

Automatic Scoring-up of Mensural Parts

Martha E. Thomae, Julie E. Cumming, Ichiro Fujinaga

Digital Musicology Workshop

CIRMMT, McGill University

Montreal, April 27th, 2018

Dereu

Dereu

Manuscript page 10v from the Voynich manuscript. The page contains musical notation on staves and a large decorated initial 'B'. The text is written in the Voynich script.

The page features a large, ornate initial 'B' in the left margin, decorated with intricate patterns. The musical notation is written on staves, with notes and rests. The text is written in the Voynich script, with some words appearing to be 'Bass', '12 rue', 'elerson', 'Existe', 'elerson', '12 rue', 'Atterium caput', 'Declaratio tenorem', 'ordinamson', and 'et sic p totam missam'.



10

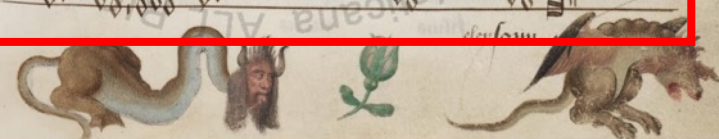
Vrie

clerfom

clerfom

Vrie

clerfom



Motivation

- The purpose of this project is to take all the notes from each of the mensural parts (i.e., voices) and line them up automatically, in order to present the piece in score format, a process that we refer to as “scoring up”
- To facilitate counterpoint studies (this is, the study of the relation between the voices)

Deus hem

vrie

elerfom *Criste*

elerfom *K vrie*

elerfom

Bass *vrie* *elerfom* *Criste*

elerfom *K vrie*

*Alicum caput Deandis tenorem
promission et sic p totam missam.*

12

Bass

vrie

clerfon

cryste

clerfon

vrie

Aterum caput. Delcandis tenorem
 p. vrie. et sic p. totam missam.

clerfo m

Asterium caput. Ascendit tenorem
ordinatam et sic p totam missam.



This manuscript page, folio 10v, contains two systems of musical notation. Each system begins with a large, ornate initial: 'Vont' in the first system and 'Ven' in the second. The notation consists of square neumes on a four-line staff, with various rhythmic markings above the notes. The lyrics, written in a script that appears to be a form of Old English or Old Norse, include 'vrie', 'clerfon', 'Criste', and 'clerfom'. The page is decorated with several illustrations: a small figure in a pointed hat and armor in the upper right; a three-lobed leaf and a small flower; a large, ornate incense burner or censer in the lower right; and two mythical creatures at the bottom, a dragon-like beast on the left and a winged dragon on the right.

10

Vrie

eysen Criste

eysen

Vrie

eysen



Mensural Notation

- There is a clear hierarchy in the note duration

longest
↓
shortest

Notes		Values	
Name	Shape	Perfect	Imperfect
Maxima	☐	☐ ☐ ☐	☐ ☐
Long	☐	◊ ◊ ◊	◊ ◊
Breve	◊	⋈ ⋈ ⋈	⋈ ⋈
Semibreve	⋈	⋈ ⋈ ⋈	⋈ ⋈

