

Swarm Theory

Composed by
Gary Fagan ASCAP

Program Notes For “Swarm Theory”

A single ant or bee does not display high levels of intelligence, but their colonies do. The study of swarm intelligence is providing insights that can help humans manage complex systems from truck routing to military robots. Swarm Theory seeks to investigate this group intelligence comes from and answer the question “How do the simple actions of individuals add up to the complex behaviour of a group?”. How do hundreds of honeybees make a critical decision about their hive if many of them disagree? What enables a school of fish to co-ordinate its movements so precisely it can change direction in a flash like a single organism? The collective abilities of such animals (none of which grasps the big picture, but each of which contributes to the groups success) seem miraculous even to the biologists who study them. This piece seeks to musically depict swarm behaviour. The “insectile” sound effects and the sudden harmonic and melodic turns are used to illustrate this type of behavioural phenomenon musically. The angular lines and rhythms help convey this idea further. Researchers are currently studying swarm behaviours in the hope that they may one day help humans work toward more efficiency in dealing with large systems in our everyday lives.

Instrumentation:

| | | | |
|----|-----------------------|---|--|
| 1 | Conductor | 3 | B♭ Trumpet 1 |
| 10 | Flutes | 3 | B♭ Trumpet 2 |
| 2 | Oboe | 3 | B♭ Trumpet 3 |
| 2 | Bassoon | 2 | F Horn 1 |
| 4 | B♭ Clarinet 1 | 2 | F Horn 2 |
| 4 | B♭ Clarinet 2 | 2 | Trombone 1 |
| 4 | B♭ Clarinet 3 | 2 | Trombone 2 |
| 2 | B♭ Bass Clarinet | 2 | Trombone 3 |
| 2 | E♭ Alto Saxophone 1 | 2 | Euphonium |
| 2 | E♭ Alto Saxophone 2 | 2 | Baritone T. C. |
| 2 | B♭ Tenor Saxophone | 3 | Tuba |
| 2 | E♭ Baritone Saxophone | 2 | Chimes/Bells/Xylophone |
| | | 2 | Snare Drum/Bass Drum |
| | | 4 | Tambourine/Triangle/ Break Drum/Cabasa/Bongos |
| | | 2 | Timpani |

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Transposed Score
(Duration: 3:40)

Swarm Theory

Commissioned by the Canonsburg Middle School Symphonic Band
Paul Rush, Conductor

Composed by
Gary Fagan
ASCAP

Adagio $\text{♩} = 60$

ff

Chimes/Bells
Xylophone

ff

Snare Drum
Bass Drum

Tambourine
Triangle
Break Drum
Cabasa
Bongos

ff

Timpani

Tune G, C, F
Hard Mallets

Swarm Theory/Fagan/p. 3

10 Allegro $\text{♩} = 120$

7 8 9 11 12 13 14 15

Fl. Tap Pencil On Stand *mf*

Ob. Tap Pencil On Stand *mf*

Bsn. Tap Pencil On Stand *mf*

Bb Cl. 1 Tap Pencil On Stand *mf*

Bb Cl. 2, 3 Tap Pencil On Stand *mf*

Bb B. Cl. Tap Pencil On Stand *mf*

Eb A. Sax. 1, 2 Tap Pencil On Stand *mf*

Bb T. Sax. Tap Pencil On Stand *mf*

Eb B. Sax. Tap Pencil On Stand *mf*

Bb Tpt. 1 Tap Pencil On Stand *mf*

Bb Tpt. 2, 3 Tap Pencil On Stand *mf*

F Hn. 1 Tap Pencil On Stand *mf*

F Hn. 2 Tap Pencil On Stand *mf*

Tbn. 1 Tap Pencil On Stand *mf*

Tbn. 2, 3 Tap Pencil On Stand *mf*

Euph. Tap Pencil On Stand *mf*

Tba. Tap Pencil On Stand *mf*

Xyl. Click Mallets Together

S.D. On Rim *f*

B.D. On Rim *f*

Tamb. Tri. Click 2 Drum Sticks Together *f*

Br. Dr. Cab. Bng. *f*

Timp. Shank of mallet on Rim *f*

Swarm Theory/Fagan/p. 4

18

16 17 18 19 20 21 22 23 24

Fl.

Ob.

Bsn.

B♭ Cl. 1

B♭ Cl. 2, 3

B♭ B. Cl.

E♭ A. Sax. 1, 2

B♭ T. Sax.

E♭ B. Sax.

B♭ Tpt. 1

B♭ Tpt. 2, 3

F Hn. 1

F Hn. 2

Tbn. 1

Tbn. 2, 3

Euph.

Tba.

Xyl.

S.D.
B.D.

