In the Beginning was the Cry[1]

by

Branka Zei Pollermann

We westerners live in an era where the "truth" and evidence are printed on paper. The proof of our existence lies, not in the fact that we are flesh and blood, but rather in the documents that we can produce. You only need to speak the truth out loud to be told at once: "Put that in writing!" Similarly, you only have to publish a lie to discover that everyone is ready to believe you. You will never be told: "Say that out loud." The living voice is considered too subjective, too ephemeral for its messages to be accepted as entirely credible.

Yet we are all aware that the living voice has always been of prime importance in human relations. Negotiations about peace (or war) are conducted by people speaking to each other; the opening and closure of major assemblies become effective only when a speaker formally announces them; the outcome of a case in court is largely influenced by the vocal style used by the lawyer.

What is a vocal style?

There is a perplexing plethora of definitions for vocal style. The Oxford English Dictionary defines vocal as "of or concerned with or uttered by the voice", and style as "a manner of writing or speaking or performing". We are

[1] Original French title: Au commencement était le cri
(Le Temps stratégique, No 66, Genève, 1995).
http://www.edicom.ch/fr/news/temps_strategique/index.php?idIndex=1684&idContent=3955121

so familiar with the phrases *way of expressing oneself* and *manner of speaking* that we no longer feel the need to seek their precise meaning.
In this article, I cast some light on the role of the voice in speech communication – a question which is as obvious as it is obscured by our writing-oriented society.

In The Beginning Was the Cry

The newborn announces its arrival with a cry. His first signature is a voice print. It is his voice which makes him unique from birth and which will continue to do so for the rest of his life. His body produces it, but it is instantly given to others. By penetrating their ears, it enters into them, deposits its imprint – and vanishes. The voice is ephemeral

From the acoustic point of view, the neonatal cry is an acoustic phenomenon lasting from 1 to 4 seconds, with an intensity of some 82 dB, and a rather high-pitched frequency level ranging between 350 and 500 Hertz. (For comparison purposes, the average fundamental frequency range for women is 200 to 280 Hz.)

From the medical point of view, the newborn cries to expel the substances obstructing his respiratory system, and to increase the ventilation as well as the temperature of his body. It is a sign of change from aquatic to aerial mode of respiration.

Ontogenetically, the cry at birth and the tearful cry seem to constitute one of the first survival mechanisms which, though grafted onto respiration, operate as an “umbilical cord” to ensure that the child has an auditory contact with his environment to assure protection from predators and neglect.
For the mother, even when out of sight, the baby can be located and recognised as hers.

From the psychological point of view, screaming and crying form the basis of the first interactions between mother and child. For the parents they "represent (…) the newborn's first requests, the first decisions, the first joys, the first stress …" (Cismaresco, 1993).

The Baby's Cry is like a Foghorn

The mother interprets the baby's cry as an expression of its needs and its emotional states. The infant's cry is an alarm signal to which mothers of certain ethnic groups (African Bushmen of the Kalahari, for example) have an average response time of six seconds. In western societies, the response time varies from 5 to 30 minutes (Bernal, J. 1972; Brazelton, T.B. 1962).
Researchers have even demonstrated a link between the newborn's cry and the skin temperature of its mother's breast. The temperature increases some seven minutes after the cry begins, thus preparing the breast to feed.
Mothers and midwives acquire the ability to distinguish between the cries of pain, hunger or discomfort (men appear to be less gifted in this regard.)

For some years now, doctors and phoneticians have been analysing the cries of babies with the aim of establishing a set of acoustic symptoms for different pathologies.
A Finnish team has identified the acoustic characteristics of the cries of infants in cases of metabolic disturbances such as hyperbilirubinemia. They discovered that the cries change one or two days before the level of bilirubin rises. It thus appears that the acoustic characteristics of the infant's voice could help refine the diagnosis, and avoid treatments as photo-therapy or blood transfusion.

The Vocal Apparatus

The apparatus which produces the voice is not designed specifically for the production of sounds. It is made up of disparate elements borrowed from the respiratory and digestive systems. Its functioning resembles that of a wind instrument: a flow of air (provided by the lungs), a vibrator (the vocal chords) and a resonator (the pharyngo-buccal cavity). The breath from the lungs enters the windpipe, at the top of which it strikes the vocal chords (thyro-arytenoid muscles). With each opening of the vocal chords, the pulmonary air is expelled as puffs which follow each other more or less quickly as the vocal chords vibrate. These movements produce the fundamental tone **(**laryngeal sound**) -** the raw material of the human voice. Prior to becoming the "true voice", the laryngeal sound is modified as it passes through the different supra-glottal cavities (pharyngeal, oral, labial and nasal). The end-product is a complex sound composed of a fundamental tone, harmonics, and noises covering an entire spectrum of frequencies which can exceed 20000 Hz. Although man was probably not created to speak or sing, he has, in the course of his evolution, succeeded in using his voice in an ever more sophisticated manner, to the point of perfectly mastering the 196 muscles involved in speech and song.