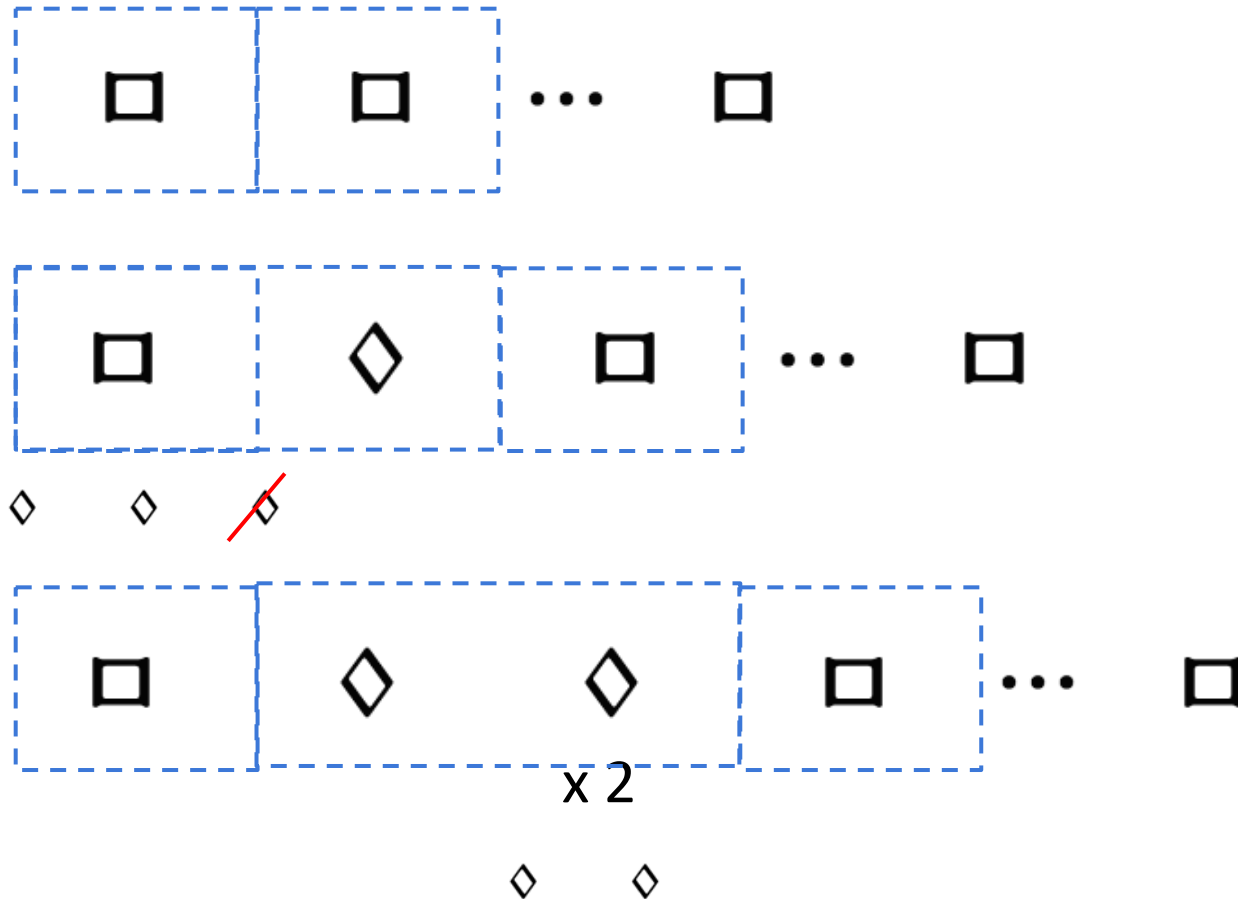
Mensuration

Establishes the relation between the note values (“perfect” or “imperfect”)

In perfect mensurations, the duration of the individual note symbols is not absolute, but rather depends on context

