
Gray Code (The Ensemble)

Gray Code for Five	336
AntiGray for Five	340
Ghost Dervish Beach (gamelan arabica)	344
Instant Music	351
Lightning	354
Worry Beads	356
Obscure, in Coral	358
Disjoinder	364
Tapas	367
Towers	368

In late 1999, I began to play in a duo with guitarist Jonathan Matis and, in a group that become the ensemble SciDolomRah, with percussionist Brian Fending. We quickly became a quintet including the members of Comma, named (by Tom Bickley once again) Gray Code.

Gray Code took over much of the electronic work that Comma had been doing, with Comma shifting back into a more acoustic format. It also has had a somewhat more flexible lineup, with as few as two original members appearing in a performance with invited others.

Gray Code for Five

Gray Code for Five

for five voices or instruments

A unique group of one to five members plays
in each of the 32 events.

At each transition,
one player begins or stops sounding.

Each event is shown by a single row on the chart,
numbered from 0 to 31.

Each player's part is shown by a single column on the chart,
labelled A through E.

This score was developed communally, at first by the members of
Comma, and then by the members of Gray Code. Jonathan Matis
designed the original spreadsheet from which we performed.

“On Gray Code and Other Algorithms” on page 32 describes the
mathematical basis for this piece.

Gray Code for Five

The cell for that player and event
shows the player's action at the start of the event:

+	Begin playing
-	End playing
=	Continue playing
(blank)	Continue silence.

A player may, at any time,
gesture to indicate or question
the current step number.

In case of disagreement,
negotiate wordlessly to arrive at consensus.

If no consensus can be found,
move to the earliest step number
being suggested.

Gray Code for Five

	A	B	C	D	E	Graph				
0										
1	+					1				
2	=	+				1	2			
3	-	=					2			
4		=	+				2	3		
5	+	=	=			1	2	3		
6	=	-	=			1		3		
7	-		=					3		
8			=	+				3	4	
9	+		=	=		1		3	4	
10	=	+	=	=		1	2	3	4	
11	-	=	=	=			2	3	4	
12		=	-	=			2		4	
13	+	=		=		1	2		4	
14	=	-		=		1			4	
15	-			=					4	

Gray Code for Five

16				=	+				4	5
17	+			=	=	1			4	5
18	=	+		=	=	1	2		4	5
19	-	=		=	=		2		4	5
20		=	+	=	=		2	3	4	5
21	+	=	=	=	=	1	2	3	4	5
22	=	-	=	=	=	1		3	4	5
23	-		=	=	=			3	4	5
24			=	-	=			3		5
25	+		=		=	1		3		5
26	=	+	=		=	1	2	3		5
27	-	=	=		=		2	3		5
28		=	-		=		2			5
29	+	=			=	1	2			5
30	=	-			=	1				5
31	-				=					5

AntiGray for Five

AntiGray for Five

for five voices or instruments

A unique group of one to five members plays
in each of the 32 events.

At each transition,
either four or all five of the players
begin or stop sounding.

Each event is shown by a single row on the chart,
numbered from 0 to 31.

Each player's part is shown by a single column on the chart,
labelled A through E.

While "Gray Code for Five" arranged its combination for the least possible disruption between steps, this piece arranges the combinations for the most disruption. "On Gray Code and Other Algorithms" on page 32 describes the mathematical basis for this piece.

Mathematical assistance by Joe Noakes.

Original spreadsheet design by Jonathan Matis.

AntiGray for Five

The cell for that player and event
shows the player's action at the start of the event:

+	Begin playing
-	End playing
=	Continue playing
(blank)	Continue silence.

Any player who is to start or stop
may trigger the transition
by clearly signalling,
audibly or visually.

The others should respond
as quickly as possible,
avoiding 'jump-cut' abruptness.

A player may, at any time,
gesture to indicate or question
the current step number.

In case of disagreement,
negotiate wordlessly to arrive at consensus.

If no consensus can be found,
move to the earliest step number
being suggested.

