

# *Musical Dice Game - Rondo I*

*based on*

*L'art de composer de la musique sans en connaître les  
éléments 2nd Ed. (1802)*

*by Antonio Callegari*

*compiled by I. T. Author*

*Cinquième  
CAHIER  
Série I  
POUR  
Les Vers de Sept Sylabes  
et avec laquelle on peut former des rondeaux  
à la polonoise.*

*Table pour la première partie des Rondeaux.*

	I	II	III	IV	V	VI	VII	VIII	IX	X	XI	XII
2	29	29	170	307	272		88	288	185	73	113	53
3	68	303	206	83	244	35	246	48	43	180	248	62
4	303	210		237	238	78	209	261	238	294	250	22
5	308	218	204	283	210	48	57		2	165	91	20
6	46	246	169	173	268	36	274	269	238	204	72	24
7	232	145	136	304	228	66	60	77	233	167	44	164
8	195	217	104	206	141	216	235	86	279	224	188	186
9	73	14	160	233	297	243	47	64	86	10	149	106
10	58	63	236	650	127	105	153	203	97	90	123	89
11	49	30	142	306	171	137	42	81	3	245	263	96
12	54	203	94	13	302	15	83	144	99	135	65	82

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# 1 Introduction<sup>1</sup>

“L’ART de Composer de la Musique  
Sans en Connaître les Éléments -  
Cinquième CAHIER Serial POUR  
Les Vers de Sept Sylabes et  
avec la quelle on peut former  
des rondeaux a la polonaise. Allegro.”

“The Art of Composing Music  
Without Knowledge of the Elements -  
Fifth Serial NOTEBOOK FOR  
Seven Syllable Verses and  
with which one can form  
rondeaus in the Polish style. Allegro.”

Thus run the French title and corresponding English translation of the Musical Dice Game (MDG) invented by Antonio Callegari (also Calegari). Rightly and interestingly so, as the Rules provided in the fifth notebook of the published work allow a non-professional musician to generate (“compose”) nearly 453.6 duodecillions ( $10^{39}$ ) of unique MDG rondos. More precisely, the total number of rondos that the rules of the *L’Art - 5th Cahier*, as we would refer to this MDG from here onward, yield is:

$$11^{32} = 452,592,555,681,759,518,058,893,560,348,969,204,658,401.$$

A *Musikalisches Würfelspiel* (German for “musical dice game” or MDG) is a system for randomly “generating” (e.g., by using a die or two dice) musical compositions from precomposed options and was quite popular throughout Western Europe in the 18th century. The earliest known MDG is Johann Philipp Kirnberger’s *Der allezeit fertige Polonoisen- und Menuettencomponist* (1st ed. 1757; rev. 2nd ed. 1783) (translated from German as “The Ever-Ready Minuet and Polonaise Composer”). Other well-known composers that are known to have composed a MDG are C.P.E. Bach (*Einfall, einen doppelten Contrapunct in der Octave von sechs Tacten zu machen, ohne die Regeln davon zu wissen* (1758); translated from German as “A method for making six bars of double counterpoint at the octave without knowing the rules”), Abbé Maximillian Stadler (*Table pour composer des minuets et des Trios à la infinie; avec deux dez à jouer* (1780); translated from French as “A table for composing minuets and trios to infinity, by playing with two dice”), the latter MDG being also attributed to Franz Joseph Haydn.

Probably the most famous of MDGs is *Musikalisches Würfelspiel K. 516f* (1787). This MDG was first published by J.J. Hummel in 1793 in Berlin and was republished in 1796 by Nikolaus Simrock in Bonn (as K. 294d or K. Anh. C 30.01). Simrock attributed this work to Wolfgang Amadeus Mozart. It is also known under the title of *Anleitung zum Componieren von Walzern so viele man will vermittelst zweier Würfel, ohne etwas von der Musik oder Composition zu verstehen* (German for “Instructions for the composition of as many waltzes as one desires with two dice, without understanding anything about music or composition”) and may have been based on Mozart’s manuscript *K. 516f*, written in 1787, consisting of numerous two-bar fragments of music, that appear to be some kind of game or system for constructing music out of two-bar fragments, but contains no instructions nor hints as to the use of dice. An [online article](#) by Hideo Noguchi offers a possible explanation for this attribution.

For this book, we generate MDG rondos based on the rules given in the second edition of *L’Art - 5th Cahier*. The first edition of this work was published in 1801 under the title *Gioco Pitagorico Musicale, col quale potrà ognuro, anco senza sapere di musica, formarsi una serie quasi infinita di picciole ariette, e duettini, per il tutto coll’accompagnamento del piano forte, o arpa, o altri strumenti* (English translation: *Game of Pythagorean Music, with which anyone, even without knowing music, can compose an almost endless series of small songs and little duets, all with the accompaniment of the pianoforte, or harp, and other instruments*) and contained five different MDGs. The twenty (20) MDG rondos given toward the latter part of this book were generated according to the rules given in *L’Art - 5th Cahier*. The scores of these generated rondos were initially written using the abc environment of Chris Walshaw, then converted to Scalar Vector Graphics (SVG) images (with corresponding MIDIs) using abcm2ps and abcmidi, and then pre-processed with Inkscape to be included in L<sup>A</sup>T<sub>E</sub>X to produce this book.

<sup>1</sup>The information contained in the introduction were culled from the following online resources: [Callegari, Antonio](#), Wikipedia: *Musikalisches Würfelspiel* (2017), <https://opus-infinity.org/>, and [Mozart’s Melody Machine](#) (Peterson, 2001)

## 2 *L'Art - 5th Cahier*

### 2.1 Rules

The Rules provided in *L'Art - 5th Cahier* generate rondos almost always consisting of 76 bars/measures (rarely of 74 or 75 bars) that may be divided into four parts (the fourth part is optional), these parts being also called arias, and a refrain. Each of the first three arias contains eight bars (sometimes, but rarely, the first and second part may have only seven bars). The optional fourth part contains 12 (or 11) bars — the eight (or seven) bars of either the second or third part with four additional bars. The first part with a *ritornello* of four measures form the 12-bar (or 11-bar) refrain. The complete rondo is played by first playing the refrain with repeat, then for each part after the first, playing the part with refrain and repeat. All told, a total of  $76 \times 2 = 152$  of music is almost always played (rarely, a total of 148 or 150 bars).