Examples of Context Changing the Note's Value

Mensuration: Breve = 3 → Breves are perfect by default



*Principles of
Imperfection
and Alteration*

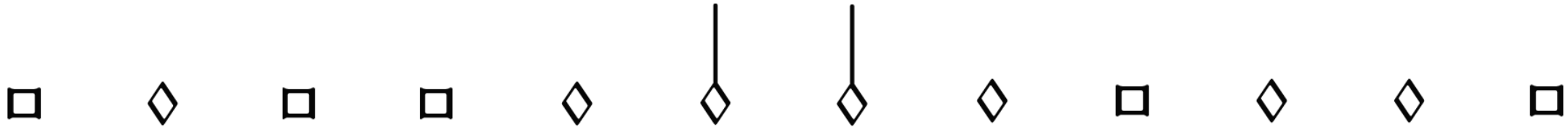
Imperfection

Perfect → Imperfect

Alteration

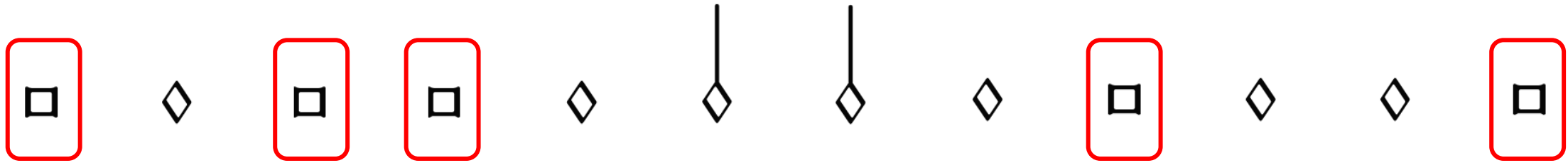
Algorithm

Mensuration: Breve = 3 \rightarrow Breves are perfect by default



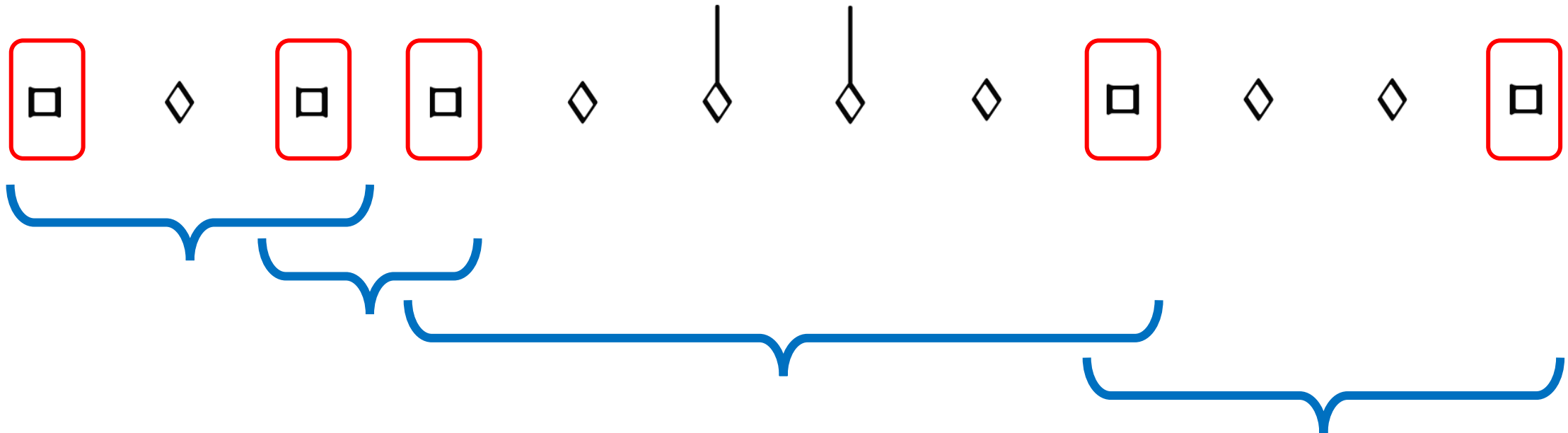
