

Peter McKenzie Armstrong

Patterns
from the
Game of Life

Part I: Eighth Notes for Toy Piano

**Revised Edition
2018**

Edition Ottaviano Petrucci

NOTES

COMPOSITION

In continued fascination with J.H.Conway's cellular automaton, I have collected several hundred patterns from the Game of Life website (ConwayLife.com) and set about to realize some as music with minimal change to their mapped specs.

Of three volumes resulting, this first "for toy piano" evolved from those images with vertical dimensions of 1 to 25 units, translating to keyboard ranges of from 1 pitch to 2 octaves. Its pieces are named for their semitone ranges in order.

Regarding clusters: As default chord content was often unmanageable for both scoring and performance, I have trimmed accordingly and imposed two notational constraints: each chord has a single stem; its intervals are as a rule spelled diatonically, with accidental-types consequently mixed.

The Game of Life dot graphs underlying these pieces (up to eight for each) are listed – by pattern name, discoverer, date – at score's end. For full information on any, access ConwayLife.com/wiki/Category:Patterns and click on its name. For comments as to my treatment, see the NOTES in two earlier compositions, *Thin Rake* and *No!*, at imslp.org/wiki/Category:Armstrong,_Peter_McKenzie.

Audio files at IMSLP accompanying this score, initially secondary output from the LilyPond processing, have been separately rewritten by the composer in RoseGarden and realized via PianoTeq's "D4 Vintage Bosendorfer" instrument. Individual durations range non-sequentially from 11 to 29 seconds, totaling 8:16.

PERFORMANCE

PROGRAMMING

I imagine this work being played, not in its entirety, but in variously selected handfuls of from three to perhaps seven items at most. Players inspired to take "toy piano" literally will need to access a 30-key model, the shortest offering two full octaves centered on 'D'.

CLUSTERS

As chords will for some hands be occasionally unnavigable, the player is invited to trim them further – discretely – where needed, most specifically to avoid rolling.

ACCIDENTALS

With the exception of natural-signs (all cautionary), accidentals throughout apply each exactly once. LilyPond terms this style "Forget".

ARTICULATION

Non-slurred notes are to be audibly detached, and any slur's end-note is to be similarly detached from the next event. Where, as often occurs, slurs contain immediate note-repetition, their *legato* connection must be effected with the damper pedal (without "smooth-over" between slurs). There are no ties.

DYNAMICS

Marked accents enhance or contradict normal beat stress, which is itself to be exaggerated in compound &/or changing meter.

TEMPO

Metronome settings are intended suggestively.

– PMA

to Rebecca Raffaelli

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2018

With meter always vivid

1

$\text{♩} = 104$

mp *mf* più mosso *p* a tempo

2

$\text{♩} = 132$

f *mf* *p* *mf* *f*

3

$5 \text{ ♩} = 54$

mp *p* *mf*

4

$\text{♩} = 92$

p *f* *sfz*

2
7

mf *p* *pp*

5

$\text{♩} = 104$

mf *mp*

5

f *sfz* *dimin.*

6

$\text{♩} = 88$

mf *p*

5

pp *cresc.* *f*

7

$\text{♩} = 56$

mf

5

cresc.

sfz

p

dimin.

The first system of the musical score consists of four measures. The first measure shows a treble clef with a half note G4 (F#4) and a quarter rest, and a bass clef with a half note G3 (F#3) and a quarter rest. The second measure has a treble clef with a half note A4 (G#4) and a quarter rest, and a bass clef with a half note A3 (G#3) and a quarter rest. The third measure has a treble clef with a half note B4 (A#4) and a quarter rest, and a bass clef with a half note B3 (A#3) and a quarter rest. The fourth measure has a treble clef with a half note C5 (B#4) and a quarter rest, and a bass clef with a half note C4 (B#3) and a quarter rest. The key signature is one sharp (F#), and the time signature is 4/4.