The notes for each bar of the rondo are determined by rolling two ordinary six-sided dice 32 times and using the four Tables of Measure Numbers (three tables for the arias and one table for the *ritornellos*) and two Tables of Measures (one for the arias and one for the *ritornellos*) that will be given later.

The following Rules may be followed for generating each rondo (not exactly the same as given in the *L'Art - 5th Cahier*):

1. For the refrain consisting of eight bars of the first part and four bars of the *ritornello*, toss two dice 12 times, then obtain the sum of numbers on the upturned faces (the possible outcomes for each toss are thus from the set  $\{2, 3, 4, \dots, 10, 11, 12\}$ ).
2. The notes for the eight bars for the first part are obtained based on the outcomes of the first eight 2-dice tosses from Step 1. The notes for each bar to be constructed are obtained by first determining the measure number from Table for Measure Numbers 1 (Table 1) corresponding to the number of the bar to be constructed and the toss outcome. The notes corresponding to the bar number obtained from Table for Measure Numbers are then obtained from the Table for Measures (Tables 1 to 13; see also section 2.3 for more details)).

For example, suppose the first 2-dice toss comes up a 2. The Table for Measure Numbers 1 (Table 1) shows that the bar number to be used for the first measure corresponding to an outcome of 2 is 19. We then obtain the notes for bar 19 from the Table for Measures (Table 2.3) for creating the bar 1 of the first part of this rondo. Thus, if the first two-dice outcome is a 2, the Chant Superieur, Chant Inferieur, and G-clef and F-clef notes for the accompaniment (pianoforte or harp), for the first bar of the part of the first part of the rondo that is being constructed are: AF2 f/e/ d/c/ B/A/, AF2 f/e/ d/c/ B/A/, z[FAc] [FAc] [FAc] [FAc], and [F,,F,]2z2z2 (in abc notation), respectively.

3. Next, one determines the notes for the four bars of the *ritornello* based on the remaining four two-dice tosses from Step 1. Procedures similar to those in Step 2. are undertaken using the Table for Measure Numbers - *Ritornello* (Table 4) and the Tables for Measures - *Ritornello* (Tables 14 to 16).
4. The notes for the eight bars of each of the second and third parts are obtained in a manner similar to Steps 1 and 2 based on the outcomes of eight two-dice tosses for each of these two parts. Note the refrain is played after each of these parts is played. Also, each of this part with the refrain is played with repeat.
5. For the optional fourth part, use the notes of either the second or third part and add four more bars (we will use the notes of the second part for the rondos here). The notes for these latter four bars are obtained by using four additional two-dice tosses, then using the last four columns of Table for Measure Numbers 1 (Table 1) to find the corresponding bars in the Table for Measures (Table 2.3). This fourth part with the refrain is played with a repeat.

6. If we name the four parts of the rondo as systems A, B, C, and D, the *ritornello* as system R, so that the refrain would be system AR, then the entire rondo is played as (AR)2.(BAR)2.(CAR)2.(BDAR)2 or AR.AR.BAR.BAR.CAR.CAR.BDAR.BDAR.

## 2.2 Table for finding Measure Number from Table of Measure Numbers

The tables given here (Tables 1 to 4) are from *L'Art - 5th Cahier*. The leftmost column contains the possible two-dice toss outcomes (which are precisely the integers from 2 to 12 as we are tossing two ordinary six-sided dice) while the topmost row contains the bar numbers ( $12 + 8 + 8 + 4 = 32$  in all) for the MDG rondo to be generated—8 bars each for the first, second, and third parts, 4 bars for the *ritornello*, and the last 4 bars for the optional fourth part.

The bodies of the three tables for arias: Table 1 to 3, include 302 measure numbers, six bar numbers short of the total number of measures that appear in the Table of Measures for the arias (Figures 1 to 13). Bar numbers 31, 32, 131, 132, 191, and 291 from the Table of Measures - Ariettas do not appear in the Table of Measure Numbers.

The body of the table for *ritornellos* (Table 4) contain  $11 \times 4 = 44$  bar numbers and this is exactly equal to the number of measures in the Table of Measures - *Ritornellos* (Tables 14 to 16).

Since 32 two-dice tosses determine a unique sequence of 32 bars for a rondo, then the total number of rondos that can be constructed based on the *L'Art - 5th Cahier - Ariettas* Rules in Section 2.1 is

$$11^{32} = 452,592,555,681,759,518,058,893,560,348,969,204,658,401 \approx 452.6 \text{ duodecillions.}$$

Table of Measure Numbers 1 (for Part A/Part D)

	1	2	3	4	5	6	7	8	9	10	11	12		
D	2	19	79	176	307	272		88	138	185	73	118	52	
i	3	68	303	206	83	244	35	246	48	43	130	248	62	
c	4	305	219		257	251	78	299	261	258	294	250	22	
e	1	5	308	218	201	283	210	42	57		2	165	91	211
+	6	46	240	169	173	268	36	271	259	238	204	72	24	
D	7	252	145	134	304	228	66	60	77	253	161	44	164	
i	8	195	217	104	216	141	214	235	84	279	224	188	186	
c	9	75	14	160	213	297	243	47	64	86	10	149	106	
e	10	58	63	156	150	127	105	153	233	96	90	125	89	
2	11	49	50	142	306	171	137	41	81	3	245	263	116	
	12	54	205	94	13	302	15	85	144	99	135	65	82	

Table 1: This Table of Measure Numbers gives the measure number to be looked-up in the Table of Measures for Arias (see Figures 1 to 9 in Section 2.3) corresponding to each of the two-dice outcome per bar for the eight bars of the first part (Part A) of the rondo and the last four bars of the optional fourth part (Part D).

Table of Measure Numbers 2 (for Part B)

		1	2	3	4	5	6	7	8
D	2	11	9	12	200	17	133	107	40
i	3	212	225	20	182	55	114	110	93
c	4	34	152	67	199	276	296	262	37
e	5	220	154	236	227	300	180	198	168
1	6	23	231	179	301	289	232	5	177
+	7	119	285		18	163	196	92	117
D	8	223	229	288	241		166	140	189
i	9	136	270	290	28	146	98	222	274
c	10	267	120	265	247	95	167	76	295
e	11	155	178	293	1	183	87	124	115
2	12	256	102	226		292	8	264	260

Table 2: This Table of Measure Numbers gives the measure number to be looked-up in the Table of Measures for Arias (see Figures 1 to 9 in Section 2.3) corresponding to each of the two-dice outcome per bar for the eight bars of the second part (Part B) of the rondo.