AntiGray for Five

	A	B	C	D	E	Graph					
0											
1	+	+	+	+	+	1	2	3	4	5	
2	=	-	-	-	-	1					
3	-	+	+	+	+		2	3	4	5	
4	+	=	-	-	-	1	2				
5	-	-	+	+	+			3	4	5	
6		+	-	-	-		2				
7	+	-	+	+	+	1		3	4	5	
8	-	+	=	-	-		2	3			
9	+	-	-	+	+	1			4	5	
10	=	+	+	-	-	1	2	3			
11	-	-	-	+	+				4	5	
12	+		+	-	-	1		3			
13	-	+	-	+	+		2		4	5	
14		-	+	-	-			3			
15	+	+	-	+	+	1	2		4	5	
16	-	-	+	=	-			3	4		

AntiGray for Five

17	+	+	-	-	+	1	2			5
18	=	-	+	+	-	1		3	4	
19	-	+	-	-	+		2			5
20	+	=	+	+	-	1	2	3	4	
21	-	-	-	-	+					5
22		+	+	+	-		2	3	4	
23	+	-	-	-	+	1				5
24	-	+		+	-		2		4	
25	+	-	+	-	+	1		3		5
26	=	+	-	+	-	1	2		4	
27	-	-	+	-	+			3		5
28	+		-	+	-	1			4	
29	-	+	+	-	+		2	3		5
30		-	-	+	-				4	
31	+	+	+	-	+	1	2	3		5
end	-	-	-		-					

Ghost Dervish Beach (gamelan arabica)

Ghost Dervish Beach (gamelan arabica)

for from three to seven musicians
with pitched instruments or voices,
and either an unpitched electronic pulse
or one or more musicians on unpitched instruments

I first wrote this piece for Comma, who performed it together with soprano Linh Kaufmann and violinist Caroline Lowndes Smith on June 20, 1998. We have since performed it several times with Gray Code.

The performances have tended to be somewhat simpler than the score: we have omitted the unpitched pulse or instruments, usually starting the piece with one player (usually Matt Davis on guitar) playing the opening D steadily. We have also never used the soloing option, switched instruments during the piece, or had people with portable instruments in motion while playing.

The title of the piece is an homage to some of the minimalist works that inspired it, especially Anthony Braxton's "Ghost Trance" pieces, Terry Riley's "Persian Surgery Dervishes", and Philip Glass's "Einstein on the Beach". (The title should include a Steve Reich reference too, but we didn't find one that felt right within it.)

Ghost Dervish Beach (gamelan arabica)

In general

This piece is in the mode:

D Eb F# G A Bb C# D

sometimes called the "Jewish minor" or "hijaz mode".

The volume should be
loud enough to form
an immersive environment for the listeners,
but not so loud that
the clarity of the individual voices is lost.

If possible,
the fixed instruments and, if needed, their loudspeakers
should surround the audience,
and singers and people playing portable instruments
should be free to move around.

(If this is not possible,
more conventional placement will suffice.)

Ghost Dervish Beach (gamelan arabica)

You may change instruments
in the course of the piece,
and, with another's consent,
switch to the other player's instrument.

Beginning

The unpitched instruments (or electronic pulse)
begin by playing a quick pulse
at about 4 beats per second.
This pulse continues throughout the piece.
You may embellish the pulse
and may drop out briefly during the piece
if the pulse is clearly identifiable
from what others are playing at the time.

Continuing

The Ensemble Path

The other performers begin by
playing repeating rhythmic patterns
in the tempo of the pulse
of any length
on the pitch D
in any octave.

Ghost Dervish Beach (gamelan arabica)

Over the course of the piece,
move gradually
through the following groups of pitches
using the groups in the order listed,
but combining the pitches
 using any subset of the current group
 in any order
 in any octave
to form repeating rhythmic patterns
in the tempo of the pulse.

You may pause at any time,
as long as at least one person is playing patterns,
and may change patterns as often as you wish,
 but must play each pattern that you play
 at least twice.