8

Example 8

Measures 1-5

Tempo: $\text{♩} = 80$

Measure 1: Treble clef: p (piano), Bass clef: p (piano)

Measure 2: Treble clef: p (piano), Bass clef: p (piano)

Measure 3: Treble clef: p (piano), Bass clef: p (piano)

Measure 4: Treble clef: p (piano), Bass clef: p (piano)

Measure 5: Treble clef: mp (mezzo-piano), Bass clef: mp (mezzo-piano)

9

$\text{♩} = 126$

ff

più mosso

5

f sotto il tempo

mf più mosso

4
9

Measures 9-12. Treble and bass staves. Measure 9 is a whole rest. Measures 10-12 are in 2/4 time. Dynamics: *ff* (measures 10-11), *cresc.* (measure 12). Tempo markings: *molto* (measures 10-11), *accel.* (measure 11), *cresc.* (measure 12). The music features complex chords and arpeggiated patterns.

10

Measures 13-15. Treble and bass staves. Measure 13 is a whole rest. Measure 14 has a tempo marking of $\text{♩} = 88$. Dynamics: *p* (measure 13), *mp* (measures 14-15). The music continues with arpeggiated patterns.

4

Measures 16-17. Treble and bass staves. Measure 16 has a dynamic of *mf*. Measure 17 has a *cresc.* marking. The music features arpeggiated patterns.

6

Measures 18-20. Treble and bass staves. Measure 18 has a dynamic of *f*. Measure 19 has a dynamic of *mp*. Measure 20 has a dynamic of *p*. The music continues with arpeggiated patterns.

11

Measures 21-23. Treble and bass staves. Measure 21 has a tempo marking of $\text{♩} = 84$ and a dynamic of *mf*. Measure 22 has a dynamic of *p*. Measure 23 has a dynamic of *p*. The music continues with arpeggiated patterns.

4

Measures 24-27. Treble and bass staves. Measure 24 has a dynamic of *mp*. Measure 25 has a dynamic of *p*. Measure 26 has a dynamic of *p*. Measure 27 has a dynamic of *p*. The music continues with arpeggiated patterns.

8

f

11

mf *mp* *p*

12

5 ♩ = 58

mf

5

mp *mf*

9

p *f* *ritenuto* *mp* *a tempo* *mf*

13

cresc. *ff* *molto riten.* *a tempo e molto dimin.* *sfz*

13

$\text{♩} = 84$

mf

p

4

mf

mp

7

mf

cresc.

10

f

p

sfz

14

$\text{♩} = 144$

p

3

mp

p

6

f *molto più mosso*

9

mf *meno mosso* *mp*

11

p *a tempo*

15

f *mp*

5 ♩ = 54

4

pp

8

ff *molto più mosso*

8
10

pp *ff*

16

$\text{♩} = 88$

f

3

p *f*

6

p più mosso *mp*

9

cresc. *f* *p*

17

$\text{♩} = 58$

p *pp* *mp* *pp*

5

mf

cresc.

8

pp

f

The musical score for 'The Rose Tree' is presented in a grand staff format, spanning measures 8 to 10. The key signature is one flat (B-flat), and the time signature is 3/4. The score is divided into three measures. Measure 8 begins with a piano (*pp*) dynamic. The melody in the treble clef starts with a quarter note G4, followed by an eighth note A4, and then a quarter note Bb4. The bass line in the bass clef starts with a quarter note G3, followed by an eighth note A3, and then a quarter note Bb3. Measure 9 continues the melody with a quarter note C5, followed by an eighth note D5, and then a quarter note E5. The bass line continues with a quarter note C4, followed by an eighth note D4, and then a quarter note E4. Measure 10 features a forte (*f*) dynamic. The melody in the treble clef starts with a quarter note F#5, followed by an eighth note G5, and then a quarter note A5. The bass line starts with a quarter note F#4, followed by an eighth note G4, and then a quarter note A4. The score concludes with a double bar line at the end of measure 10.

18

The musical score for exercise 18 is written for piano in 3/8 time. It consists of two staves. The tempo is marked as quarter note = 88. The piece begins with a mezzo-forte (*mf*) dynamic. The right hand starts with a half rest, followed by a quarter rest, and then a quarter note G#. The left hand plays a descending eighth-note scale: F#4, E4, D4, C4, B3, A3, G3, F#3. The dynamic changes to forte (*f*) at the second measure. The right hand plays a half note G#4, and the left hand plays a half note F#3. The piece ends with a half rest in the right hand and a half note G#3 in the left hand.

