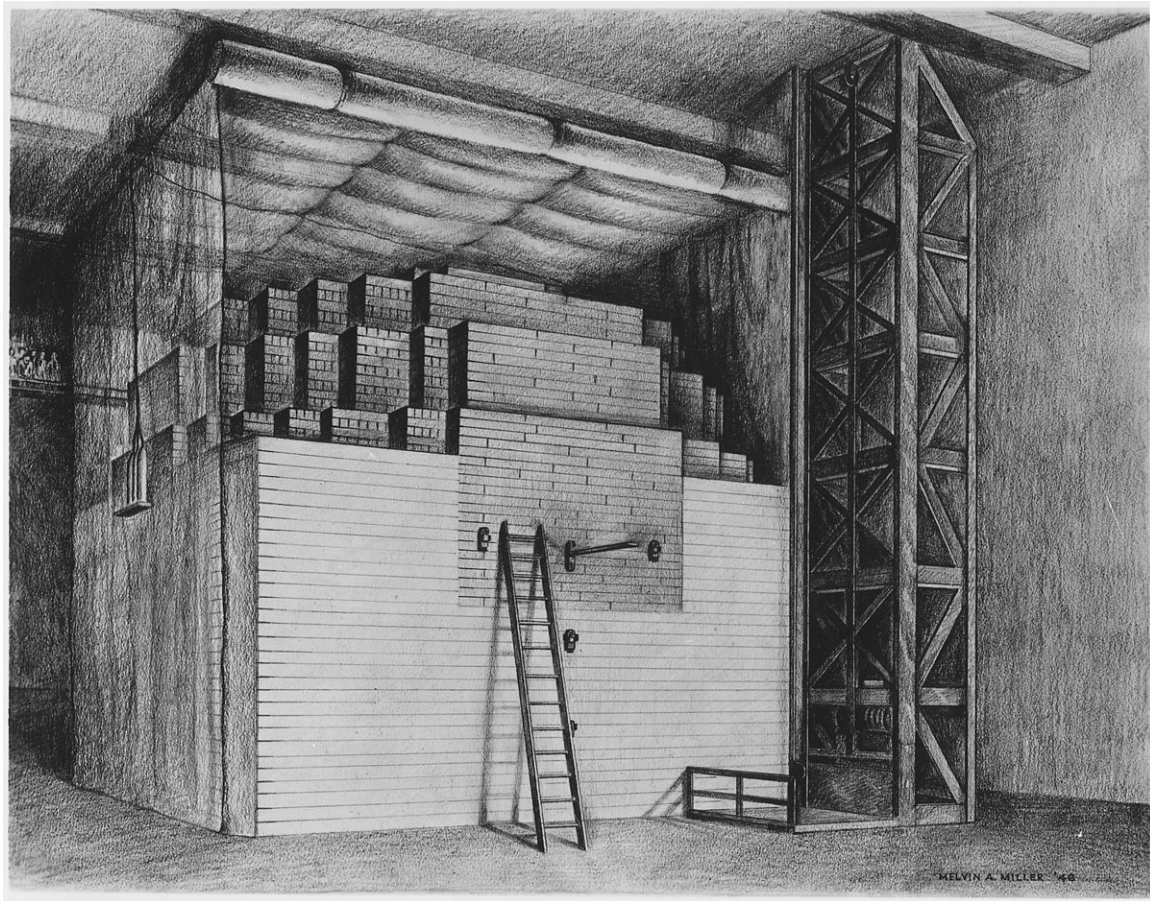


Chain Reactions

2017

for flute/alto flute, vibraphone/crotales, and pian



Commissioned for the 75th commemoration of Chicago Pile-1

Clifton Callender

Chain Reactions was commissioned for the 75th Commemoration of Chicago Pile-1, the first controlled, self-sustaining nuclear chain reaction achieved under the supervision of Enrico Fermi. The first movement, *Subcriticality*, refers to the situation in which neutron losses (due to absorption) exceed neutron production (due to fission) leading to eventual termination of the reaction. Throughout the movement, processes are initiated but inevitably dissipate energy and terminate. The second movement, *Criticality*, is stable without being static. The rhythms of the movement are determined by a guided probabilistic structure in much the same way that the “cross section” of a nucleus characterizes the probability that the nucleus will undergo a nuclear reaction.

