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I am about to relate the story of what I consider to be the most momentous event ever to have taken place in the linguistic sciences. The story tells of how a theory, massively supported by the data of linguistics, neurology, anthropology, psychology, and evolutionary biology, was totally destroyed by one man who succeeded in "turning round on his schemata." As a consequence of this paradigm-shift, linguistics became a branch of cognitive psychology.

By the close of 1832, the sailing ship 'Beagle' had reached Tierra del Fuego and was anchored in Good Success Bay. Captain FitzRoy sent a party ashore and the young Charles Darwin met his first Fuegians in their native habitat. In his diary for December 18th, Darwin wrote: "Their language does not deserve to be called articulate. Capt. Cook says it is like a man clearing his throat; to which may be added another very hoarse man trying to shout and a third encouraging a horse with that peculiar noise which is made in one side of the mouth. Imagine these sounds and a few gutterals mingled with them, and there will be as near an approximation to their language as any European may expect to obtain." 1)

Missionaries, biologists, and explorers found the sounds they heard in the 'uncivilised' world (that is non-European) bizarre and bewildering. Later, under the influence of evolutionary ideas, linguists themselves argued, with respect, for example, to some of the South African languages, that "These inarticulate clicks, thus adapted to the purpose of articulate speech, bridge over the gulf between the latter and the cries of animals, and we may see in them a survival of those primaeval utterances out of which language was born." (Sayce, 1880).

1) "These Fuegians, as they appeared to Darwin, may be responsible for much that is now called Darwinism." (Müller, 1888). Müller goes on to extol the virtues of the Fuegians and their language, noting that Darwin later wrote (1871): "... I took a very erroneous view of the nature and capabilities of the Fuegians."
A full explanation was called for. Throughout the second half of the nineteenth century, a story of the following nature was popular: The sounds of articulate language developed out of expressive noises, grunts, groans, yells and so forth. Lefèvre (1894) believed that "It is hardly necessary to observe that the vowels, pure or mixed, short or long, nasal or combined into diphthongs, may be recognised in the utterances of the dog, the cat, the horse, the ox, the sheep, the frog, the toad and the crow. Out of the sounds peculiar to each species it is easy to construct without omitting a single note or quality of sound, the entire vowel scale." Such noises, however, tend to vary continuously along acoustic parameters, rather than falling naturally into distinct classes. (Lefèvre, note, is "constructing" the vowel scale out of his cat and toad noises.) It seems likely, then, that prehistoric man's first utterances were "like those of the higher apes, mere jabberings, scarcely more distinct and varied than the present language of man's companion, the dog, who, a howler in the wild state, has learnt in domesticity to bark diversely to yelp, yelp, growl, snare, whimper, moan, or bay." (Keane, 1895). The transition from 'jabberings' to 'distinct' speech must have been slow and hesitant: "... all new features are at first inconstant, pliable, unstable, until permanently fixed." (Keane, 1895). Or as Darwin (1871) put it: "As the voice was used more and more, the vocal organs would have been strengthened and perfected through the principle of the inherited effects of use; and this would have reacted on the power of speech." Concurrently, the power of the brain is also developing so that it becomes more capable of controlling the position of the vocal organs: Man speaks "because the mouth and larynx communicate with the third frontal convolution of the brain" (Lefèvre, 1894). Because the brains of 'savages' are obviously not as advanced as those of Victorian man, it follows that the speech sounds of primitive tribes will be indeterminate, the articulation of the 'same' word will fluctuate (or 'alternate') from utterance to utterance. "The races", according to Lefèvre (1894) not only have "unequal power in the use of the gutturals, dentals, and labials, but, in certain dialects of Africa and Polynesia, the
pronunciation is still so uncertain that the most delicate
ear can hardly distinguish between k and t; the ear is doubt-
ful, and approaches now the one, now the other."

This theory had a remarkably wide domain of application.
It explained, according to Lefèvre, why there should be both
weak and strong consonants in modern German and why even 'perfect'
languages should have semi-vowels. These sounds are "the traces of
a long hesitation, of a remarkable confusion." "We hear, as it
were, across the ages the stammerings and hesitations of speech in
its infancy." (Lefèvre, 1894). The theory also provides an expla-
nation for the fact that there are so many different languages:
"... as the stuttering groups spread abroad from a common centre,
their speech such as it was, rapidly diverged, and broke readily
into numerous varieties. Then these varieties, following each
its inward bent, gradually acquired greater consistency and firm-
ness." (Keane, 1895). More importantly still, it explained why
"in all countries inhabited by savages, the number of languages
is very great ..." (Lubbock, 1870).