Table of Measure Numbers 3 (for Part C)

		1	2	3	4	5	6	7	8
D	2	111	275	21	6	71	70	242	38
i	3	207	112	203	221	126	97	249	143
c	4	187	280	175	172	51	147	284	27
e	5	281	103	184	215	159	45	266	33
1	6	181	239	59	254	148	298	129	278
+	7	4	53	162	194	56	16	230	25
D	8	39	269	237	128	234	123	282	151
i	9	29	157	202	286	74	209	287	170
c	10	100	208	158	122	197	255	273	30
e	11	101	108	139	277	26	193	113	109
2	12	190	174	61	192	7	121	69	80

Table 3: This Table of Measure Numbers gives the measure number to be looked-up in the Table of Measures for Arias (see Figures 1 to 9 in Section 2.3) corresponding to each of the two-dice outcome per bar for the eight bars of the second part (Part C) of the rondo.

Measure Numbers for

*Ritornellos*

		1	2	3	4
D	2	10	15	21	12
i	3	4	9	16	30
c	4	22	31	33	42
e	5	27	41	1	37
1	6	26	40	43	17
+	7	18	2	11	28
D	8	23	19	25	36
i	9	44	7	35	38
c	10	6	24	3	29
e	11	5	20	34	14
2	12	13	8	32	39

Table 4: This Table of Measure Numbers gives the measure number to be looked-up in the Table of Measures for *Ritornellos* (see Figures 10 to 12 in Section 2.3) corresponding to each of the two-dice outcome per bar for the last four bars of the optional fourth part (Part D) of the rondo.

### 2.3 Table of Measures

The Table of Measures for *L'Art - 5th Cahier - Ariettas* are given in Figures 1 to 13 that follow while the Table of Measures for *L'Art - 5th Cahier - Ritornellos* are given in Figures 14, 15, and Figures 16. These are all based but not exactly identical to those that are given in Antonio Calegaris's *L'Art - 5th Cahier*.

#### Calegari Ariettas

[from [https://s9.imslp.org/files/imglnks/usimg/6/63/IMSLP653334-PMLP1047762-L'Art\\_de\\_composer\\_de\\_la\\_-...-Calegari\\_Antonio\\_bpt6k9617931c.pdf](https://s9.imslp.org/files/imglnks/usimg/6/63/IMSLP653334-PMLP1047762-L'Art_de_composer_de_la_-...-Calegari_Antonio_bpt6k9617931c.pdf)]

*Antonio Calegari*

A musical score for four voices (Soprano, Alto, Tenor, Bass) and basso continuo. The tempo is  $\text{♩} = 120$ . The score consists of 24 numbered measures. The vocal parts are in soprano, alto, tenor, and bass. The basso continuo part is shown at the bottom. The score includes various time signatures and dynamic markings.

Figure 1: Table of Measures - Ariettas (Page 1/13)

25 26 27 28 29 30 31 32

33 34 35 36 37 38 39 40

41 42 43

44 45 46 47 48

Figure 2: Table of Measures - Ariettas (Page 2/13)

A musical score for a string quartet (two violins, viola, cello) and piano. The score consists of five systems of music, each containing four measures. The key signature is mostly B-flat major (two flats), with some changes in measure 59 and 69. The time signature varies between common time (4/4) and 3/4. Measure numbers are indicated above the staff in each system.

**Measures 49-56:** The first violin plays eighth-note patterns, while the other three instruments provide harmonic support with sustained notes and chords.

**Measures 57-64:** The first violin continues its eighth-note patterns, and the piano provides harmonic support with sustained notes and chords.

**Measures 65-72:** The first violin plays eighth-note patterns, and the piano provides harmonic support with sustained notes and chords.

Figure 3: Table of Measures - Ariettas (Page 3/13)

Musical score for Ariettas, showing measures 73 through 96. The score consists of four staves: Violin (top), Viola, Cello, and Double Bass (bottom). The music is in common time, with various key signatures (F major, G major, A major, D major) indicated by sharps and flats. Measures 73-76 feature sixteenth-note patterns in the upper voices. Measures 77-80 show eighth-note patterns. Measures 81-84 continue the sixteenth-note patterns. Measures 85-88 introduce eighth-note patterns. Measures 89-96 conclude the section with sixteenth-note patterns.

Figure 4: Table of Measures - Ariettas (Page 4/13)

97

98

99

100

101

102

103

104

105

106

107

108

109

110

111

112

Figure 5: Table of Measures - Ariettas (Page 5/13)

The musical score displays a sequence of measures from a piece titled "Ariettas". The score is arranged for four instruments: basso continuo, violoncello, viola, and cello/bass. The measures are numbered sequentially from 113 to 144. The instrumentation includes a harpsichord or organ part (basso continuo) providing harmonic support, and three bowed string instruments (cello, viola, and bass). The music features a variety of rhythmic patterns, primarily based on eighth and sixteenth notes, often grouped into triplets. Time signatures change frequently, notably from 3/4 to 2/4. Measure 113 begins with a complex sixteenth-note pattern in the basso continuo. Measures 114-116 show eighth-note patterns. Measures 117-118 return to sixteenth-note patterns. Measures 119-120 continue with eighth-note patterns. Measures 121-123 introduce a new rhythmic pattern. Measures 124-125 show a transition to a more sustained eighth-note pattern. Measures 126-127 continue this pattern. Measures 128-129 show a return to sixteenth-note patterns. Measures 130-131 show eighth-note patterns. Measures 132-133 show sixteenth-note patterns. Measures 134-135 show eighth-note patterns. Measures 136-137 show sixteenth-note patterns. Measures 138-139 show eighth-note patterns. Measures 140-141 show sixteenth-note patterns. Measures 142-143 show eighth-note patterns. Measures 144 concludes the section.