3

Handwritten musical score for 'The Rose Tree'. The score is written for piano (p) and features a treble and bass staff. The key signature is one sharp (F#), and the time signature is 7/8. The melody is in the treble staff, and the accompaniment is in the bass staff. The score is divided into three measures. The first measure has a dynamic marking of *mf* (mezzo-forte). The second measure has a dynamic marking of *mp* (mezzo-piano). The third measure has a dynamic marking of *f* (forte). The melody consists of eighth and sixteenth notes, with some rests. The accompaniment consists of eighth and sixteenth notes, with some rests. The score is written in a clear, legible hand.

6

p

f

The musical score for 'The Rose Tree' is presented in a two-staff format. The key signature is one flat (B-flat), and the time signature is 4/4. The score is divided into two measures. The first measure begins with a piano (*p*) dynamic. The right hand (treble clef) starts with two whole rests, followed by a quarter note chord of G4, A4, and B4. The left hand (bass clef) plays a descending sequence of chords: B-flat4, A-flat4, G4, F4, E4, D4, C4, and B-flat3. The second measure begins with a forte (*f*) dynamic. The right hand plays a series of chords: G4, A4, B4, C5, B4, A4, G4, F4, E4, D4, C4, and B-flat3. The left hand plays a series of chords: B-flat4, A-flat4, G4, F4, E4, D4, C4, and B-flat3. The score is marked with a '6' at the beginning of the first measure.

8

p

cresc. e ritard.

mf

pp a tempo

10
11

f

5 ♩ = 66

19

mf *cresc.* *f*

5

mp *f* *molto cresc.*

8

ff *dimin.* *mf* *mp*

♩ = 126

20

mp

5

10

mf poco più mosso

14

19

f a tempo *mp* *p*

21

p

3

mp

6

mf cresc.

12

8

p *dimin.*

22

$\text{♩} = 100$

p

5

mf *più mosso* *mp* *a tempo*

8

f *più mosso*

12

ff *molto più mosso* *sfz*

23

5 $\text{♩} = 60$

mp *p*

5

mf

10

cresc.

f

p

14

molto cresc.

17

f *molto riten.*

mp a tempo

24

f

2

p

14

5

mp

Measures 14-16: Treble and bass staves in 6/8 time. Measure 14 starts with a mezzo-piano (mp) dynamic. The music features complex chords and melodic lines in both hands.

8

f

Measures 17-19: Treble and bass staves in 6/8 time. Measure 17 starts with a forte (f) dynamic. The music continues with complex chords and melodic lines.

9

mp

Measures 20-22: Treble and bass staves in 6/8 time. Measure 20 starts with a mezzo-piano (mp) dynamic. The music continues with complex chords and melodic lines.

12

p

Measures 23-25: Treble and bass staves in 3/4 time. Measure 23 starts with a piano (p) dynamic. The music continues with complex chords and melodic lines.

15

f

Measures 26-28: Treble and bass staves in 6/8 time. Measure 26 starts with a forte (f) dynamic. The music continues with complex chords and melodic lines.

25

5 ♩ = 58

mf mp

Measures 29-32: Treble and bass staves in 3/8 time. Measure 29 starts with a mezzo-forte (mf) dynamic, and measure 30 starts with a mezzo-piano (mp) dynamic. The music continues with complex chords and melodic lines.

5 *ff* *dimin.*

8 *p* *cresc.*

11 *ff*

14 *mp* *mf*

18 *f* *molto cresc.*

21 *ff*

ConwayLife.com Source Graphs

(height = movement number)