Algorithm

Mensuration: Breve = 3 \rightarrow Breves are perfect by default

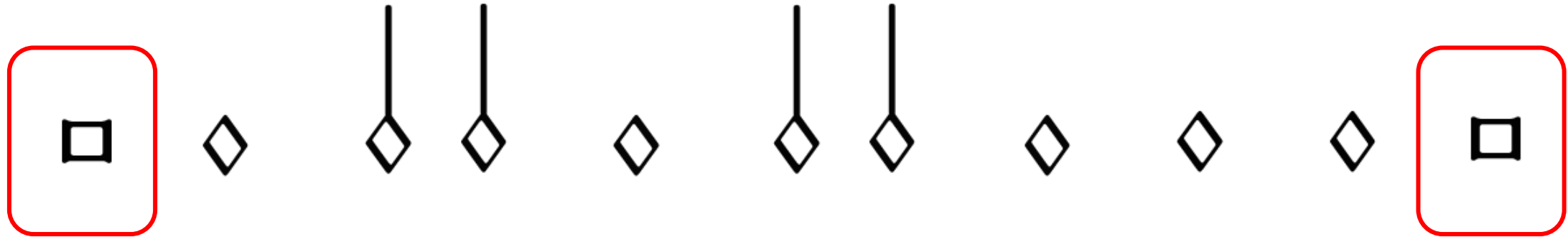


Algorithm

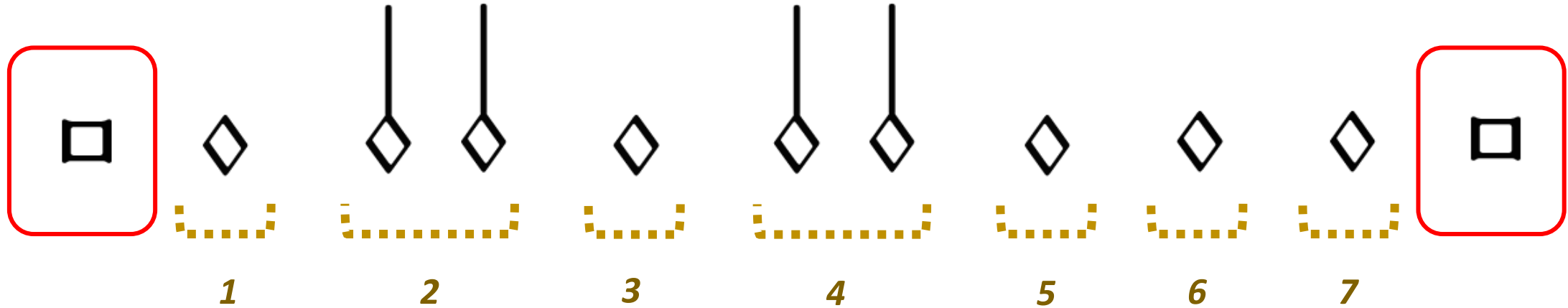
Mensuration: Breve = 3 \rightarrow Breves are perfect by default



Example: (sequence bounded by breves)

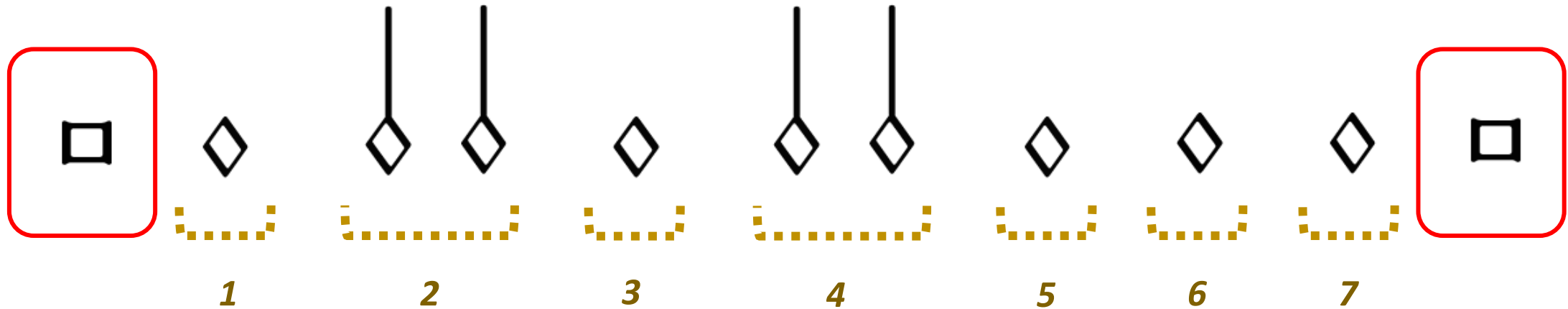


Example: (sequence bounded by breves)



