

Humdrum Tools II

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Melodic Searching

`tindex – themax – theloc`

Download data files for J.S. Bach chorales:

`humcat –s h://371chorales | humsplit`

Create *thema* search index:

`tindex *.krn > index.dat`

Search for the pitch sequence “c d e f g a b”:

`themax –p “c d e f g a b” index.dat`

`chor190.krn::1 48 58`

`chor325.krn::1 17`

Convert matched note numbers into measure/beat locations:

`themax –p “c d e f g a b” index.dat --loc | theloc`

`chor190.krn::1 48=9B1-54=9B4 58=10B2-64=11B2.5`

`chor325.krn::1 17=5B1-23=6B3`

<http://extras.humdrum.org/man/tindex> (themax, theloc)

Marking search in data

chor190.krn::1

48=9B1-54=9B4

58=10B2-64=11B2.5

Chorale 190, first **kern spine (bass part)

First match on notes 48-54 which is in measure 9 starting on beat one and ending at beat 4.

Second match on notes 58-64 starting at m10 beat 2 and ending at m11 beat 2.5

Marking match in original data:

themax -p "c d e f g a b" index.dat --loc | theloc -m

(only first entry in themax results will be processed)

@ sign is a user-definable signifier

!!!RDF**kern: @ = matched note

=9	=9	=9	=9
8CL@	4c	4g	4ee
8D@	.	.	.
8E@	[4c	4g	4ee
8FJ@	.	.	.
8GL@	4c]	4g	4dd
8A@	.	.	.
8B@	[4B	8gL	4dd
8GJ	.	8fJ	.
=10	=10	=10	=10
8AAL	4B]	2e	2cc
8BB	.	.	.
8C@	[4A	.	.
8DJ@	.	.	.
2E;@	4A]	2e;	2b;
.	4G#;	.	.
=11	=11	=11	=11
8FFL@	8AL	4c	4a
8GGn@	8BJ	.	.
8AA@	4c	4f	4a
8BBJ@	.	.	.
8CL	4c	4f	4g
8D	.	.	.
8E	8cL	[4e	4g
8CJ	8B-J	.	.
=12	=12	=12	=12

Displaying matches in graphical notation

```
themax -p "c d e f g a b" index.dat --loc | head -n1 | theloc -m | myank -m 9-11 > match.krn
```

```
cat match.krn | autostem | hum2muse | muse2ps =z21j | pstopnm -dpi=300 \  
| convert -trim -resize '33%' match.png
```

Herr, nun laß in Friede

J.S. Bach

The image shows a musical score for the hymn "Herr, nun laß in Friede" by J.S. Bach. The score is written in C major and 3/4 time. It consists of four staves. The first three staves are in treble clef, and the fourth is in bass clef. The first staff has a soprano line with a fermata on the second measure. The second staff has an alto line. The third staff has a tenor line with a fermata on the second measure. The fourth staff has a bass line with a fermata on the second measure. The first measure of the bass line is highlighted in red.

Parallel searches

Search for the pitch sequence “cdefgab” only going upwards:

```
themax -p "cdefgab" -C "uuuuuu" index.dat  
chor190.krn::1 48  
chor325.krn::1 17
```

pitch: cdefgab
contour: up up up up up up

Prevent matches across fermatas:

```
tindex -fermata *.krn > index2.dat  
themax -p "cdefgab" -C "uuuuuu" index2.dat  
#FERMATA  
chor190.krn::1 48  
chor325.krn::1 17
```

Josquin Research Project website

- front-end for tindex/themax/theloc

<http://jrp.ccarh.org>

The Josquin Research Project

Project Director: Jesse Rodin, Stanford Music
Computational Consultant: Craig Sapp, CCAH

WORK LIST

Go to: [Busnoys](#) | [Du Fay](#) | [Josquin](#) | [La Rue](#) | [Mouton](#) | [Obrecht](#) | [Ockeghem](#)
| [de Orto](#)

No. Title (click title for more info.) ☒ Scores ☐ MIDI Voices

Josquin des Prez (287 of 336 works)

Masses (29)

