

PITCH SHIFT PROBLEMS (1)

(Math, List, Perf, and Comp are discussing pitch shift problems, because Perf had some difficulties with his a capella choir during rehearsals of Schütz's *St. Matthew Passion*.)

PERF. I will give an example of the problems I encountered in the choir part of 'Die Kriegsknechte'. It starts with a G major chord. Then the resting points are, successively, on C major, on B flat major, on D major, and on B flat major, and it ends with a G major chord. But during the rehearsal, this chord was slightly lower than the G major chord we started with. What is your explanation? Here is the score:¹

The image displays a musical score for a choir part in 'Die Kriegsknechte'. It consists of two systems of four staves each. The first system includes a soprano, alto, tenor, and bass line. The lyrics are: 'Ge-grü - ßet, ge - grüßet seist du, gegrü-ßet seist du, du, Ge - grü - ßet, ge - grüßet seist du, du, der Ge - grü - ßet, ge - grüßet seist du, du, Ge - grü - ßet, gegrü-ßet seist du, du,'. The second system continues with: 'der Ju-den Kö - nig! Ge-grüßet seist du, ge - grüßet seist du, du, Juden Kö - nig! Ge-grüßet seist du, du, du, du, der Ju-den Kö - nig! Ge-grüßet seist du, du, du, der Ju-den Kö - nig! Ge - grüßet seist du, du,'. The score features various musical notations including rests, notes, and accidentals, with a key signature of one flat and a common time signature.

¹ 'Die Kriegsknechte', edited by Peter Kaplan and Lily Pond on the Internet.

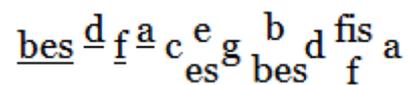
du, der Ju-den Kö - nig, du, du, der Ju-den Kö - nig!

du, der Ju-den Kö - nig, du, du, der Ju-den Kö - nig!

der Ju-den Kö - nig, du, du, du, du, der Ju-den Kö - nig!

du, der Ju-den Kö - nig, du, du, der Ju-den Kö - nig!

MATH. Apparently, the voices went down in the so-called circle of fifths. The Eitz-diagram shows it:



As a result, the B flat chord in bar 4 is a comma lower than the first inversion of the original G minor chord:

seist du,

du,

du,

seist du,

If the tones of these chords? are maintained in what follows, the chord $d^1 d^1 fis^1$ at the end of bar 5 will also be a comma lower than the original chord:

du, der Ju-den Kö - nig!
, der Juden Kö - nig!
du, der Ju-den Kö - nig!
du, der Ju-den Kö - nig!

This is the corresponding Eitz-diagram:

$$g \ \underline{b} \ \underline{d} \ \underline{fis} \ \underline{a} \ \underline{cis} \ e$$

$$f$$

PERF. How can we repair it?

MATH. The best solution would be that the first chord of bar 5 already has the original pitch, and that the alto intonates the e^1 on 'Kö-' as an **e**:

der Ju-den Kö - nig!
Juden Kö - nig!
der Ju-den Kö - nig!
der Ju-den Kö - nig!

The the corresponding Eitz-diagram is as follows:

$$e \ g \ b \ d \ fis \ a \ cis \ e$$

PERF. I doubt if this is possible, but I will try it out at the next rehearsal!

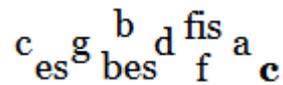
LIST. I hope to attend it!

COMP. What about the rest of 'Die Kriegsknechte'?

MATH. There is an innocent comma difference between two c's.

du, der Ju-den Kö - nig,
du, der Ju-den Kö - nig,
der Ju-den Kö - nig, du, du,
du, der Ju-den Kö - nig,

The c^1 on 'Ju-' in the tenor forms a pure fifth with the g^1 on 'Ju-' in the soprano, and is a c , but then the next c^1 on 'Kö-' becomes part of an F major chord, and must form a pure fifth with the f on 'der' in the bass. Therefore this c^1 is a \mathbf{c} , according to the following Eitz-diagram of bars 6 to 10:



PERF. Thank you for your theoretical analysis. I am looking forward to the practical synthesis!

MATH. So do I!

(The four friends note the date of the next rehearsal of Perf's choir in their agendas. Then they part.)