Tamb.
Tri.
Br. Dr.
Cab.
Bng.

Timp.

f

f

Click Sticks

On Rim

Click Sticks

On Rim

On Head

f

Swarm Theory/Fagan/p. 5

26

27

28

29

30

31

32

33

34

This musical score page contains the following parts and markings:

- Fl.**: Flute part, measures 25-34.
- Ob.**: Oboe part, measures 25-34, with a *f* dynamic marking at measure 33.
- Bsn.**: Bassoon part, measures 25-34, with a *f* dynamic marking at measure 26.
- B♭ Cl. 1**: Clarinet 1 part, measures 25-34, with a *f* dynamic marking at measure 33.
- B♭ Cl. 2, 3**: Clarinet 2 and 3 parts, measures 25-34.
- B♭ B. Cl.**: Bass Clarinet part, measures 25-34.
- E♭ A. Sax. 1, 2**: Alto Saxophone 1 and 2 parts, measures 25-34.
- B♭ T. Sax.**: Tenor Saxophone part, measures 25-34.
- E♭ B. Sax.**: Baritone Saxophone part, measures 25-34, with a *f* dynamic marking at measure 26.
- B♭ Tpt. 1**: Trumpet 1 part, measures 25-34, with a *f* dynamic marking at measure 33.
- B♭ Tpt. 2, 3**: Trumpet 2 and 3 parts, measures 25-34, with a *f* dynamic marking at measure 33.
- F Hn. 1**: Horn 1 part, measures 25-34, with a *f* dynamic marking at measure 26.
- F Hn. 2**: Horn 2 part, measures 25-34, with a *f* dynamic marking at measure 26.
- Tbn. 1**: Trombone 1 part, measures 25-34, with a *f* dynamic marking at measure 26.
- Tbn. 2, 3**: Trombone 2 and 3 parts, measures 25-34, with a *f* dynamic marking at measure 26.
- Euph.**: Euphonium part, measures 25-34, with a *f* dynamic marking at measure 26.
- Tba.**: Tuba part, measures 25-34.
- Xyl.**: Xylophone part, measures 25-34, with a *f* dynamic marking at measure 33.
- Percussion**: Includes S.D. (Snare Drum), B.D. (Bass Drum), Tamb. (Tambourine), Tri. (Triangle), Br. Dr. (Bongos), Cab. (Cajon), Bng. (Bongos), and Timp. (Timpani).
 - Click Sticks**: Marked above S.D. and B.D. in measures 25-26.
 - On Head**: Marked above S.D. in measures 27-34.
 - Tamb.**: Marked above Br. Dr. in measures 31-34.
 - Bongos**: Marked above Bng. in measures 31-34, with a *f* dynamic marking at measure 31.
- Timp.**: Timpani part, measures 25-34, with a *f* dynamic marking at measure 26.

Swarm Theory/Fagan/p. 6

35 36 37 38 39 40 41 42 43 44

Fl.

Ob.

Bsn.

B♭ Cl. 1

B♭ Cl. 2, 3

B♭ B. Cl.

E♭ A. Sax. 1, 2

B♭ T. Sax.

E♭ B. Sax.

B♭ Tpt. 1

B♭ Tpt. 2, 3

F Hn. 1

F Hn. 2

Tbn. 1

Tbn. 2, 3

Euph.

Tba.

Xyl.

S.D.
B.D.

Tamb.
Tri.
Br. Dr.
Cab.
Bng.

Timp.

div.

Detailed description: This is a page of a musical score for a large ensemble. It covers measures 35 through 44. The score is written in a key signature of two flats (B-flat major or D-flat minor) and a common time signature. The instruments listed on the left are: Flute (Fl.), Oboe (Ob.), Bassoon (Bsn.), Clarinet in B-flat (B♭ Cl. 1 and 2, 3), Bass Clarinet (B♭ B. Cl.), Alto Saxophone (E♭ A. Sax. 1, 2), Tenor Saxophone (B♭ T. Sax.), Baritone Saxophone (E♭ B. Sax.), Trumpet in B-flat (B♭ Tpt. 1 and 2, 3), Horn in F (F Hn. 1 and 2), Trombone (Tbn. 1, 2, 3), Euphonium (Euph.), Tuba (Tba.), Xylophone (Xyl.), and Percussion (S.D., B.D., Tamb., Tri., Br. Dr., Cab., Bng., Timp.). The percussion parts include snare drum (S.D.), bass drum (B.D.), tambores, triangles, bongo drums, conga drums, and timpani (Timp.). The woodwind and brass parts feature various rhythmic patterns, including eighth and sixteenth notes, and some parts have slurs and accents. A 'div.' (divisi) marking is present in the second trumpet part at measure 38. The score is presented on a single page with measures numbered 35 to 44 at the top.