1201	Missa Ad fugam	☒	☐	4
0701	Missa Allez regretz I	☒	☐	4
0301	Missa Ave maris stella	☒	☐	4
0304	Missa Cum iocunditate	☒	☐	4(-5)
0302	Missa Da pacem	☒	☐	4
0303	Missa De beata virgine	☒	☐	4-5

SEARCH TOOLS

Pitch
Interval
Rhythm

Sort by

Accidentals

Composer

Genre

Mensuration

[instructions](#)

themax input fields

-D option

(diatonic search
ignoring accidentals)

Interval: -I

Rhythm: -u

JRP Search Results

search for diatonic pitch sequence “cdefgab”

169 matches in 105 works/movements [\[New Search\]](#)

Matches	Locations (click for score with matches)	No.	Title (click titles for more analytical tools)	Voices	MIDI file
1		2802	Ach hulff mich leid	4	M
4		1501	Alleluia Laudate Dominum	5?	M
2		2308	Ave maris stella	4	M
1		2102	Ave verum corpus	2–3	M
3		2103	Ave verum corpus	5	M
4		2312	Ave virgo sanctissima	5	M
3		1502	Beati omnes qui timent Dominum	4	M
2		2720	La belle se siet	3	M
1		1402	Benedicite omnia opera	4	M
3		2721	La Bernardina	3	M
1		1505	Bonitatem fecisti cum servo tuo	4	M



location of match within score (color indicates voice type which has match)

Graphical display of search results

- Click on location thumbnail to view score with matches highlighted:



Themefinder/Kernscores

Themefinder
[About | Search options | Help]
[New Links | Composers | Random]

[Take the Quartet Quiz.](#)

Repertory type of music to search

Pitch A-Q, sharp=#, flat=-
e.g. C E- G F#

Interval maj=m, min=m, aug=A, dim=a per=p, fifth=5,
up=+, down=-,
e.g. +m9 -p8 +m3 p1

Scale Degree do=1, re=2, mi=3, fa=4, so=5, la=6, ti=7 (mode insensitive). e.g. 34554321

Gross Contour up=/, down=\, unison=-.
e.g. / \ - / or uudsu

Refined Contour up step=u, up leap=U,
down step=d, down leap=D, same=s. e.g. uUDsdu

Location ☒ beginning of theme only,
or ☐ anywhere in theme

Key Mode:

Meter

Sponsored by the
Center for Computer Assisted Research

Kern Scores

A library of virtual musical scores in the Humdrum **kern data format.
Total holdings: 7,866,496 notes in 108,703 files.

search:
[browse](#) | [shortcuts](#) ☐ anchored

[A guided tour of the KernScores website](#) [Online Humdrum Editor](#)
[Recent additions to the KernScores library](#) [CCARH Humdrum Portal](#)
[Data Collection Highlights](#) [Contribute kern scores](#)

Composers

Adam	Chopin	Giovannelli	Lassus	Schubert
Alkan	Clementi	Grieg	Liszt	Schumann
J.S. Bach	Corelli	Haydn	MacDowell	Scriabin
Banchieri	Dufay	Himmel	Mendelssohn	Sinding
Beethoven	Dunstable	Hummel	Monteverdi	Sousa
Billings	Field	Isaac	Mozart	Turpin
Bossi	Flecha	Ives	Pachelbel	Scarlatti
		Joplin	Prokofiev	Vecchi
		Josquin	Ravel	Victoria
		Landini	Scarlatti	Vivaldi
				Weber

Genres

Motets	Scherzos	Symphonies
Preludes	Sonatas	Virelais
Ragtime	Sonatina	Waltzes
Quartets		

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No. Title (click title for more info.) ☒ Scores ☐ MIDI ☐ Voices

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0701	Missa Allez regretz I	S	4
0301	Missa Ave maris stella	S	4
0304	Missa Cum iocunditate	S	4(-5)
0302	Missa Da pacem	S	4
0303	Missa De beata virgine	S	4-5
0903	Missa Di dadi	S	4
0703	Missa D'ung aultre amer	S	4
0801	Missa Faisant regretz	S	4
0401	Missa Ferialis	S	4
0802	Missa Fortuna desperata	S	4
0402	Missa Gaudeamus	S	4
1101	Missa Hercules dux Ferrarie	S	4(-6)
0601	Missa L'homme armé quarti toni	S	4
0602	Missa L'homme armé sexti toni	S	4(-6)

