u



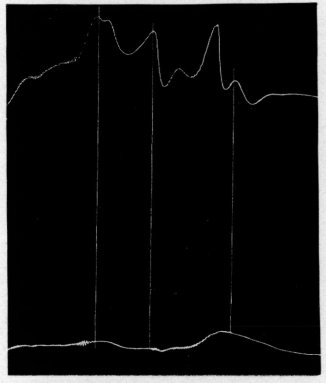
3. ts i dz i ' a



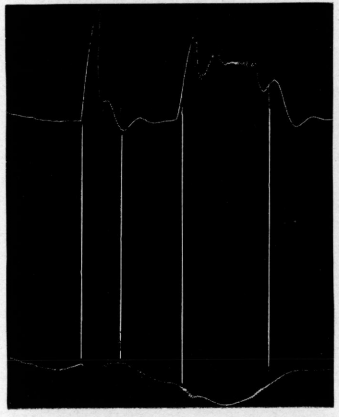
4. kw a t: i



5. n ü g a



6. u h u



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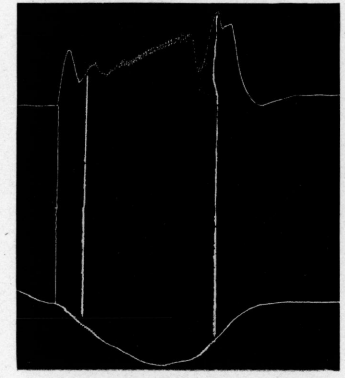


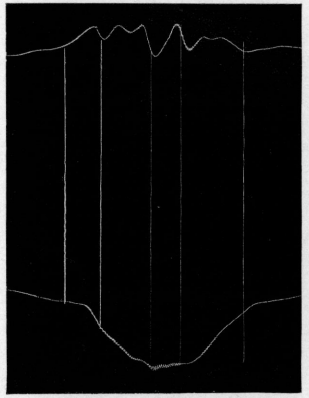
8. p o

TRACINGS OF PAIUTE WORDS

EXPLANATION OF PLATE 5.

Tracings of Paiute sounds, breath and glottis.

Fig. 1.—hibi, drink.
Fig. 2.—piza, good.
Fig. 3.—nodoty:aina, sore-throat.
Fig. 4.—yabi, hurry.
Fig. 5.—sida, bad.
Fig. 6.—güi, bite.
Fig. 7.—idza'a, coyote.
Fig. 8.—tsi'a, girl.



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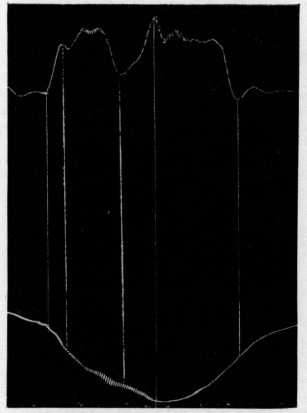

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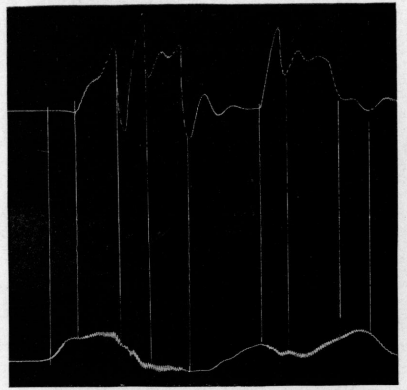

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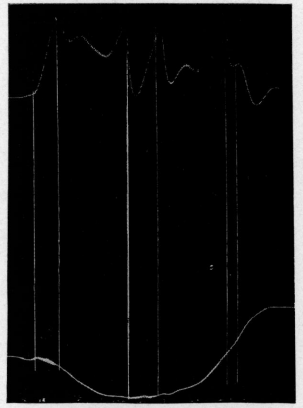

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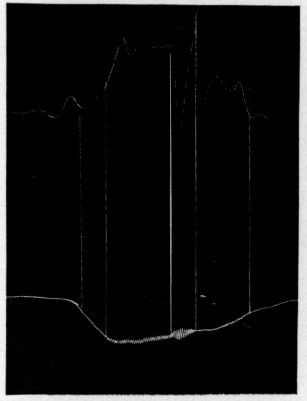

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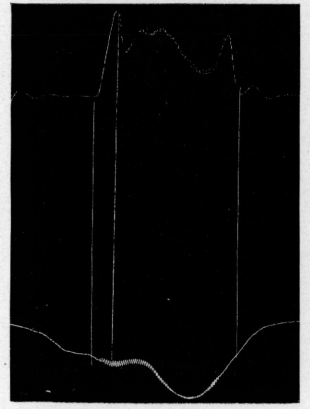

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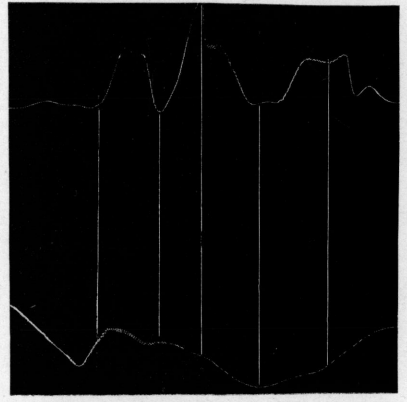

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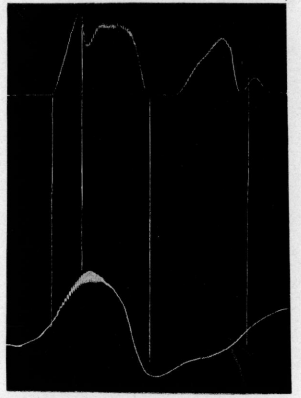

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