Chain Reactions

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Clifton Callender

I. Subcriticality

Allegro ♩ = 132-138

alto flute

tongue ram *

f possibile

vibraphone

piano

mf

p

8vb

Sost. Leo.

senza Leo.

sempre al fine

a fl

vb

pn

mf

f

mp

f

f

(*Sost. Leo.*)

* Finger diamond notehead; lower notehead is the sounding pitch.

11

a fl *mp* *ff*

vb *mp* *ff*

pn *mp* *ff*

(Sost. *Reo*)

16

a fl *p* *ff* *p* *ff*

vb *p* *ff* *p* *ff*

pn *p* *ff* *p* *ff*

(Sost. *Reo*)

22

a fl *p* *f*

vb *p* *f* *Ped.* *Ped.* *Ped.*

pn *p* *f* *Ped.* *Ped.* *** *Ped.*

(Sost. *Reo*)

27

a fl

vb

pn

f possibile

p

f

(Sost. Leo)

* *f*

35

a fl

vb

pn

mf *mp* *f*

mf *mp* *f*

(Sost. Leo)

41

a fl

vb

pn

mp *ff* *mfpp* *mfpp*

mp *ff* *mf*

ff *mp*

p

(Sost. Leo)

Leo *Leo*

47

a fl *mf pp* *mf pp* *mf* 5:3 *f p* *f p* *f p*

vb *mf* 5:3 *mf*

pn *mp* *mf* 5:3 *mf* 5:3 *Reo.* *Reo.* *Reo.*

(Sost. Reo.) * *senza Reo.*

52

a fl *f p* *f p* *f p* *f p* *f p*

vb *mp* *f*

pn *f* *Reo.* *Reo.* *Reo.* *Reo.* *Reo.* * *senza Reo.*

(Sost. Reo.)

57

a fl *p* *ff*

vb *ff*

pn *ff*

(Sost. Reo.)

62

a fl

62

vb

62

pn

(Sost. And.)

fl

vb

pn

(Sost. Leo)

ff

Leo

122 128

[illegible]

79

a fl

f possibile

vb

più f *f*

pn

più f *f*

(Sost. Xco)

83 *to flute*

a fl

vb

f *ff*

pn

f *ff*

(Sost. Xco)

87

a fl

vb

8va *Ped.* *8va*

pn

f

(Sost. Xco)

This musical score is for a piece featuring flute, vibraphone, and piano. The score is divided into three systems, each with measures 92, 97, and 102. The flute part includes a 'flute' marking and a 'ff' dynamic. The vibraphone part includes a 'ff' dynamic. The piano part includes a 'fff' dynamic and a 'Sost. Leo.' marking. The score is written in 2/4 time and features various musical notations, including notes, rests, and dynamic markings.

fl

vb

pn

107

4:3

4:3

(Sost. ♩)

Detailed description: This system covers measures 107 to 110. The flute and violin parts play a series of eighth and sixteenth notes with various accidentals (flats, naturals, sharps) and accents. The piano accompaniment consists of chords in the right hand and single notes or dyads in the left hand. A 4:3 ratio is marked for the first two measures, indicating a tempo change.

fl

vb

pn

111

(Sost. ♩)

Detailed description: This system covers measures 111 to 113. The flute and violin parts continue with similar rhythmic patterns. The piano accompaniment features chords in the right hand and single notes or dyads in the left hand. The tempo remains at the 'Sost. ♩ ' level.

fl

vb

pn

114

5

5:3

5:3

(Sost. ♩)

Detailed description: This system covers measures 114 to 117. Measures 114 and 115 continue the previous patterns. Measures 116 and 117 show a change in the piano accompaniment, with the right hand playing chords and the left hand playing single notes. A 5:3 ratio is marked for the last two measures, indicating a tempo change.