Figure 6: Table of Measures - Ariettas (Page 6/13)

The musical score displays a sequence of measures from a piece titled "Ariettas". The score is arranged for four instruments: Bassoon, Trombone, Violin, and Cello/Bass. The measures shown are numbered 145 through 168. The instrumentation is as follows:

- Bassoon:** Measures 145-152, 153-155, 156-159, 161-163, 165-167.
- Trombone:** Measures 145-152, 153-155, 156-159, 161-163, 165-167.
- Violin:** Measures 145-152, 153-155, 156-159, 161-163, 165-167.
- Cello/Bass:** Measures 145-152, 153-155, 156-159, 161-163, 164-168.

The score features complex rhythmic patterns, including sixteenth-note figures and eighth-note chords. Time signatures vary throughout the measures, notably including 5/8 in measures 151-152 and 164-168. Dynamics such as forte, piano, and accents are used to emphasize specific notes and phrasing.

Figure 7: Table of Measures - Ariettas (Page 7/13)

Musical score for Ariettas, showing measures 169 through 200. The score is for three voices (Soprano, Alto, Bass) and includes a piano part. The score shows a mix of 3/4 and 2/4 time signatures, with measure 176 marking a transition from 3/4 to 2/4. Measures 185-192 show a transition back to 3/4 time.

Figure 8: Table of Measures - Ariettas (Page 8/13)

201      202      203      204

205      206      207      208

209      210      211      212      213      214      215      216

217      218      219

Figure 9: Table of Measures - Ariettas (Page 9/13)

A musical score page showing measures 220 through 248. The score consists of four staves (string instruments). Measure numbers are placed above the staves. Measure 220 starts with a dynamic  $\text{f}$ . Measures 221-224 show various rhythmic patterns. Measures 225-232 feature sixteenth-note patterns. Measures 233-240 show eighth-note patterns. Measures 241-248 continue the sixteenth-note patterns from the previous section.

Figure 10: Table of Measures - Ariettas (Page 10/13)

Musical score for Ariettas, showing measures 249 to 264. The score consists of four staves: Violin (top), Viola, Cello, and Double Bass (bottom). The music is in common time, with various key changes indicated by sharps and flats.

Measure 249: Violin plays sixteenth-note patterns. Viola and Cello provide harmonic support. Double Bass provides bassline.

Measure 250: Violin continues sixteenth-note patterns. Viola and Cello provide harmonic support. Double Bass provides bassline.

Measure 251: Violin continues sixteenth-note patterns. Viola and Cello provide harmonic support. Double Bass provides bassline.

Measure 252: Violin continues sixteenth-note patterns. Viola and Cello provide harmonic support. Double Bass provides bassline.

Measure 253: Violin starts in G major (no sharps or flats) and moves to A major (one sharp). Viola and Cello provide harmonic support. Double Bass provides bassline.

Measure 254: Violin continues in A major. Viola and Cello provide harmonic support. Double Bass provides bassline.

Measure 255: Violin continues in A major. Viola and Cello provide harmonic support. Double Bass provides bassline.

Measure 256: Violin continues in A major. Viola and Cello provide harmonic support. Double Bass provides bassline.

Measure 257: Violin continues in A major. Viola and Cello provide harmonic support. Double Bass provides bassline.

Measure 258: Violin continues in A major. Viola and Cello provide harmonic support. Double Bass provides bassline.

Measure 259: Violin continues in A major. Viola and Cello provide harmonic support. Double Bass provides bassline.

Measure 260: Violin starts in E major (two sharps). Viola and Cello provide harmonic support. Double Bass provides bassline.

Measure 261: Violin continues in E major. Viola and Cello provide harmonic support. Double Bass provides bassline.

Measure 262: Violin continues in E major. Viola and Cello provide harmonic support. Double Bass provides bassline.

Measure 263: Violin continues in E major. Viola and Cello provide harmonic support. Double Bass provides bassline.

Measure 264: Violin continues in E major. Viola and Cello provide harmonic support. Double Bass provides bassline.

Figure 11: Table of Measures - Ariettas (Page11/13)

265 266 267 268 269 270 271 272

273 274 275 276 277 278 279 280

281 282 283 284 285 286 287 288

289 290 291 292 293 294 295 296

Figure 12: Table of Measures - Ariettas (Page 12/13)



Figure 13: Table of Measures - Ariettas (Page 13/13)

Calegari Ritournelles

[from [https://s9.imslp.org/files/imglnks/usimg/6/63/IMSLP65334-PMLP1047762-L'Art\\_de\\_composer\\_de\\_la\\_-...-Calegari\\_Antonio\\_bpt6k9617931c.pdf](https://s9.imslp.org/files/imglnks/usimg/6/63/IMSLP65334-PMLP1047762-L'Art_de_composer_de_la_-...-Calegari_Antonio_bpt6k9617931c.pdf)]

*Antonio Calegari*

$\text{♩} = 120$

1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16

Figure 14: Table of Measures - Ritornellos (Page 1/3)

Musical score showing measures 17 through 32. The score consists of four staves for different voices. Measures 17-19 show rhythmic patterns with eighth and sixteenth notes. Measures 20-24 continue these patterns with some changes in dynamics and note heads. Measures 25-27 show a transition to a new section with quarter notes and eighth-note patterns. Measures 28-32 conclude the ritornello section with a final rhythmic flourish.

Figure 15: Table of Measures - Ritornellos (Page 2/3)



Figure 16: Table of Measures - Ritornellos (Page 3/3)

### 3 Related Links

The following are very interesting sites in that they allow the online rendering of MDGs:

- [Opus Infinity](#) - Collaborative work of Robbert Harms, Hein Moors, and Suus van Petegem whose goal is to unravel the mystery behind the tables used for generating MDGs. Site visitors can generate MDGs based on works of Kirnberger, Mozart, Stadler/Haydn, Bach, Gerlach, and Callegari (*1st Cahier*). Corresponding audio files (`mid`, `ogg`, and/or `mp3`) and image files (`pdf` or `png`) are also made available for listening, viewing, or downloading.
- [Mozart](#) - A site maintained by John Chuang that allows the site visitor to generate MDGs based on the work of Stadler/Haydn.
- [Mozart](#) - A site maintained by Marian Aldenhövel allows the visitor to generate a MDG (user-specified or randomly-generated) and the corresponding audio (`midi`, `wav`) and image files (`pdf`, `png`) based on *Musikalisches Würferspiel*, K. 516f.
- [mozart.zip](#) - This is a Windows software (© 1995 VisionSoft) by John Chuang and Stephen Goodwin that generates MDG based on input from user and is available for *free* from [Amaranth Publishing](#).
- “[Mozart - Musical Game in C K. 516f](#).” Mozart Studies Online - The site of Hideo Noguchi that offers an explanation linking *Musikalisches Würferspiel*, K. 516f, and K. 294d (K. Anh. C 30.01).