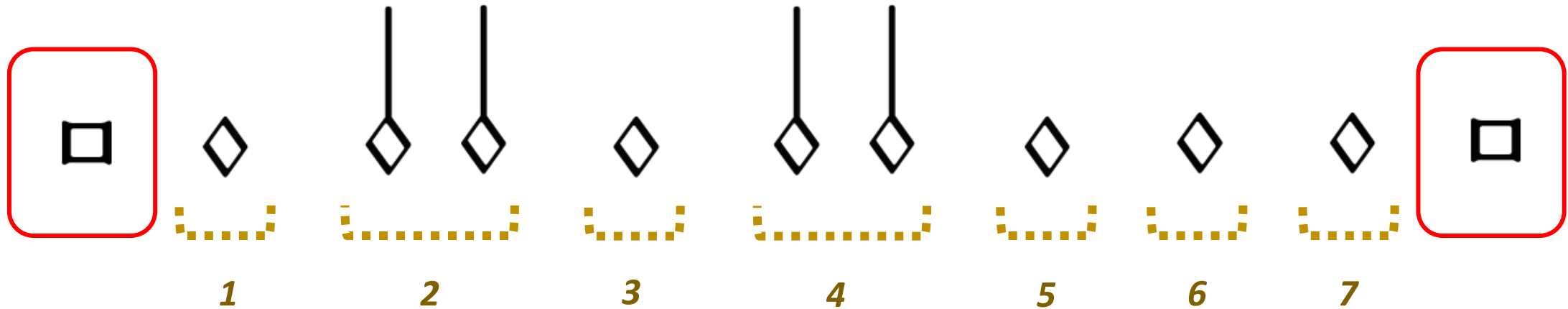
7 semibreves

Example: (sequence bounded by breves)



7 semibreves = Two groups of 3 semibreves + 1

Example: (sequence bounded by breves)



7 semibreves

=

Two groups of 3 semibreves

+

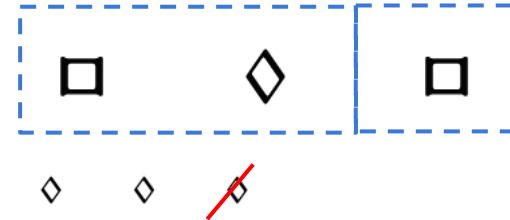
1

Number N of semibreves between the boundaries	Number P of perfect groups of semibreves	General Interpretation	Alternative Interpretation
$N = 3P + 1$	$P \geq 0$	Imperfection a.p.p.	Imperfection a.p.a.
$N = 3P + 2$	$P = 0$	Alteration	Imperfection a.p.p. & Imperfection a.p.a.
	$P > 0$	Imperfection a.p.p. & Imperfection a.p.a.	Alteration
$N = 3P$	$P = 0$	-	-
	$P = 1$		Imperfection a.p.p. & Alteration
	$P > 1$	Imperfection a.p.p. & Alteration	-

Number N of semibreves between the boundaries	Number P of perfect groups of semibreves	General Interpretation	Alternative Interpretation
$N = 3P + 1$	$P \geq 0$	Imperfection a.p.p.	Imperfection a.p.a.
$N = 3P + 2$	$P = 0$	Alteration	Imperfection a.p.p. & Imperfection a.p.a.
	$P > 0$	Imperfection a.p.p. & Imperfection a.p.a.	Alteration
$N = 3P$	$P = 0$	-	-
	$P = 1$		Imperfection a.p.p. & Alteration
	$P > 1$	Imperfection a.p.p. & Alteration	-



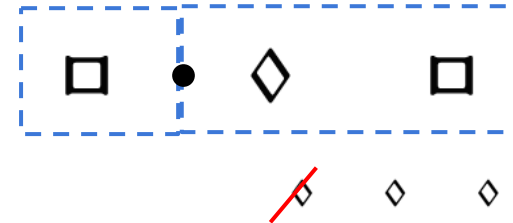
Number N of semibreves between the boundaries	Number P of perfect groups of semibreves	General Interpretation	Alternative Interpretation
$N = 3P + 1$	$P \geq 0$	Imperfection a.p.p.	Imperfection a.p.a.
$N = 3P + 2$	$P = 0$	Alteration	Imperfection a.p.p. & Imperfection a.p.a.
	$P > 0$	Imperfection a.p.p. & Imperfection a.p.a.	Alteration
$N = 3P$	$P = 0$	-	-
	$P = 1$		Imperfection a.p.p. & Alteration
	$P > 1$	Imperfection a.p.p. & Alteration	-