flute m. 119 – 125 independent of notated tempo and meter

presto possibile poco a poco ritardando e decrescendo

repeat figure through m. 125

119

fl *ff*

119 percussion and piano m. 119 – 125 maintain notated tempo and meter

119 percussion and piano m. 119 – 125 maintain notated tempo and meter

pn (Sost. *Reo.*) *mf* *Reo.* 5:3 5:3

al ♩ = 52 *pizz.* *mp* *fff_p* *fff_p* *fff_p* *fff_p* *8^{va}* *8^{va}* *8^{va}* *8^{va}*

124 *crotales* *ff* *8^{va}* wait for flute to finish figure

pn (Sost. *Reo.*) *8^{vb}* *ff* *Reo.*

----- (Sost. *Reo.*) -----

*

* Dampen immediately.

II. Criticality

$\text{♩} = 176$

flute

vibraphone **

piano **

fl

vb

pn

ff *p* *ff* *ff mp* *p*

ff *p* *ff* *ff mp* *p*

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

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

mf *f* *ff* *p*

mf *f* *ff* *p*

ff *p*

* Flute and vibraphone equally balanced throughout movement.

** Pedal ad lib. Use sparingly!

System 1 (Measures 20-24):

- fl:** Starts at measure 20. Dynamics: *f*, *mf*, *p*.
- vb:** Starts at measure 20. Dynamics: *f*, *mf*, *p*.
- pn:** Starts at measure 20. Dynamics: *ff*, *p*, *f*, *p*, *f*.

System 2 (Measures 25-29):

- fl:** Starts at measure 25. Dynamics: *mf*, *mp*, *f*, *ff*, *f*, *ff*, *mp*.
- vb:** Starts at measure 25. Dynamics: *mf*, *mp*, *f*, *ff*, *f*, *ff*, *mp*.
- pn:** Starts at measure 25. Dynamics: *ff*, *mf*, *ff*, *p*. Includes a *pizz.* marking above the right hand in measure 28.

System 3 (Measures 30-34):

- fl:** Starts at measure 30. Dynamics: *mf*. Includes a *pizz.* marking above the staff in measure 30.
- vb:** Starts at measure 30. Dynamics: *mp*. Includes a *dead stroke* marking above the staff in measure 30.
- pn:** Starts at measure 30. Dynamics: *mp*, *mf*, *p*.

35

fl *mf* *mf*

vb *mf* *mp*

pn *p* *mf* *mp* *mf* *f* *ff*

39

fl *f* *ff* *p* *ff* *mf*

vb *f* *ff* *p* *ff* *mf*

pn *p* *ff*

44

fl *ff* *mp* *f* *p* *mf* *ff* *mf*

vb *ff* *mp* *f* *p* *mf* *ff* *mf*

pn *mp* *mf* *mp* *mf* *ff* *p*

fl 48 *f* *ff* pizz. *p* *cresc.*

vb 48 *f* *ff* dead stroke *pp* *cresc.*

pn 48 *f* *pp*

fl 53 *al f*

vb 53 *al f*

pn 53 *f* *ff* *8va* *p* *mf* *f*

fl 57 *ff* *ff* *mf* *f*

vb 57 *ff* *ff* *mf* *f*

pn 57 *mf* *f* *mf* *f* *ff* *f*

Detailed description: This musical score is for a piece titled 'Chain Reactions'. It consists of three systems of staves for flute (fl), vibraphone (vb), and piano (pn). The first system covers measures 48 to 52. The flute and vibraphone parts begin with a forte (*f*) dynamic, followed by fortissimo (*ff*), and then a pizzicato (*pizz.*) section with a piano (*p*) dynamic and a crescendo (*cresc.*). The piano part starts with a forte (*f*) dynamic and then moves to pianissimo (*pp*). The second system covers measures 53 to 56. The flute and vibraphone parts continue with an *al f* (all fortissimo) dynamic. The piano part features a variety of dynamics including *f*, *ff*, *p*, *mf*, and *f*, with an *8va* (octave up) marking. The third system covers measures 57 to 60. The flute and vibraphone parts show a sequence of dynamics: *ff*, *ff*, *mf*, and *f*. The piano part continues with *mf*, *f*, *mf*, *f*, *ff*, and *f*.

[illegible]