	PATTERN NAME	DISCOVERER	YEAR
1:	Unidimensional Tumbler	Paul Callahan	1998
2:	Tetrominoes	--	--
3:	Gliders by the Dozen	Roger H. Rosenbaum	--
	House	--	--
	Long Hook	--	--
	Long Snake	--	--
	Pentadecathlon	John Conway	1970
	Pre-Pulsar	--	--
	Shillelagh	Charles Corderman	1971
	Thunderbird	--	--
4:	HighLife	Nathan Thompson	1994
5:	25P3H1V0.2	Dean Hickerson	1989
	Blinker Fuse	--	--
6:	2x2 6-Cell Still Lifes	--	--
	Lightweight Emulator	Robert Wainwright	1980
7:	Fast Forward Force Field	Dieter Leithner	1994
	Heavyweight Emulator	Robert Wainwright	1980
	Middleweight Emulator	Robert Wainwright	1980
	Trans Queen Bee Shuttle	Bill Gosper	1970
8:	25P3H1V0.1	Dean Hickerson	1989
	B29	Hartmut Holzwart	2004
	Blocked P4-2	Adam P. Goucher	2010
	Revolver	--	--
9:	Garden of Eden	Roger Banks	1971
10:	36P22	Jason Summers	2000
	46P4H1V0	Tim Coe	1996
	Eve	Andrzej Megier	2008
11:	60P5H2V0	Tim Coe	1996
	Edge-Repair Spaceship 1	David Bell	1992
	Glasses	--	--
12:	101	Achim Flammenkamp	1994
	Fireship	Simon Ekstroem	2016
	Pentadecathlon on 38P7.2	--	--
	Pentoad 2	--	--
	Siesta	David Buckingham	1973
13:	48P31	Mattias Merzenich	2010
	Blocked P4 T-Nose Hybrid	Mattias Merzenich	2010
	Jolson	Robert Wainwright	1984
	Pre-Pulsar Spaceship	David Bell	1998
14:	22P36	Naom Elkies	1995
	Blocked P4-1	Adam P. Goucher	2010
	Honeybit	Brice Due	2006
	Killer Candle Frobos	Robert Wainwright	1984
	Tritoad	David Buckingham	1977
15:	2x2 7-Cell Still Lifes	--	--
	Electric Fence	Dean Hickerson	1993
	Uninteresting P24	--	--

16: HighLife 10–Cell Still Lifes	Nathan Thompson	1994
Mold on 36P22	Jason Summers	--
Pre–Pulsar Shuttle 28	--	--
Wickstretcher 1	Hartmut Holzwart and Dean Hickerson	1992
17: Monogram Synth	Mark D. Niemiec	--
P35 Honey Farm Hassler	Dongook Lee	2016
Twin Bees Shuttle V2	David Bell, Bill Gosper and Heinrich Koenig	1971
18: Backrake 1	Jason Summers	--
Boring P24	--	--
Ecologist	--	--
Fumarole on 34P13	Nikolay Beluchenko	2009
Lake 2 Synth	--	--
Pre–Pular Shuttle 29 V2	David Buckingham	1980
19: 119P4H1V0	Dean Hickerson	1989
69P48	Naom Elkies	2002
20: Ellison P4 HW Emulator Hybrid	Scot Ellison	2010
Eureka V2	David Buckingham	1980
Gourmet	David Buckingham	1978
Pentadecathlon on 38P7.2	--	--
Pentadecathlon on Snacker	--	--
Schick Engine	Paul Schick	1972
21: 50P35	Jason Summers	2002
77P4H1V0.1	--	--
B–52 Bomber	Naom Elkies and David Bell	1996
Figure Eight on 36P22	--	--
Fumarole on 34P13	Nikolay Beluchenko	2009
True Period 22 Gun	David Eppstein	2000
22: Blocked P4–2	Adam P. Goucher	2010
Edge–Repair Spaceship 2	Stephen Silver	2000
Pipsquirt 1 as Reflector	Naom Elkies	1997
Queen Bee Shuttle	Bill Gosper	1970
Skewed Traffic Light	Robert Wainwright	1989
Trans Queen Bee Shuttle	Bill Gosper	1970
Wasp	David Bell	1998
23: 98P25	Naom Elkies	2002
Blocked P4–1	Adam P. Goucher	2010
Buckaroo	David Buckingham	--
Crown	Naom Elkies	1995
P32 Blinker Hassler	Naom Elkies	2010
P60 Hassler	Naom Elkies	2002
Snark	Mike Playle	2013
24: 48P31	Mattias Merzenich	2010
P35 Beehive Hassler	Dean Hickerson	1995
Two Pre–L Hasslers	Robert Wainwright	1983
25: 144P24	Naom Elkies	1994
65P13.1	David Buckingham	1996
Blinker Puffer 2	David Bell	1992
Light Speed Oscillator 2	Josh Ball	2007

Graphs listed twice are mutually perpendicular.