The Spoken Word vs. the "Dead Letter"

Being a product of a sensorimotor behaviour, the voice carries the bodily signature of the three systems involved in its production (respiratory, phonatory, and articulatory). Yet the functioning of these three systems is influenced by the emotional state of the speaker. For a given emotional arousal, there is a corresponding modification of the respiratory, phonatory and articulatory activities.

In case of stress, the increased action of the sympathetic nervous system leads to a tense phonation which is manifest in the intensity level of the voice, in its pitch height, and in the manner of articulating the sounds of the language. For example, the prolongation of vowels is found in tender emotions, while the prolongation of consonants is related to aggressive emotions.

At all times, the voice reflects the speaker's affective state. It is the window through which one may "spy" on feelings. The configuration of oral cavities differs according to the type of emotion expressed. The acoustic changes resulting from different configurations are easily perceived by the human ear.

The figures below represent three-dimensional spectrograms for the same phrase: a state of tenderness and a state of anger.

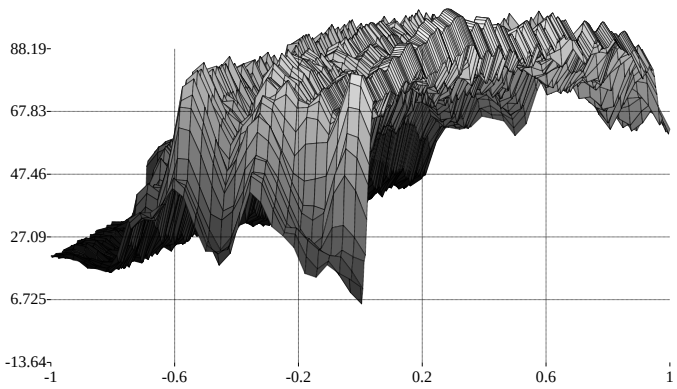

Figure 1: Tenderness

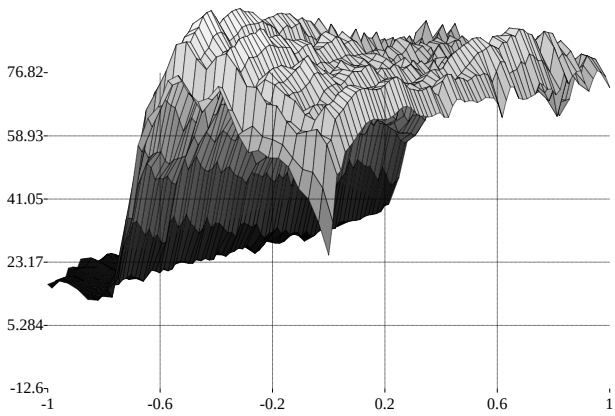

Figure 2: Anger

Such vocal differences are real codes – parallel to the linguistic code. They differ from the latter by their non arbitrary nature. They accompany speech and provide the emotional framework for the interpretation of the statements at a specific time. Spoken word is, therefore, less ambiguous than its written counterpart. When said out loud, the "cold" word is enriched by the vibrations of the soul of the interpreter.

A Debt to Ferdinand de Saussure

De Saussure[1] was the first to provide a theoretical framework for the notion of *vocal style*, by highlighting the conceptual difference between **language** and **speech**.

Language is a system of signs which serves to communicate. The meaning of each sign is set by convention since the sounds used to signify an idea are chosen arbitrarily by each speaking community. There are numerous examples where the same succession of sounds, in another language, means something else.

Speech is an ensemble of lexical, articulatory and acoustic choices realised in an utterance. A speech-act is intended to satisfy the communicative needs of a speaker in a concrete situation.

It is precisely this **concrete situation** which determines the emotional state of speaker and the vocal style corresponding to his communicative intentions. Consequently, a vocal style has its place in **speech** (and not in language), where it enriches the communication with an infinity of nuances of meanings.

2000 Years Ago, It was Already Late

Cicero expresses surprise that the study of oratory came so late to Athens, the Mother-city of Eloquence. That was at the time of Solon and Pisistratus (600-

525 A.D.). Yet there is no doubt that vocal expression had occupied an important place in Athens, as Homer could not have praised Ulysses' and Nestor's eloquence if, eloquence had not enjoyed great prestige at that time.