SEARCH TOOLS

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[instructions](#)

ANALYSIS TOOLS

Repertory

Thematic index
 Vocal ranges
 Parallel octaves/fifths
 Measure-long rhythmic patterns
 Attacks per measure

JRP Analysis Tool: dissonant

dissonant jrp://Jos2721 | myank -m 10-15

**kern	**text	**kern	**text	**kern	**text
=10	=10	=10	=10	=10	=10
4A]	.	1.f	.	4cc]	.
4G>	T7	.	.	4b	.
4F	.	.	.	4a	.
4E<	T2	.	.	4g<	T-2
2D	.	.	.	2a	.
[2A	.	2e	.	[2cc	.

http://jrp.ccarh.org/data?a=dissonantpdf&f=Jos2721-La_Bernardina

10

T-2 T-2 T-2

C-2,S2

T7 T2 T7 T2 T4 T7,S7 S7

dissonant

dissonant h://371chorales/chor008.krn | extractx -i'**kern' | satb2gs | autostem | \
hum2muse | muse2ps =z14jv120,100 | pstopnm -dpi=300 | convert - -trim output.png

Freuet euch, ihr Christen alle

J.S. Bach

The image displays a musical score for a chorale by J.S. Bach, titled 'Freuet euch, ihr Christen alle'. The score is written for a four-part vocal ensemble (Soprano, Alto, Tenor, Bass) and a keyboard accompaniment (likely organ or harpsichord). The key signature is B-flat major (two flats), and the time signature is common time (C). The score is divided into three systems, with measures 7, 14, and 21 marked at the beginning of each system. The notation includes various musical symbols such as notes, rests, and accidentals. The notes are color-coded: green for the Soprano part, red for the Alto part, blue for the Tenor part, and black for the Bass part. The keyboard accompaniment is written in a grand staff (treble and bass clefs). The score is presented in a clean, professional layout with a white background and black text.

dissonant/abcm2ps

dissonant h://371chorales/chor008.krn | extractx -i'***kern' | satb2gs | autostem | hum2abc \
| abcm2ps -s 0.8 - -O - | pstopnm -dpi=300 | convert - -trim output.png

8. Freuet euch, ihr Christen alle

Johann Sebastian Bach

The image displays a musical score for the chorale "Freuet euch, ihr Christen alle" by Johann Sebastian Bach. The score is presented in five systems, each consisting of a treble and bass staff. The key signature is B-flat major (two flats), and the time signature is common time (C). The music is written in a style that includes dissonant annotations, with red and green circles highlighting specific notes. The first system starts with a treble staff and a bass staff. The second system is marked with a '5' above the treble staff. The third system is marked with a '9' above the treble staff. The fourth system is marked with a '13' above the treble staff. The fifth system is marked with a '17' above the treble staff. The score concludes with a double bar line and repeat dots.

dissonant/abcm2ps

dissonant h://371chorales/chor008.krn | extractx -i'***kern' | myank -m13-15 | satb2gs \
| hum2abc | abcm2ps - -O - | pstopnm -dpi=300 | convert - -trim output.png

8. Freuet euch, ihr Christen alle

Johann Sebastian Bach

13

4th below tenor
2nd below alto
2nd above soprano

=13	=13	=13	=13
8FFL	4c	4a-	4ff
8GG <>	.	.	.
8AA-	4c	4a-	4ff
8BB-J<>	.	.	.
8CL	4c	4g	4ee-X
8D ><	.	.	.
8E-	4c	4g	4ee-
8FJ<>	.	.	.