Ghost Dervish Beach (gamelan arabica)

The groups are:

1. D
2. D Eb
3. D Eb F# G
4. D Eb F# G A Bb C# D
5. Bb C# D Eb F#
6. F# G A Bb
7. G A
8. D Eb F# G A Bb C# D (again)
9. A Bb C# D
10. C# D
11. D

Everyone playing patterns
should move through the groups
at approximately the same pace.

You can move to the next group when you believe
that everyone is playing your current group
or the group after it.

Do not move to the next group
if you hear anyone playing the group
before your current group.

(Since some groups are subsets
of those that precede or follow them,
it may be hard to tell if everyone has caught up.
Use your best judgment.)

Ghost Dervish Beach (gamelan arabica)

You may develop and notate patterns
as you work with the piece
before the performance
and may work with these notes
in performance.

You may synchronize pattern lengths
from time to time with other players,
and play in unison
or parallel or contrary motion with them.
These should, however, not be preplanned,
but may be allowed to happen
(or allowed not to happen)
as they occur during the improvisations.

Soloing Option

Once the ensemble is playing the first group,
any player
(though not more than half the ensemble)
may depart from the patterns
and solo on top of them.

Ghost Dervish Beach (gamelan arabica)

The solo should be significantly different
from the patterns being played,
and may incorporate
pitches outside the current group,
glissandi, non-pitched sounds, long tones,
and other materials.

It must, however, sound appropriate
within the soundscape being played
in terms of tone color, balance, style,
and other choices.

Ending

Once the pitched instruments are again
playing only the D (as Group 11),
gradually drop out, one at a time.

If instruments are playing the pulse,
continue for a brief time,
then end.

If the pulse is electronically supplied,
end it when the last performer stops,
or as soon as possible afterwards.

Instant Music

for multiple voices or instruments

Beginning

Someone makes a sound
with a clear, quick attack
and a sustain and decay
of any duration.

The others either remain silent
or respond with other sounds
with clear, quick attacks
and sustains and decays
of any duration
immediately upon hearing the first sound
so that the group of sounds,
including the first,
sound like they began
in the same instant.

Another take (like “Mountains” on page 296) on James Tenney’s idea of the “klang”. It evolved into the later piece “Lightning” on page 354.

Instant Music

Once the initial group of sounds has started,
remain silent
or continue the sounds
that you are currently sustaining
until it is clear that the initial instant has passed.

If necessary,
you may let continued sounds end gently
so that the ending of the sound
does not form another clear event.

Continuing

After sufficient time has passed,
anyone may start a new sound
with a clear quick attack
and a sustain and decay
of any duration.

The others may remain silent,
respond immediately with other sounds
or abruptly end sustained sounds
in the same instant,
or continue sounds they are currently sustaining.

Continue playing sounds
with attacks grouped together
into discrete instants
separated by the sustaining
of sounds and silences between them.

Ending

The piece ends
when everyone has started sounds
at the same instant,
after a predetermined amount of time,
at a predetermined signal,
or by consensus.

Note

This sounding may form a layer
alongside free improvisation
or other structured layers.

Lightning

Lightning

for multiple voices or instruments

Beginning

Someone plays a brief sound or cluster of sounds.
Everyone else remains silent
until that sound has clearly ended.

Continuing

Play brief sounds or cluster of sounds.
Do not begin a sound
when anyone else's brief sound is playing.

If two or more people begin sounds simultaneously,
continue playing together
for the duration of a full breath,
extending your phrases together
in whatever way seems appropriate.

A followup to "Instant Music" on page 351, working from the visual image of separate spatial areas of sound and flashes of lightning darting between them (represented by the collective phrases).

Lightning

Others may continue to play their brief sounds
while the longer collective phrases are happening,
without beginning brief sounds
when others' brief sounds are playing.

If two or more begin sounds simultaneously.
continue together into the longer phrases.

Players may signal each other
to sound together
and play longer phrases,
may let the combinations happen by chance, or
may combine these approaches.

Ending

The performance ends
after a predetermined duration,
at a predetermined signal, or
by consensus.