In De Oratore (55 A.D.), Cicero gives very precise explanations of vocal styles and the use of the voice in persuasion. He believes, as had Aristotle before him, that a good orator has three tasks to accomplish:

1. To instruct (a debt to be paid),
2. To please (a gratuity to confer) and
3. To rouse emotion (a sheer necessity).

It is pleasure and emotion which are dependant on the voice. For St. Agustine (The Confessions 397-400), the voice which enters into the body gives sensual pleasure. It enchants and seduces. Tito Lucrezio Caro (98-53 A.D.) places the auditory experience of a voice among the physical-corporal experiences. It is known, he says (in De Natura), that the voice of a single messenger strikes the ears of a whole crowd: one single voice splits into as many voices as there are ears to hear it. It circumvents obstacles; it passes through walls; it goes straight to the heart.

The seductive and persuasive power of the voice was well-known to the ancient orators and philosophers. They placed the art of oratory in the framework of persuasive communication. **For Plato, as for Aristotle, it is the vocal style which can render facts and arguments credible and convincing**. It can inflect the meaning by strengthening or reducing the semantic effect of the words. Consequently, orators such as Demosthenes or Quintilian give very detailed indications concerning the use of the voice for purposes of persuasion.

These days, 2000 years later, the lack of any systematic teaching of either vocal style or the art of oratory is regrettable. Students get practice principally in writing texts. At best, they learn to recite a poem by heart. But it is often the **by heart** which counts, and not the vocal interpretation. Yet it is

known that the meaning of a poem depends largely on the tone given to it. It is known that the tone can deny a declaration of love just as it can infuse life into an ordinary statement. The art of argument is taught (in writing), but the vocal aspects of putting an oral argument are not. On leaving school, the student knows all there is to know about written styles and nothing about vocal styles. At the end of the XXth century, vocal style is not even on the agenda.

Music and the Tone of Voice

As the tone of voice directly reflects the emotional state of the speaker, it functions as a language independent musical indication of the speaker's affectivity. For example, a musical transcription of the tone of voice in an utterance expressing anxiety or sadness has a monotonous contour. In vocal and instrumental European music, sadness and anxiety are also expressed by a sharp reduction of the melodic range.
One is thus tempted to wonder to what extent musical expression of emotionality is inspired by the tone of the spoken word.

Since Computers Started to Talk

The scientific study of the human voice has made great strides since acoustic phonetics equipped itself with programmes specially designed to acoustically analyse the most subtle features of the human voice.

While ancient orators had the instinctive know-how, modern phoneticians have the scientific data which make it possible to understand the fine structure of the voice and to carry out experiments in order to discover the power of voice in speech communication.

Computerised analysis allows us, for instance, to measure the principal parameters of voice and their relation to the most important attributes of

personality, of affectivity, of attitudes, etc. Most attributes derive from four vocal dimensions. These are: the fundamental frequency related to the pitch height, the intensity, the spectrum (energy distribution in the frequency field) and the speed of delivery (measured by the number of syllables uttered per second).

It has been found, for instance, that a rather fast delivery combined with a loud voice can characterise an extrovert personality. Slow speech rate combined with vocal monotony and weak intensity, may characterise the speaker as sad, uninterested, indifferent or depressed. In a stressful situation, for example, vocal parameters may characterise the way in which the speaker is coping with stress.

A specific configuration of vocal parameters (pitch, energy, speech rate) may characterise an active, independent, dominant personality; whereas, another configuration of the same parameters can characterise a passive or a submissive attitude.

The electronic manipulation of the acoustic signal has, in addition, opened a promising route to speech synthesis.

The Voice as a Symptom

Numerous scientific works have demonstrated the relationship between affective disorders and the acoustic characteristics of the patient's voice. Vocal monotony combined with a weak vocal intensity are among the vocal symptoms of depression. A group of London researchers has succeeded in differentiating two types of schizophrenia thanks to the analysis of the patients' voices.

Here are some examples of areas in which acoustic analysis of the voice can be applied, not only in psychiatry, but in medicine in general:

- Aid in refining the clinical picture in somatic patients (e.g. the consequences of neuropathy of the autonomic nervous system in diabetics)
- Aid in the diagnosis and treatment of patients suffering from various affective disorders (e.g. the presence of anxiety or of anger as non-verbalised feelings)
- Aid in diagnosing depression in the child
- Control of the effects of psycho tropes.

One frequently-used technique consists in collecting voice samples of the patients while they are verbally describing their own emotional experiences. Normally, at the time of the recall, the patient relives to a lesser degree the emotion in question. The digitalised recording is then analysed by means of programmes designed for this purpose. In this way, emotion becomes a measurable phenomenon.