JRP Analysis Tool: parallel

<http://josquin.ccarh.org/data?composer=Joa&repertory=parallel>

```
for i in `seq -w 371`  
do  
    echo \!\\chorale $i  
    parallel -l h://371chorales/chor$i.krn  
done | less
```

```
parallel h://371chorales/chor008.krn | autostem | hum2muse | muse2ps =z6j \  
| pstopnm -dpi=300 | convert - -trim output.png
```

Freuet euch, ihr Christen alle

J.S. Bach

Soprano

Alto

Tenor

Bass

The image displays a musical score for a four-part setting of the chorale 'Freuet euch, ihr Christen alle' by J.S. Bach. The score is written for Soprano, Alto, Tenor, and Bass voices. It consists of two systems of staves. The first system shows the vocal entries and the beginning of the main melody. The second system continues the piece, featuring various musical notations including eighth and sixteenth notes, rests, and bar lines. The key signature is one flat (B-flat), and the time signature is common time (C). The score is presented in a clean, black-and-white format with some red markings on the original image, likely indicating specific notes or measures of interest.

satb2gs

parallel h://371chorales/chor008.krn | satb2gs | autostem | hum2muse \
| muse2ps =z14v120,120j | pstopnm -dpi=300 | convert - -trim output.png

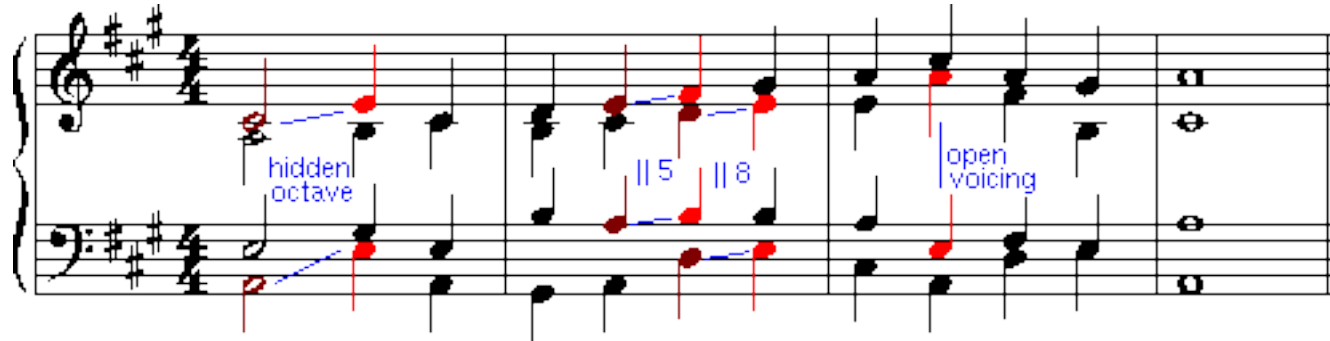
Freuet euch, ihr Christen alle

J.S. Bach

The image displays a musical score for the chorale 'Freuet euch, ihr Christen alle' by J.S. Bach, rendered in the SATB2GS format. The score is presented in three systems, each with a grand staff (treble and bass clefs) and a common time signature (C). The key signature is B-flat major (two flats). The first system contains measures 1 through 6. The second system, starting at measure 7, continues the piece. The third system, starting at measure 14, concludes the excerpt. The notation includes various musical symbols such as notes, rests, and bar lines. Some notes are highlighted in red, likely indicating specific melodic lines or chords. The overall layout is clean and professional, suitable for digital distribution or printing.

chorck

<http://extras.humdrum.org/man/chorck>



chorck h://371chorales/chor008.krn -w

- 3. Contrary parallel 5th between tenor and soprano on line 26
- 3. Contrary parallel 5th between tenor and soprano on line 40
- 3. Contrary parallel 5th between tenor and soprano on line 52
- 5. Hidden 5th between soprano and alto on line 54
- 5. Hidden 5th between soprano and bass on line 54
- 5. Hidden 5th between soprano and tenor on line 70
- 5. Hidden 5th between soprano and bass on line 70
- 5. Hidden 5th between soprano and tenor on line 85
- 8. Open spacing between alto and tenor on line 120
- 8. Open spacing between alto and tenor on line 121
- 3. Contrary parallel 5th between tenor and soprano on line 125
- 5. Hidden 5th between soprano and tenor on line 137
- 5. Hidden 5th between soprano and tenor on line 146
- 7. Voice crossing between tenor and bass on line 154
- 8. Open spacing between alto and tenor on line 154
- 7. Voice crossing between tenor and bass on line 155
- 8. Open spacing between alto and tenor on line 155