Worry Beads

Worry Beads

for one or more instruments

a G# a# G b F# c F c# E d D#
a# a b G# c G c# F# d F d# E
G# G a F# a# F b E c D# c# D
b a# c a c# G# d G d# F# e F
G F# G# F a E a# D# b D c C#
c b c# a# d a d# G# e G f F#
F# F G E G# D# a D a# C# b C
c# c d b d# a# e a f G# f# G
F E F# D# G D G# C# a C a# B
d c# d# c e b f a# f# a g G#
E D# F D F# C# G C G# B a A#
d# d e c# f c f# b g a# g# a

An adaptation of some of the ideas in *Simple Composition* by Charles Wuorinen (hence the name).

Worry Beads

In this chart,
 pitches in capital letters are in a single octave,
 A through G#,
 and pitches in lowercase are in the octave above it.

Starting from the a in the upper left corner,
move among the notes in the grid,
 by single steps,
 horizontally or vertically,
 each note following a note
 directly adjacent to it
 with any timbres and any rhythm.
 with or without a pulse.

End when you reach the a in the lower right corner
 playing it repeatedly
 until everyone has reached that note
 and is repeating it.

Obscure, in Coral

Obscure, in Coral

for multiple voices or instruments

The Source Score

The source score can be
any primarily homophonic composition
for multiple voices or instruments.
For example, Bach's chorale setting of
"Ein Feste Burg ist unser Gott"
would work well.

For polyphonic instruments
such as pianos or guitars,
each note of the voice's part
should be considered individually
when played on that instrument.

A tribute, in a sense, to the composers and recordings on the Obscure record label, which Brian Eno ran in the 1970s, and to the choral work of Cornelius Cardew. The piece was inspired by some of the near-simultaneities that arose when Comma recorded Matt Davis's "Prelude for Three".

If the source is not in the public domain,
performers should obtain permission
from the copyright holder
before performing a version of this piece
that is based on it.

Definitions

A chord is a set of notes
for one or more voices
that begin at exactly the same time in the score
regardless of when each ends.

Each voice that is included in that set of notes
has a note in the chord.

Obscure, in Coral

Procedure

For each chord in the source score,
in the order that the chords occur:

If it is the first chord,
or if you were not playing a note
from the previous chord:
If you have a note in the chord,
start and sustain that note.
Stagger the entrances
so that each begins, if possible,
at a different time than any other person
who has a note within the chord.
The order and timing of the voices' entrances
should vary throughout the performance.

If you were already playing
a note from a previous chord:
If you have a note in the current chord,
If the pitch of the note
in the current chord is different
from the note in the previous chord,
change smoothly to the new note
without a pause between them.
If the pitch of the note
in the current chord is the same
as the pitch in the new chord,
distinguish the notes in some way,
such as a change in tone color,
a clear attack in the new note,
or a quick pause between them.
If your note continues past
the start of the current chord,
sustain it while
those who have notes in the chord
begin them.

Obscure, in Coral

Once everyone who has notes within that chord has begun them:

If you are sounding a note that ends
before the start of the next chord,
stop sounding soon after
all the notes within the current chord
have begun.

If you are sounding a note that ends
at the start of the next chord,
if that note is followed
by a note in the next chord
without a rest between them,
stop sounding soon after
all the notes within the current chord
have begun.

If you are sounding a note that is
immediately followed
by a note in the next chord,
sustain that note
until you begin the next note.

If you are not sounding a note,
remain silent until the next chord
in which you have a note.

If, on a polyphonic instrument,
the relationship of notes
in one chord to the next is ambiguous
(such as, for example,
two notes in one chord leading into
a single note in the next),
use your best judgment as suggested
by principles of effective voice leading.

The piece ends
when all who are sounding during the last chord
have ended their notes.

If the source score indicates that the piece repeats
(such as for new verses),
these repeats may be used or omitted,
by consensus.
The performances of each repeat
should differ from each of the previous
performances of the section.

Disjoinder

Disjoinder

for multiple voices or instruments

Beginning

Someone begins playing
with a clear, quick attack,
continuing in any manner,
but without including extended silence.
The others either remain silent
or respond by beginning to play
in any manner
immediately upon hearing the first sound
so that all who are playing,
including the first,
sound like they began
in the same instant.