Number N of semibreves between the boundaries	Number P of perfect groups of semibreves	General Interpretation	Alternative Interpretation
$N = 3P + 1$	$P \geq 0$	Imperfection a.p.p.	Imperfection a.p.a.
$N = 3P + 2$	$P = 0$	Alteration	Imperfection a.p.p. & Imperfection a.p.a.
	$P > 0$	Imperfection a.p.p. & Imperfection a.p.a.	Alteration
$N = 3P$	$P = 0$	-	-
	$P = 1$		Imperfection a.p.p. & Alteration
	$P > 1$	Imperfection a.p.p. & Alteration	-



Number N of semibreves between the boundaries	Number P of perfect groups of semibreves	General Interpretation	Alternative Interpretation
$N = 3P + 1$	$P \geq 0$	Imperfection a.p.p.	Imperfection a.p.a.
$N = 3P + 2$	$P = 0$	Alteration	Imperfection a.p.p. & Imperfection a.p.a.
	$P > 0$	Imperfection a.p.p. & Imperfection a.p.a.	Alteration
$N = 3P$	$P = 0$	-	-
	$P = 1$		Imperfection a.p.p. & Alteration
	$P > 1$	Imperfection a.p.p. & Alteration	-



Scoring-up tool

- Deals with the context-dependent nature of mensural notation
 - By implementing the “principles of imperfection and alteration”
- Deals with other non-context related features:

- Dots of Augmentation



When?

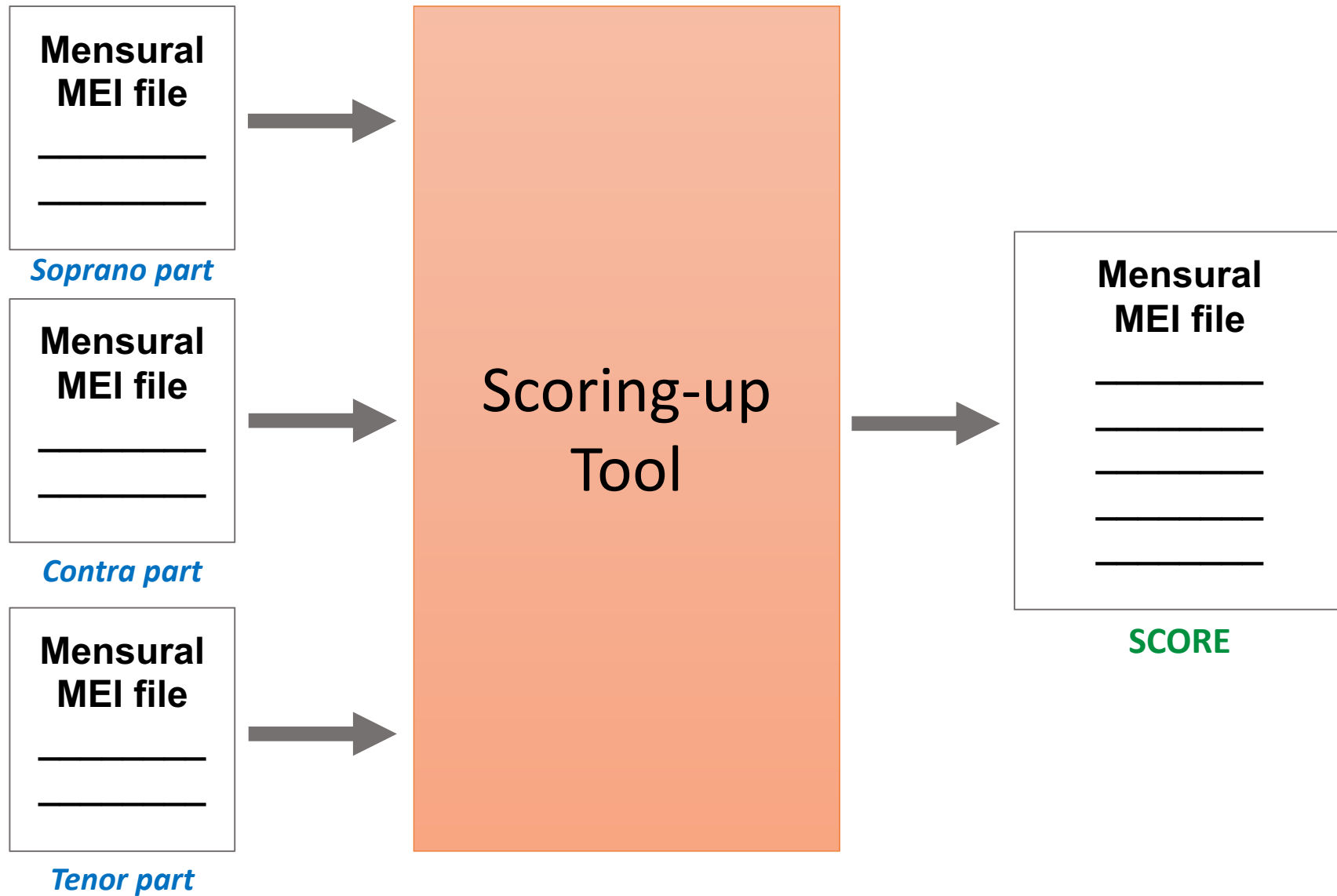
Distinguish between “dots of division”
and “dots of augmentation”