## 4 Acknowledgments

Special thanks to International Music Score Library Project for *L'art de composer de la musique sans en connaître les éléments 2nd Ed. (1802)*, Opus Infinity for additional related information, and Amaranth Publishing for a copy of `mozart.zip`. My sincerest gratitude to Chris Walshaw et al. for the ABC music notation; Jean-Francois Moine for `abcm2ps` and the accompanying examples, templates, and pointers for the appropriate use of these resources; Guido Gonzato for the ABC Plus Project and the `abcmidi resources` available there, more especially for the ABC resource book *Making Music with ABC 2*; James R. Allwright and Seymour Shlien for `abcmidi` source and binaries; Artifex, Inc. for Ghostscript v.10.00.0 (includes the `ps2pdf` converter); Inkscape v.1.2.2 for the tool for converting SVGs to PDFs for inclusion into L<sup>A</sup>T<sub>E</sub>X documents; William Schelter for Maxima v.5.47.0—used for computing the permutation number; Google Lens and Google Translate for aiding in producing the English versions of the text of *L'Art - 5th Cahier*; Colomban Wendling et. al for Geany 2.0 IDE; and User:Martin H for his reply to a T<sub>E</sub>X / L<sup>A</sup>T<sub>E</sub>X Stack Exchange question on including SVGs into L<sup>A</sup>T<sub>E</sub>X documents. Thanks to Ditto to Machtelt Garrels for the book Bash Guide for Beginners, Vivek Gite for the book Linux Script Shell Tutorial, and Steve Parker for the Unix/Linux Shell Cheatsheet. John Fogarty's GitHub Site: Latex CreateSpace BookCover and Peter Wilson's reply in T<sub>E</sub>X / L<sup>A</sup>T<sub>E</sub>X Stack Exchange on designing a book cover, were sources of ideas, information, and materials for creating the book cover and title page, thanks to both of them; LibreOffice Calc for its use in the image creation of the book cover. Many thanks, too, to the Debian Project for the Debian 12 (Bookworm) GNU/Linux OS, TeXLive for providing the T<sub>E</sub>X distribution, and GitHub for its generosity in providing space for the project.

## 5 Twenty (20) Selected Rondos based on *L'Art - 5th Cahier*

This section contains an example of 20 rondos that were generated using the Rules in Section 2.1. As mentioned above in Step 6 of the Rules (see Section 2.1), the parts are played as (AR)2.(BAR)2.(CAR)2.(BDAR)2 or AR.AR.BAR.BAR.CAR.CAR.BDAR.BDAR and that there are a total number of either 74, 75, or 76 bars; when played with repeats, a total of 148, 150, or 152 bars are played for each rondo.

10-4-12-9-12-7-6-3-10-8-2-6-4-10-9-10-5-4-4-11-3-12-9-6-4-4-11-2-8-12-6-7  
 acg5::58:219:94:213:302:66:271:48:6:19:21:17:34:120:290:247:300:296:262:115:58:219:94:213:302:66:271:48:6:19:21:17:  
 :207:174:202:254:51:147:113:38:58:219:94:213:302:66:271:48:6:19:21:17:  
 :34:120:290:247:300:296:262:115:279:135:72:164:58:219:94:213:302:66:271:48:6:19:21:17:  
 Perm. No.: 34419077886100248820306056272811337391457

Order for Playing Parts: (AR)2.(BAR)2.(CAR)2.(BDAR)2

$\text{♩} = 120$

A

R

D

B

C

The musical score consists of five systems of music for a four-part ensemble. Part A (top) features six staves of mostly eighth-note patterns. Part R (second from top) has three staves with eighth-note patterns and some rests. Part D (middle) has four staves with eighth-note patterns and rests. Part B (third from bottom) has four staves with eighth-note patterns and rests. Part C (bottom) has four staves with eighth-note patterns and rests. Measure numbers are present at the beginning of each system.

For audio (midi): [acg5-10-4-12-9-12-7-6-3-10-8-2-6-4-10-9-10-5-4-4-11-3-12-9-6-4-4-11-2-8-12-6-7.mid](#)

11-8-3-3-4-11-6-3-9-4-6-2-6-3-8-11-5-12-3-4-4-3-10-2-6-8-5-11-8-8-5-2

acg5::49:217:206:83:251:137:271:48:44:31:43:12:23:225:288:1:300:8:110:37:49:217:206:83:251:137:271:48:44:31:43:12:  
 :187:112:158:6:148:123:266:109:49:217:206:83:251:137:271:48:44:31:43:12:  
 :23:225:288:1:300:8:110:37:279:224:91:52:49:217:206:83:251:137:271:48:44:31:43:12:  
 Perm. No.: 383690262109488078177276083946019724889082

Order for Playing Parts: (AR)2.(BAR)2.(CAR)2.(BDAR)2

$\text{♩} = 120$

A

R

D

B

C

For audio (midi): [acg5-11-8-3-3-4-11-6-3-9-4-6-2-6-3-8-11-5-12-3-4-4-3-10-2-6-8-5-11-8-8-5-2.mid](#)

11-9-6-8-12-12-11-8-2-4-7-5-5-3-4-6-8-4-6-5-12-4-9-4-5-12-12-4-6-4-8-7

acg5::49:14:169:216:302:15:41:84:10:31:11:37:220:225:67:301::296:5:168:49:14:169:216:302:15:41:84:10:31:11:37:  
 :190:280:202:172:159:121:69:27:49:14:169:216:302:15:41:84:10:31:11:37:  
 :220:225:67:301::296:5:168:238:294:188:164:49:14:169:216:302:15:41:84:10:31:11:37:  
 Perm. No.: 123194508978175638652360918404630596481074