Voice Indicates the Size of the Animal

When birds and mammals are in danger, their voices become deeper than usual. It seems that this is a defence mechanism designed to intimidate the enemy by giving the impression that the animal is larger than is actually the case. The reasoning is simple: a deep voice is produced by vocal chords which are rather long and thick. It therefore reflects the size of the animal. Thus, the tendency to be intimidated by a deep voice is a natural reaction.

Similarly in man, a high-pitched voice may indicate the speaker's small size or submission. There is a tendency to use high-pitched voices in order to inhibit aggression. A deep voice, on the other hand, will have opposite connotations: self-confidence, dominance, self-sufficiency, etc.

The Voice of a Dialogue

The voice of a dialogue differs from that of a monologue because the interaction partners influence each other. Ways of speaking are contagious. One responds to a confident tone with a confident tone. Lovers often resemble each other in their ways of talking. A stuttering child may "infect" his little friend.

Voice plays an important role in the regulation of verbal interaction. The study of voice is particularly interesting in the field of management where the voice is differently used in competitive and decision-making situations, than in cases of conflict?

It is well-known that the subtleties of a negotiation bear a direct relationship to the vocal behaviour of the interlocutors, who will be perceived as being collaborative or hostile according to the degree of adaptation of their vocal styles.

The adaptation may be bilateral or unilateral. Often, if not always, the position in the pecking order determines which of the two speakers will adapt to the other. The weaker adapts to the stronger. But adaptation does not work in the same way for all the vocal parameters. It can happen, for example, that a dominant person uses a greater loudness when addressing someone lower down the scale. The dominated individual, however, will not respond by increasing the intensity of his voice, thus indicating his acceptance of the respective roles.

The psychological principle underlying speech accommodation is that of 'attractiveness though similarity'. Those who resemble us are more predictable, and are therefore considered less dangerous. In this context, geographical and cultural issues loom large. Inhabitants of hot regions, exposed to strong winds, are used to speaking loudly. Where social life often takes place outdoors, in village squares or in the street, the vocal habits of the

inhabitants are very different from those which correspond to communication in closed locations. This may partly explain why the voices in certain Mediterranean regions are perceived as being strident or aggressive in the eyes (ears) of people from regions further north.

Cultural norms play an important role in the way in which we express ourselves vocally. This is often a question of tacit censorship of emotional expression. Studies have shown that, in certain cultures, the expressions of anger are repressed. So, each culture constructs its own stereotypes, which direct our perception of others as well as that of us.

A "Voice Lift"

Today, interest in the voice is springing up mainly in political circles and in publicity. It is becoming more and more usual to take care of the brand image by taking care of the vocal image as projected by the speaker. One former British Prime Minister actually underwent a "voice lift". Her natural voice was unacceptably high-pitched for the duties of a stateswoman.
It would seem that head-hunters are turning increasingly to voice analysis as a means of precisely determining the vocal image which their candidates project to the world.

Teachers and communication professionals are becoming aware that voice is the principal tool of their trade. Monotonous voices run the risk of putting listeners to sleep; high-pitched voices with frequent rising intonations risk irritating them. The voice exerts a remarkable impact on the entire teaching process.
Companies adhering to the notion of "total quality" are organising courses for their telephone operators and secretaries for, very often, the first contact with clients is vocal so that **the first voice heard acts as the company's visiting card.**

Practically speaking, the objective for voice work is first defined, because there are no universally good voices. The person concerned gives several samples of his/her voice. A computer analysis reveals its principal characteristics after which, an individual programme of work is established.

In order to judge the impact of a change of voice, computer technology allows us to “fix” an original recording by changing certain characteristics. A high-pitched voice becomes deeper, for instance; a slow elocution is accelerated (without changing the quality of the voice itself), etc. Once “lifted” in this way, this new voice becomes a model for work with the person concerned.

In the third millennium, will the living voice reclaim its rightful place?

References

Saussure, F. de (1972 [1916]) : *Cours de linguistique générale*, édition critique préparée par Tullio De Mauro, Paris : Payot.

Bernal, J., Crying during the first ten days of life and maternal responses. Developmental Medicine and Child Neurology, 1972, 14, 362-372.

Brazelton, T. B., Crying in infancy. Pediatrics, 1962, 29, 579-588.

T. Lucrezio Caro (vit entre 98 et 53 AC) "Della natura"- Sansoni, Firenze 1969.

Cismaresco, A-S, Le cri néonatal et ses fonctions, Ed: M.Cl. Busnel," Le langage des bébés, savons nous l'entendre", Grancher, 1993, Paris

Fonagy, I. La vive voix, Payot 1983.

Russel, D.A., Ancient literary criticism, Clarendon Press, Oxford, 1972.