The theory was furthermore supported by a vast quantity of
evidence, namely, the alternate spellings in the notebooks of every
field worker in linguistics. We can conveniently summarise the
position from Müller (1864). Müller expresses his amazement that
certain (Indo-European) letters are absent from some families of
languages. But he finds "even more curious ... the inability of
some races to distinguish, either in hearing or speaking, between
some of the most normal letters of our alphabet. No two consonants
would seem to be more distinct than k and t. Nevertheless, in the
language of the Sandwich Islands these two sounds run into one, and
it seems impossible for a foreigner to say whether it is a gutteral
or a dental. The same word is written by Protestant missionaries
with k, by French missionaries with t. It takes months of patient
labour to teach a Hawaiian youth the difference between k and t,
g and d, l and r. The same word varies in Hawaiian dialects as much
as Koki and hoi, kela and tea." "Such a confusion", Müller correctly
remarks, "... would destroy the very life of a language like English.
The distinction between carry and tarry, car and tar, key and tea, neck and net, would be lost. Yet the Hawaiian language struggles successfully against these disadvantages, and has stood the test of being used for a translation of the Bible, without being found wanting." Concerning the question of exactly how these 'primitive' languages could stand any kind of test, Müller and all other scholars of his persuasion were conspicuously silent. Müller, however, had no doubts as to the source of these "floating letters". "This confusion between two consonants in the same dialect is a characteristic, I believe, of the lower stages of human speech, and reminds us of the absence of articulation in the lower stages of the animal world."

He gives the standard explanation: "Physiologically we can only account for this confusion by inefficient articulation, the tongue striking the palate bluntly half-way between the k and the t points, and thus producing sometimes more of a dental, sometimes more of a palatal noise." We might also note that the evolutionary credentials of the theory were greatly enhanced by observing that not only savages, but also children, the insane, and, in civilised society, members of the lower class, also indulged in sloppy articulation.

The theory was killed by Franz Boas in 1889. But many people who wanted to believe it did so for many years afterwards.

Boas had been trained as a physicist and his dissertation was on the absorption of light by seawater. In the course of this work, Boas became aware of various problems concerning subjective judgements of hue, saturation and intensity; his interests moved from physics to Weber-Fechner psychophysics, an area of research to which he made a number of important contributions. This background was to serve him well when he later concentrated his attention on anthropological and linguistic studies. Boas realized that perception was categorical; that physical measurements were not always isomorphic with unaided human judgements; that they may well be large individual and cultural differences in psychological scales of measurement, and that judgements of the structure of 'objective' stimuli change as a function of practice and experience. His trip to the Arctic, during which he studied the
perceptual categories of the Eskimo, confirmed him in these opinions. Boas, perhaps in part as a consequence of his own position in nineteenth century Europe, was also not inclined to believe that some races were naturally inferior to others.

In his own linguistic work, Boas, like other scholars, had transcribed the words of Indian languages differently on different occasions. He was aware that errors, similar to those of non-native linguists, were made by Boston schoolchildren when writing individual words to dictation in their own language (Wiltse, 1888). Wiltse pronounced *fan* clearly and distinctly; the children wrote down 'than', 'thank', 'fair' etc. Boas realized that "sounds are not pronounced by the speaker." (Boas, 1889). It remained for him to destroy the standard theory of anthropologists' transcriptions by standing it on its head. These fluctuating spellings were not due, Boas argued, to the sloppiness with which the natives pronounced their words; rather some of the sounds of Amerindian tongues were in fact intermediate between the sounds which entered into the phonetic systems of European languages. The 'savages' articulated no less, and no more, precisely than Europeans. But linguists, unfamiliar with the structure of these non-European tongues, apperceived these sounds in terms of the phonetic categories with which they were familiar. 2)

Boas further supported this position by noting that there were distinct Indian words which he at first heard as identical, but which, after considerable experience, he could distinguish. He also predicted that those English sounds which fell midway between Indian sounds would appear to the Indian to alternate, as indeed they did. Boas reviewed this work in 1911 as follows: "... the Indians of the North Pacific coast have a series of sounds, which may be roughly compared to our sounds *sl, cl, gl*. Consequently, a word like *close* is heard by the Indians sometimes one way, sometimes another; our *cl* is for them an intermediate sound, in the same way as some Indian sounds are intermediate sounds to our ears. The alternation of the sounds is clearly an effect of perception through the medium of a foreign system of phonetics, not that of a greater variability of pronunciation than the one that is characteristic of our own sounds." Concerning the influence of Boas' original 1889 paper, Stocking (1968), in the definitive study of Boas' early work, writes: "It is impossible to exaggerate the significance of this article for the history of anthropological thought."

2) Note that there were no "phonemes" in 1889. The synchronic study of speech sounds was the study of articulatory phonetics. The work of Baudouin de Courtenay and N. Kruszewski was not widely known until much later.
REFERENCES


John C. Marshall