Order for Playing Parts: (AR)2.(BAR)2.(CAR)2.(BDAR)2

$\text{♩} = 120$

A

R

D

B

C

For audio (midi): [acg5-11-9-6-8-12-12-11-8-2-4-7-5-5-3-4-6-8-4-6-5-12-4-9-4-5-12-12-4-6-4-8-7.mid](#)

12-3-11-4-7-9-10-8-7-11-6-10-4-7-12-8-2-7-2-10-5-2-9-10-8-4-2-12-8-12-8-11  
 acg5::54:303:142:257:228:243:153:84:18:20:43:29:34:285:226:241:17:196:107:295:54:303:142:257:228:243:153:84:18:20:43:29:  
 :281:275:202:122:234:147:242:80:54:303:142:257:228:243:153:84:18:20:43:29:  
 :34:285:226:241:17:196:107:295:279:135:188:116:54:303:142:257:228:243:153:84:18:20:43:29:  
 Perm. No.: 412337611188362684795073186064210436841601

Order for Playing Parts: (AR)2.(BAR)2.(CAR)2.(BDAR)2

$\text{♩} = 120$

A

R

D

B

C

The musical score consists of five systems of music for four parts: A, R, D, B, and C. Each system is in common time (indicated by '♩ = 120') and includes four staves (treble, alto, bass, and tenor). The parts are labeled above their respective staves. The score features various musical elements such as sixteenth-note patterns, eighth-note chords, and sixteenth-note chords. Measure numbers are present at the beginning of each system.

For audio (midi): [acg5-12-3-11-4-7-9-10-8-7-11-6-10-4-7-12-8-2-7-2-10-5-2-9-10-8-4-2-12-8-12-8-11.mid](#)

2-2-3-2-3-8-11-10-6-2-3-12-4-6-9-8-5-4-8-3-6-12-8-7-10-12-3-4-2-12

acg5::19:79:206:307:244:214:41:233:26:15:16:39:34:231:290:241:146:166:198:37:19:79:206:307:244:214:41:233:26:15:16:39:  
 :39:112:59:192:234:16:273:80:19:79:206:307:244:214:41:233:26:15:16:39:  
 :34:231:290:241:146:166:198:37:43:294:118:82:19:79:206:307:244:214:41:233:26:15:16:39:  
 Perm. No.: 443286088335472339250536450110787735424288

Order for Playing Parts: (AR)2.(BAR)2.(CAR)2.(BDAR)2

$\text{♪} = 120$

A

R

D

B

C

For audio (midi): [acg5-2-2-3-2-3-8-11-10-6-2-3-12-4-6-9-8-5-4-8-3-6-12-8-7-10-12-3-4-2-12.mid](#)

2-8-10-8-5-8-11-8-2-7-7-6-7-12-11-6-2-2-7-7-10-7-4-3-3-12-10-8-6-6-2-12  
 acg5::19:217:156:216:210:214:41:84:10:2:11:17:119:102:293:301:17:133:92:117:19:217:156:216:210:214:41:84:10:2:11:17:  
 :100:53:175:221:126:121:273:151:19:217:156:216:210:214:41:84:10:2:11:17:  
 :119:102:293:301:17:133:92:117:238:204:118:82:19:217:156:216:210:214:41:84:10:2:11:17:  
 Perm. No.: 280226904107390516805443668096188382229826

Order for Playing Parts: (AR)2.(BAR)2.(CAR)2.(BDAR)2

$\text{♩} = 120$

A

R

D

B

C

For audio (midi): [acg5-2-8-10-8-5-8-11-8-2-7-7-6-7-12-11-6-2-2-7-7-10-7-4-3-3-12-10-8-6-6-2-12.mid](#)

3-2-9-9-8-5-12-6-4-8-9-5-2-3-12-4-9-2-8-8-11-5-12-10-2-2-10-11-7-4-6-11  
 acg5::68:79:160:213:141:42:85:259:22:19:35:37:11:225:226:199:146:133:140:189:68:79:160:213:141:42:85:259:22:19:35:37:  
 :101:103:61:122:71:70:273:109:68:79:160:213:141:42:85:259:22:19:35:37:  
 :11:225:226:199:146:133:140:189:253:294:72:116:68:79:160:213:141:42:85:259:22:19:35:37:  
 Perm. No.: 400251600961250683694441563751769155806182

Order for Playing Parts: (AR)2.(BAR)2.(CAR)2.(BDAR)2

$\text{♩} = 120$

A

R

D

B

C

For audio (midi): [acg5-3-2-9-9-8-5-12-6-4-8-9-5-2-3-12-4-9-2-8-8-11-5-12-10-2-2-10-11-7-4-6-11.mid](#)

4-12-6-6-9-8-6-8-2-12-6-7-6-8-5-2-2-8-5-9-4-3-12-7-10-11-6-10-7-8-9

acg5::305:205:169:173:297:214:271:84:10:8:43:28:23:229:288:227:17:133:140:168:305:205:169:173:297:214:271:84:10:8:43:28:  
 :29:280:203:192:56:255:113:278:305:205:169:173:297:214:271:84:10:8:43:28:  
 :23:229:288:227:17:133:140:168:96:161:188:106:305:205:169:173:297:214:271:84:10:8:43:28:  
 Perm. No.: 201146319735817817788993471956876309111059

Order for Playing Parts: (AR)2.(BAR)2.(CAR)2.(BDAR)2

$\text{♩} = 120$

A

R D

B

C

For audio (midi): [acg5-4-12-6-6-9-8-6-8-2-12-6-7-6-8-5-2-2-8-5-9-4-3-12-7-10-11-6-10-7-8-9.mid](#)

4-7-11-10-2-4-8-5-4-9-8-5-8-12-9-11-11-4-6-2-2-12-8-12-5-3-3-12-12-6-5

acg5::305:145:142:150:272:78:235::22:7:25:37:223:102:290:1:183:296:5:40:305:145:142:150:272:78:235::22:7:25:37:  
 :111:174:237:192:159:97:249:143:305:145:142:150:272:78:235::22:7:25:37:  
 :223:102:290:1:183:296:5:40:99:135:72:211:305:145:142:150:272:78:235::22:7:25:37:  
 Perm. No.: 45347857901738360761202937439893947507016