Swarm Theory/Fagan/p. 7

45 46 47 **48** 49 50 51 52 53 54

Fl. *f*

Ob. *f*

Bsn.

Bb Cl. 1 *f*

Bb Cl. 2, 3 *f*

Bb B. Cl.

Eb A. Sax. 1, 2 *f*

Bb T. Sax.

Eb B. Sax.

Bb Tpt. 1 *f*

Bb Tpt. 2, 3 *f* *div.*

F Hn. 1

F Hn. 2

Tbn. 1

Tbn. 2, 3

Euph.

Tba.

Xyl. *f*

S.D. B.D.

Tamb. Tri. Br. Dr. Cab. Bng.

Timp.

Swarm Theory/Fagan/p. 8

58

55 56 57 58 59 60 61 62 63 64

Fl. *f*

Ob. *f*

Bsn. *legato*
mf

B♭ Cl. 1 *f*

B♭ Cl. 2, 3 *f*

B♭ B. Cl.

E♭ A. Sax. 1, 2 *f*

B♭ T. Sax.

E♭ B. Sax. *legato*
mf

B♭ Tpt. 1 *mf*

B♭ Tpt. 2, 3 *mf*

F Hn. 1 *legato*
mf

F Hn. 2 *legato*
mf

Tbn. 1 *legato*
mf

Tbn. 2, 3 *legato*
mf

Euph. *legato*
mf

Tba. *legato*
mf

Xyl. *f* Bells *mf* Xyl. *mf*

S.D. B.D. *mf*

Tamb. Tri. *Tri.*

Br. Dr. Cab. Bng. *Cabasa* *mf*

Timp.

Swarm Theory/Fagan/p. 9

Musical score for Swarm Theory/Fagan/p. 9, page 74. The score includes parts for Flute (Fl.), Oboe (Ob.), Bassoon (Bsn.), Clarinets (Bb Cl. 1, Bb Cl. 2, 3), Saxophones (Eb A. Sax. 1, 2, Bb T. Sax., Eb B. Sax.), Trumpets (Bb Tpt. 1, Bb Tpt. 2, 3), Horns (F Hn. 1, F Hn. 2), Trombones (Tbn. 1, Tbn. 2, 3), Euphonium (Euph.), Tuba (Tba.), Xylophone (Xyl.), Percussion (S.D., B.D., Tamb., Br. Dr., Cab., Bng., Timp.), and Bassoon. The score is in 3/4 time with a key signature of two flats. It features various dynamics such as marcato, f, and mf.

Swarm Theory/Fagan/p. 10

76 77 78 79 80 81 82 83 84 85 Pencil on Stand

Fl. *f* *ff* Pencil on Stand

Ob. *f* *ff* Pencil on Stand

Bsn. *f* *ff*

B♭ Cl. 1 *f* *ff*

B♭ Cl. 2, 3 *f* *ff*

B♭ B. Cl. *f* *ff*

E♭ A. Sax. 1, 2 *f* *ff*

B♭ T. Sax. *f* *ff* Pencil on Stand

E♭ B. Sax. *f* *ff*

B♭ Tpt. 1 *f* *ff* Pencil on Stand

B♭ Tpt. 2, 3 *f* *ff* Pencil on Stand

F Hn. 1 *f* *ff* Pencil on Stand

F Hn. 2 *f* *ff* Pencil on Stand

Tbn. 1 *f* *ff* Pencil on Stand

Tbn. 2, 3 *f* *ff* Pencil on Stand

Euph. *f* *ff* Pencil on Stand

Tba. *f* *ff* Pencil on Stand

Xyl. Xyl. & Bells *f* *ff* Pencil on Stand

S.D. B.D. *f* *ff* On Rim

Tamb. Tri. Br. Dr. Cab. Bng. *f* *ff* On Rim

Timp. *f* *ff*

Swarm Theory/Fagan/p. 11

86

87

88

89

90

91

92

93

94

95

96

Fl. *f*

Ob. *f*

Bsn. *f* *mf*

B♭ Cl. 1 *f* *mf*

B♭ Cl. 2, 3 *f* *mf*

B♭ B. Cl. *f* *mf*

E♭ A. Sax. 1, 2 *f* *mf*

B♭ T. Sax. *f*

E♭ B. Sax. *f* *mf*

B♭ Tpt. 1 *f*

B♭ Tpt. 2, 3 *f*

F Hn. 1 *f*

F Hn. 2 *f*

Tbn. 1

Tbn. 2, 3

Euph. *f*

Tba.

Xyl. *f* Bells Only

S.D. B.D. *f* *mf* On Head

Tamb. Tri. Br. Dr. Cab. Bng. *mf*

Timp.