

Formant Technique in Traditional Singing

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How do we behave when the requirement is to sing loudly?

The simplest answer would be: we try to intensify phonation, i.e., to increase the amplitude of the vibration of our vocal folds. We achieve this by increasing subglottal pressure. This works to some extent only, because putting too much pressure on our folds can cause their damage.

Increase of the subglottal pressure raises not only the intensity of the sound produced by the folds, but the pitch as well (Sundberg 1995: 83). So, in general, physiological activity remains the same provided we go up pitch while increasing intensity. This works until we reach the transition point between voice registers. In other words, to sing high means to sing loudly and vice versa. Once more, here we mean constant mechanism of vocal activity.

There is one more way to increase the volume of singing. We can find a “comfortable” vocal tract configuration empirically, i.e., the articulation that causes the biggest possible radiated intensity. This is what is meant by the formant technique.

Obviously, all methods are used simultaneously. Since singing “simply louder” and higher is limited, the formant technique enables a person to extend his or her dynamic range. On the other hand, applying the formant technique economizes the work of the vocal folds.

The formant technique is widely used by professional singers, especially sopranos. The frequency range of the higher register of sopranos overlaps the ranges of the two lowest formants. Provided the fundamental exceeds the standard frequency of the 1st formant (or even the 2nd one), the formant tends to be dragged up to the fundamental.

Traditional singing that survives to this day features the traces of a peculiar formant technique. This technique is more or less distinct, depending on the function of a song, individual manner of singing and other factors. A distinct example of applying a formant technique is chosen in the present investigation. This is rye-harvesting song “Oi aš pjaunu pjovėjė” (“Oh, I am reaping, a reaper”), performed by three women from Dzūkija (Southern Lithuania) some thirty years ago (Četkauskaitė 1974: Nr. 2); see *Fig. 1*.

Fig.1a

Fig.1b

a1 u1 o1 é1 è2 è3 a2 o2 a3 o3 a4 a5 e1 o4
 1. Oi, aš pjau-nu pjo-vè-jè-lè / An to kal-no, / An kal-ne-lio.

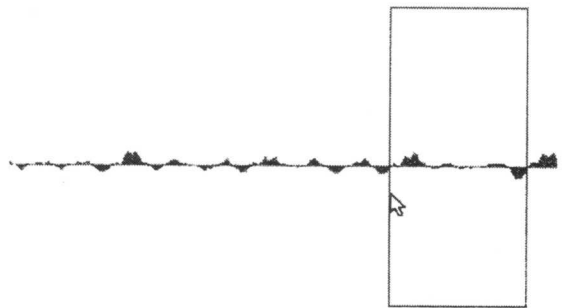
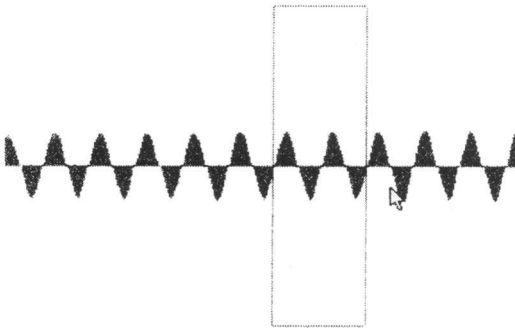
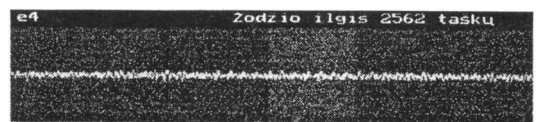
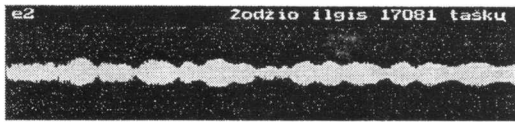
i1 a6e2 a7 e3 e4 i2 i3 o5 a8 o6 a9
 2. Oi, ir a-tei-na ber-ne-lis / Jiš po kal-no / Jiš po aukš-to.

a10 è4 e5 e6 e7 u2 u1 u3 e8
 3. - Pa-dèk, Die-ve, tau, mer-ge-la, / Ru-gių pjau-te, / Ru-ge-lè-lių.

Before exhaustive analysis it should be stressed that, in general, the results of applying a formant technique are observable simply in graphs showing acoustical signals. For instance, the signals of the phoneme e in positions e_2 and e_4 (see Fig. 1b) are presented in Fig. 2a and 2b, respectively. It is evident that the 2nd partial dominantes in e_2 , whereas no partial is distinct in e_4 , i.e., the contributions of the lowest as well as successively higher partials can be seen. It means that the frequency of the 2nd partial and formant (the 1st one in this case) are very close in e_2 . On the contrary, the correlation between partials and formants hardly appears in e_4 . In addition, e_2 is more intensive than e_4 ; the beats in e_2 are characteristic, they result from the superposition of a few close and stable pitches.

Fig. 2a

Fig. 2b



Generally, the acoustical difference between two cases of the same phoneme, like those described above, can be accidental. But further we will demonstrate statistically that cases, such as e_2 , can be treated as showing a typical application of a formant technique, and that cases, such as e_4 , can be attributed to ordinary voice production with no specific articulatory attempts.

Let us consider the relationship between the type of acoustical event and the role of the corresponding tone in a performance. According to Fig. 1, the more intensive e_2 (though to be produced by applying a formant technique) refers to the upper supporting tone, accented and prolonged (see syllable *-tei-* in strophe 2). Whereas e_4 refers to an intermediate, insignificant tone (see syllable *-ne-* in strophe 2).