Order for Playing Parts: (AR)2.(BAR)2.(CAR)2.(BDAR)2

$\text{♩} = 120$

A

R

D

B

C

For audio (midi): [acg5-4-7-11-10-2-4-8-5-4-9-8-5-8-12-9-11-11-4-6-2-2-12-8-12-5-3-3-12-12-6-5.mid](#)

5-12-2-5-8-7-4-10-7-2-10-6-4-8-6-12-5-3-2-8-8-11-7-4-4-8-6-11-6-3-12-11  
 acg5::308:205:176:283:141:66:299:233:18:15:3:17:34:229:179::300:114:107:189:308:205:176:283:141:66:299:233:18:15:3:17:  
 :39:108:162:172:51:123:129:109:308:205:176:283:141:66:299:233:18:15:3:17:  
 :34:229:179::300:114:107:189:238:130:65:116:308:205:176:283:141:66:299:233:18:15:3:17:  
 Perm. No.: 387373920231118766526283211889362350194314

Order for Playing Parts: (AR)2.(BAR)2.(CAR)2.(BDAR)2

$\text{♩} = 120$

A

R

D

B

C

The musical score consists of five systems of music for four parts: A, R, D, B, and C. Each system is in common time (indicated by '8'). The parts are arranged vertically: A is at the top, followed by R, D, B, and C at the bottom. The score includes various musical elements such as eighth-note patterns, sixteenth-note patterns, rests, and dynamic markings like 'f' (fortissimo). The parts are primarily composed of eighth-note patterns, with some sixteenth-note patterns and rests.

For audio (midi): [acg5-5-12-2-5-8-7-4-10-7-2-10-6-4-8-6-12-5-3-2-8-8-11-7-4-4-8-6-11-6-3-12-11.mid](#)

6-11-2-2-6-12-5-2-11-11-7-5-11-2-6-8-9-12-9-2-5-9-5-12-9-2-7-3-9-10-4-6

acg5::46:50:176:307:268:15:57:138:5:20:11:37:155:9:179:241:146:8:222:40:46:50:176:307:268:15:57:138:5:20:11:37:  
 :281:157:184:192:74:70:230:143:46:50:176:307:268:15:57:138:5:20:11:37:  
 :155:9:179:241:146:8:222:40:86:90:250:24:46:50:176:307:268:15:57:138:5:20:11:37:  
 Perm. No.: 60092376731182258006064760844144356643392

Order for Playing Parts: (AR)2.(BAR)2.(CAR)2.(BDAR)2

$\text{♩} = 120$

A

R

D

B

C

For audio (midi): [acg5-6-11-2-2-6-12-5-2-11-11-7-5-11-2-6-8-9-12-9-2-5-9-5-12-9-2-7-3-9-10-4-6.mid](#)

6-11-3-7-11-10-9-11-3-9-5-9-2-7-10-12-7-3-10-7-6-5-9-4-11-3-9-8-5-8-12-9

acg5::46:50:206:304:171:105:47:81:4:7:1:38:11:285:265::163:114:76:117:46:50:206:304:171:105:47:81:4:7:1:38:  
 :181:103:202:172:26:97:287:151:46:50:206:304:171:105:47:81:4:7:1:38:  
 :11:285:265::163:114:76:117:2:224:65:106:46:50:206:304:171:105:47:81:4:7:1:38:  
 Perm. No.: 273677449110065816109645995912470005155412

Order for Playing Parts: (AR)2.(BAR)2.(CAR)2.(BDAR)2

$\text{♩} = 120$

A

R

D

B

C

For audio (midi): [acg5-6-11-3-7-11-10-9-11-3-9-5-9-2-7-10-12-7-3-10-7-6-5-9-4-11-3-9-8-5-8-12-9.mid](#)

6-12-4-7-10-6-2-6-12-6-4-7-11-4-9-9-7-10-6-11-11-7-8-4-3-7-9-9-4-8-7-12

acg5::46:205::304:127:36:88:259:13:40:33:28:155:152:290:28:163:167:5:115:46:205::304:127:36:88:259:13:40:33:28:  
 :101:53:237:172:126:16:287:170:46:205::304:127:36:88:259:13:40:33:28:  
 :155:152:290:28:163:167:5:115:258:224:44:82:46:205::304:127:36:88:259:13:40:33:28:  
 Perm. No.: 315934884524126992794195879270091422812140

Order for Playing Parts: (AR)2.(BAR)2.(CAR)2.(BDAR)2

$\text{♩} = 120$

A

R

D

B

C

For audio (midi): [acg5-6-12-4-7-10-6-2-6-12-6-4-7-11-4-9-9-7-10-6-11-11-7-8-4-3-7-9-9-4-8-7-12.mid](#)

6-7-2-7-3-12-11-10-9-12-11-9-7-5-8-8-9-2-6-3-10-7-8-2-11-6-9-7-4-8-4

acg5::46:145:176:304:244:15:41:233:44:8:34:38:119:154:288:241::98:107:177:46:145:176:304:244:15:41:233:44:8:34:38:  
 :207:208:162:128:71:193:129:170:46:145:176:304:244:15:41:233:44:8:34:38:  
 :119:154:288:241::98:107:177:253:294:188:22:46:145:176:304:244:15:41:233:44:8:34:38:  
 Perm. No.: 306053865551272486907571082000392103341548

Order for Playing Parts: (AR)2.(BAR)2.(CAR)2.(BDAR)2

$\text{♩} = 120$

A

R

D

B

C

For audio (midi): [acg5-6-7-2-7-3-12-11-10-9-12-11-9-7-5-8-8-9-2-6-3-10-7-8-2-11-6-9-7-4-8-4.mid](#)

7-12-3-5-6-8-7-3-6-9-7-11-10-9-5-11-4-6-11-7-3-7-4-9-9-12-12-10-9-4-5-8  
 acg5::252:205:206:283:268:214:60:48:26:7:11:14:267:270:236:1:276:232:124:117:252:205:206:283:268:214:60:48:26:7:11:14:  
 :207:53:175:286:74:121:69:30:252:205:206:283:268:214:60:48:26:7:11:14:  
 :267:270:236:1:276:232:124:117:86:294:91:186:252:205:206:283:268:214:60:48:26:7:11:14:  
 Perm. No.: 370199652103905563489737107634317654086328