- Coloration



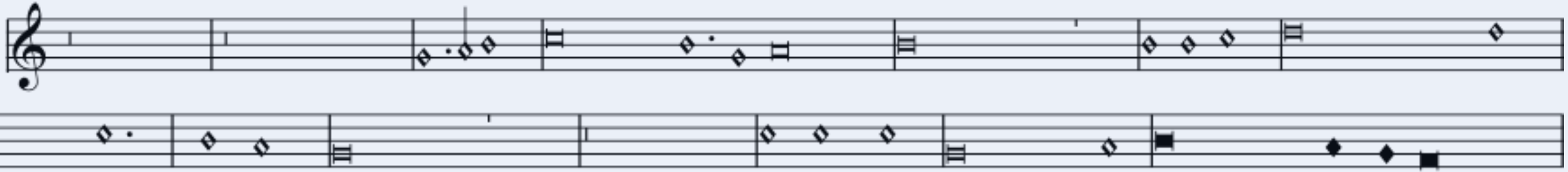
When does coloration affect the note value?

Scoring-up tool



Example: Parts

Superius



Tenor



Contratenor



Without using the Scoring-up Tool

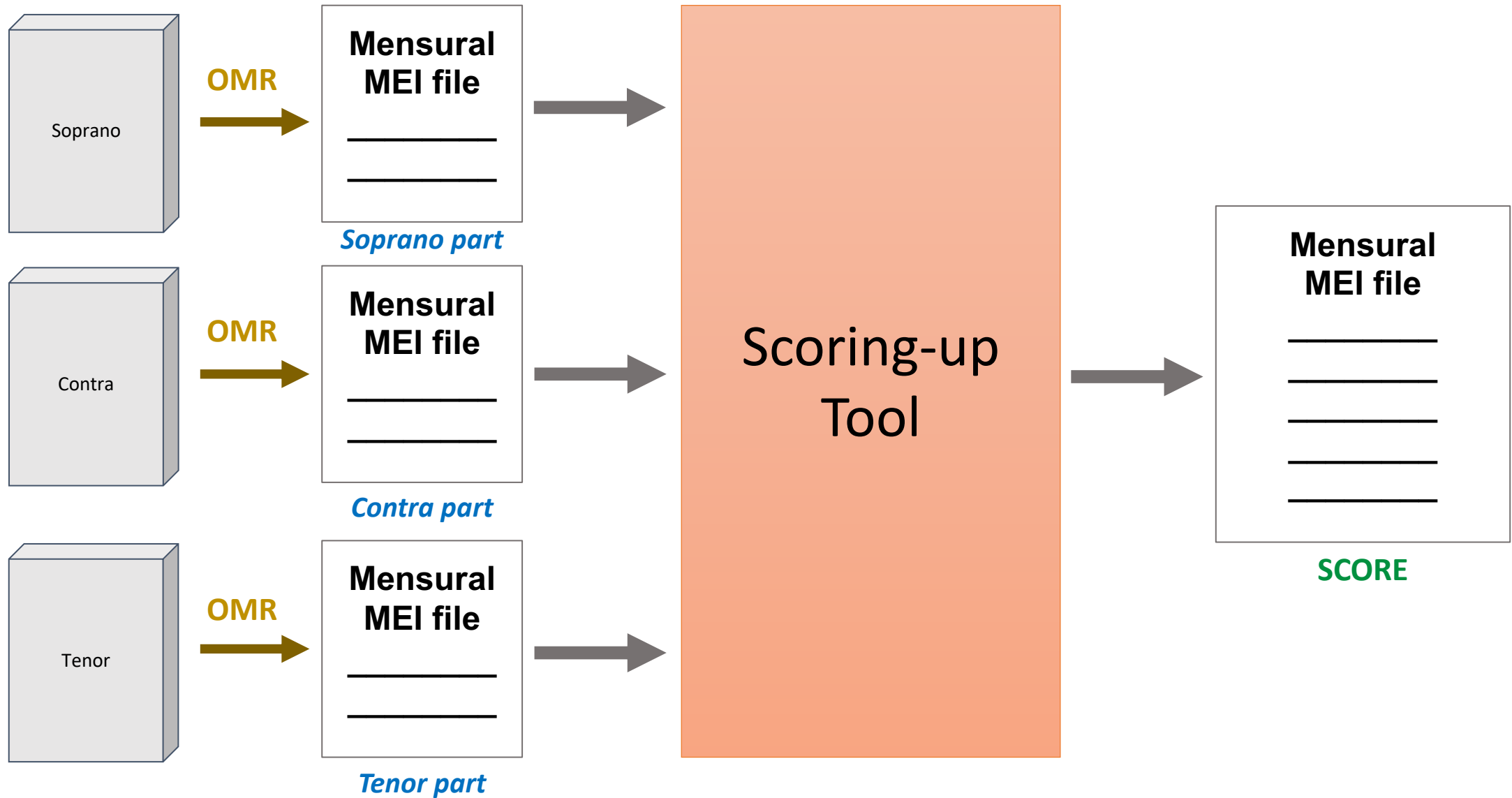
The image displays a musical score for three voices: Superius, Tenor, and Contratenor. The score is written on three staves, each with a treble clef and a key signature of one sharp (F#). The Superius part is the top staff, the Tenor part is the middle staff, and the Contratenor part is the bottom staff. The score is divided into measures by vertical red lines. The notes are represented by diamond shapes, and rests are indicated by vertical lines. The Tenor and Contratenor parts have an '8' below the staff, indicating an octave shift. The score is complex, with many notes and rests, and some notes are marked with a '1' or '2' above them, possibly indicating fingerings or specific notes. The overall layout is clean and professional, with a clear distinction between the three parts.

With the Scoring-up Tool

A musical score for three voices: Superius, Tenor, and Contratenor. The score is written on three staves, each with a treble clef and a key signature of one flat (B-flat). The Superius part is on the top staff, the Tenor part is on the middle staff, and the Contratenor part is on the bottom staff. The score is divided into measures by vertical red lines. The notes are represented by diamond shapes, and there are various accidentals (sharps, flats, and naturals) throughout the score. The Tenor and Contratenor parts have an octave sign (8) below the first few notes, indicating they are written an octave lower than the Superius part. The score is presented in a clean, minimalist style with a white background and black notation.

Conclusions

- The scoring-up tool presents the piece in score format
- Facilitates visualizing the vertical sonorities and studying the relation between the voices of a piece, which was difficult given the separate-parts layout of the original sources
- Preserves the original note values



Thank you!

SIMSSA | Single Interface for Music
Score Searching and Analysis



Social Sciences and Humanities
Research Council of Canada

Conseil de recherches en
sciences humaines du Canada



Canada



McGill



Schulich School of Music
École de musique Schulich

DDMAL

DISTRIBUTED DIGITAL MUSIC
ARCHIVES & LIBRARIES LAB



Centre for Interdisciplinary Research
in Music Media and Technology

Fonds de recherche
Société et culture

Québec

