

Rules for modifying vowels:

Remember that the first resonance is PRIMARILY related to the size of the pharyngeal space (compare [i], which has large pharyngeal space and a low first resonance, with [a], which has a small pharyngeal space and a high first resonance), while the second resonance is PRIMARILY related to the size of the oral cavity in front of the hump of the tongue (again, [i] has a high second resonance because the space in front of the hump of the tongue is small, while [a] has a low second resonance because the space in front of the hump of the tongue is large). The third resonance is quite strongly affected by the position of the tip of the tongue. Resonances 3,4 and 5 are clustered closer to each other by lip puckering.

Resonances lower with lip rounding and larynx descending

Resonances increase with lip spreading and larynx raising

Raising and fronting the tongue lowers R1 and raises R2 (as in i, I, e)

Lowering the tongue brings R1 and R2 closer to each other (as in a)

Harmonic Series:

Exercises for seeing how resonance frequencies can be shifted towards boosting different harmonics:

1. Sing [a] on a comfortable pitch. Round your lips and note the change in the power spectrum. Sing your normal [a] on the same pitch as before, then sing [a] with an exaggeratedly lowered larynx. Note changes in the power spectrum. You can also test this in fry.
2. Sing the vowel series [ae, E, e, I, i] on a constant pitch. Note the changes in the power spectrum as your tongue raises and fronts.
3. Sing the vowel series [a, o, u] on a constant pitch, noticing how the power spectrum changes as your mouth rounds and your lips lengthen your vocal tract.
4. Sing [i] on a constant pitch, then round your lips to form [y]. Note changes in the power spectrum.
5. Sing [o] on a constant pitch, then move your tongue to produce the mixed vowel found in the closed German ö. Note the changes in the power spectrum.
6. Sing [a] on a constant pitch, then switch to [ae] by slightly spreading your lips and shifting your tongue. Note changes in the power spectrum. Go back and forth [a – ae – a – ae] several times.
7. Sing [a] in a comfortable low range with your mouth quite closed, then open your mouth quite wide (as for a very high note), but stay on the same pitch. Note changes in the power spectrum.