Order for Playing Parts: (AR)2.(BAR)2.(CAR)2.(BDAR)2

$\text{♩} = 120$

A

R

D

B

C

For audio (midi): [acg5-7-12-3-5-6-8-7-3-6-9-7-11-10-9-5-11-4-6-11-7-3-7-4-9-9-12-12-10-9-4-5-8.mid](#)

7-8-3-9-11-10-11-7-4-11-7-8-7-5-2-2-12-10-12-9-12-7-10-9-8-8-12-8-2-4-4-10  
 acg5::252:217:206:213:171:105:41:77:22:20:11:36:119:154:12:200:292:167:264:274:252:217:206:213:171:105:41:77:22:20:11:36:  
 :190:53:158:286:234:123:69:151:252:217:206:213:171:105:41:77:22:20:11:36:  
 :119:154:12:200:292:167:264:274:185:294:250:89:252:217:206:213:171:105:41:77:22:20:11:36:  
 Perm. No.: 286520577191126836668896299685665157191006

Order for Playing Parts: (AR)2.(BAR)2.(CAR)2.(BDAR)2

$\text{♩} = 120$

A

R

D

B

C

For audio (midi): [acg5-7-8-3-9-11-10-11-7-4-11-7-8-7-5-2-2-12-10-12-9-12-7-10-9-8-8-12-8-2-4-4-10.mid](#)

8-6-3-10-5-9-5-12-12-4-2-5-12-4-10-11-7-7-6-4-2-9-11-5-10-8-4-3-9-9-8-4  
 acg5::195:240:206:150:210:243:57:144:13:31:21:37:256:152:265:1:163:196:5:37:195:240:206:150:210:243:57:144:13:31:21:37:  
 :111:157:139:215:197:123:284:143:195:240:206:150:210:243:57:144:13:31:21:37:  
 :256:152:265:1:163:196:5:37:86:10:188:22:195:240:206:150:210:243:57:144:13:31:21:37:  
 Perm. No.: 50924078015641388693751491937016083763466

Order for Playing Parts: (AR)2.(BAR)2.(CAR)2.(BDAR)2

$\text{♩} = 120$

A

R

D

B

C

The musical score consists of five systems of music for four parts: A, R, D, B, and C. Each system is in common time (indicated by '♩ = 120') and includes four staves: Bassoon (Bassoon), Bassoon (Bassoon), Trombone (Trombone), and Bassoon (Tuba). The parts are arranged in a specific order for performance: (AR)2.(BAR)2.(CAR)2.(BDAR)2. The score features various musical techniques such as eighth-note patterns, sixteenth-note patterns, grace notes, and dynamic markings like 'f' (fortissimo) and 'p' (pianissimo). Measure numbers are present at the beginning of each system.

For audio (midi): [acg5-8-6-3-10-5-9-5-12-12-4-2-5-12-4-10-11-7-7-6-4-2-9-11-5-10-8-4-3-9-9-8-4.mid](#)

8-7-6-7-11-8-11-8-10-9-4-11-11-5-2-11-9-6-5-4-2-11-8-3-10-12-9-7-5-7-12-4  
 acg5::195:145:169:304:171:214:41:84:6:7:33:14:155:154:12:1:146:232:198:37:195:145:169:304:171:214:41:84:6:7:33:14:  
 :111:108:237:221:197:121:287:25:195:145:169:304:171:214:41:84:6:7:33:14:  
 :155:154:12:1:146:232:198:37:2:161:65:22:195:145:169:304:171:214:41:84:6:7:33:14:  
 Perm. No.: 235559179565478427118731142047906694265946

Order for Playing Parts: (AR)2.(BAR)2.(CAR)2.(BDAR)2

$\text{♩} = 120$

A

R

D

B

C

The musical score consists of five systems of music for a four-part ensemble. Each system has four staves: Bassoon (Bassoon), Bassoon (Bassoon), Trombone (Trombone), and Trombone (Trombone). The parts are labeled A, R, D, B, and C from top to bottom. The tempo is indicated as  $\text{♩} = 120$ . The score includes various musical markings such as grace notes, slurs, and dynamic changes. The parts are numbered 1 through 4, corresponding to the order of playing: (AR)2.(BAR)2.(CAR)2.(BDAR)2.

For audio (midi): [acg5-8-7-6-7-11-8-11-8-10-9-4-11-11-5-2-11-9-6-5-4-2-11-8-3-10-12-9-7-5-7-12-4.mid](#)

9-10-7-11-9-5-4-5-12-8-8-4-9-12-10-6-6-5-11-12-4-3-12-12-9-6-12-6-11-5-8-3

acg5::75:63:134:306:297:42:299::13:19:25:42:136:102:265:301:289:180:124:260:75:63:134:306:297:42:299::13:19:25:42:  
 :187:112:61:192:74:298:69:278:75:63:134:306:297:42:299::13:19:25:42:  
 :136:102:265:301:289:180:124:260:3:165:188:62:75:63:134:306:297:42:299::13:19:25:42:  
 Perm. No.: 203590686460282734981536823925002044808240

Order for Playing Parts: (AR)2.(BAR)2.(CAR)2.(BDAR)2

$\text{♩} = 120$

A

R

D

B

C

For audio (midi): [acg5-9-10-7-11-9-5-4-5-12-8-8-4-9-12-10-6-6-5-11-12-4-3-12-12-9-6-12-6-11-5-8-3.mid](#)

9-9-6-4-10-11-5-2-4-2-3-10-9-5-9-12-12-8-2-7-11-5-9-6-12-11-9-7-11-7-7-5  
 acg5::75:14:169:257:127:137:57:138:22:15:16:29:136:154:290::292:166:107:117:75:14:169:257:127:137:57:138:22:15:16:29:  
 :101:103:202:254:7:193:287:25:75:14:169:257:127:137:57:138:22:15:16:29:  
 :136:154:290::292:166:107:117:3:161:44:211:75:14:169:257:127:137:57:138:22:15:16:29:  
 Perm. No.: 235289531078460430321951679329705279186175

Order for Playing Parts: (AR)2.(BAR)2.(CAR)2.(BDAR)2

$\text{J} = 120$

A

R

D

B

C

For audio (midi): [acg5-9-9-6-4-10-11-5-2-4-2-3-10-9-5-9-12-12-8-2-7-11-5-9-6-12-11-9-7-11-7-7-5.mid](#)

## 6 License

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