An attempt to achieve the type of small-group combinations and discontinuity achieved in “AntiGray for Five” on page 340 without reliance on a predetermined chart of successive events. It also follows up on “Instant Music” on page 351 in having all the players in an event begin simultaneously (which has proven difficult to communicate and implement). This piece evolved into “Tapas” on page e367.

Continuing

Someone who is playing
stops playing.

All the others who are playing
stop playing soon afterward,
ending their phrases appropriately.

Someone who was not playing in that grouping
begins playing.

If you were not playing in that grouping,
you may either remain silent
or respond by beginning to play
in any manner
immediately upon hearing the first sound.

If you were playing in that grouping,
remain silent as the new grouping plays.

The performance continues with
any number of these segments.

You may only play in a segment
if you have not played in the segment before it.

Disjoinder

(If all the performers are playing in a segment,
anyone can play in the next segment.
This can only happen, however,
in the opening segment,
or by error,
or in a segment that happens
because of this rule,
and should be avoided.)

Each segment should be fairly short,
averaging not more than a minute.

Try to avoid 'jump-cut' abruptness
in the transitions,
continuing and reviving
ideas from previous segments
in new segments, as appropriate.

Ending

The piece ends
when all remain silent
for long enough
that it is clear that no one
is beginning a new segment.

Tapas

for multiple voices or instruments

One or more (but not all) of the players play a brief event.

When they have finished, anyone who did not play in that event can choose to play in the next event.

Continue similarly, with no one playing in two consecutive events.

End after a predetermined time or by consensus.

If errors or confusions happen, work it out appropriately and with good will (assuming the good will of the others).

A distillation of “Disjoinder” on page 364, dropping the requirement that all musicians in an event start together and changing it into a form that could be explained very quickly to the performers and audience.

Tapas are a traditional Spanish cuisine, made up of an array of small, individual meat or vegetable dishes. We first performed this piece under the name “Sonic (Vegan) Tapas”, because some of the performers who do not eat animal products preferred not to perform in an event named for a meat dish.

An interesting ambiguity arose in performing this on the QslashC 2000 tour: it was hard to tell if a series of events separated by silence were part of the same event or distinct. It was also unclear whether, if a person was involved in a piece by the action of another (such as being used as a prop), that person should be considered as having been a performer in the event and therefore ineligible for the next event. We agreed to leave this issue unresolved.

Towers

Towers

for multiple voices or instruments

Beginning

Someone plays a sound having
a quick attack and
a longer sustain or decay.

An attempt to create a type of improvised homophony. This piece evolved from the series of pieces including “Mountains” on page 296, “Instant Music” on page 351, and “Lightning” on page 354. It was influenced by the same works that influenced those, as well as by Bach chorales and John Cage’s “Sculptures Musicales”.

One unexpected feature of the piece quickly became audible: due to people’s differing reaction times, a person’s immediate reaction to a sound might appear to another person to be an entirely new event, to which that person might then respond, triggering other responses in a chain reaction. We realized that this was similar to the response patterns of my father’s six dogs when they get into barking frenzies, and often refer to this piece as “My Father’s Dogs”.

One or more other people
immediately play sounds having
a quick attack and
a longer sustain or decay,
beginning them quickly enough
that they sound like part of
the same event as the first sound.

Continuing

After enough time has passed
that the next sound
would clearly begin a new event,

someone plays another sound having
a quick attack and
a longer sustain or decay.

The sound may start from silence,
or continue directly from a sound
that that person is already playing.

Towers

One or more other people
immediately play sounds having
a quick attack and
a longer sustain or decay,
beginning them quickly enough
that they sound like part of
the same event as that sound,
either starting from silence
or continuing directly from sounds
that they are already playing.

Continue like this,
with clusters of sounds
played as streams of grouped events.
Each event must include
at least one player other than
the one who made the first sound.

Players may group together
into distinct streams
for part or all of the performance.

Ending

The piece ends
after a predetermined amount of time,
at a signal,
or by consensus.