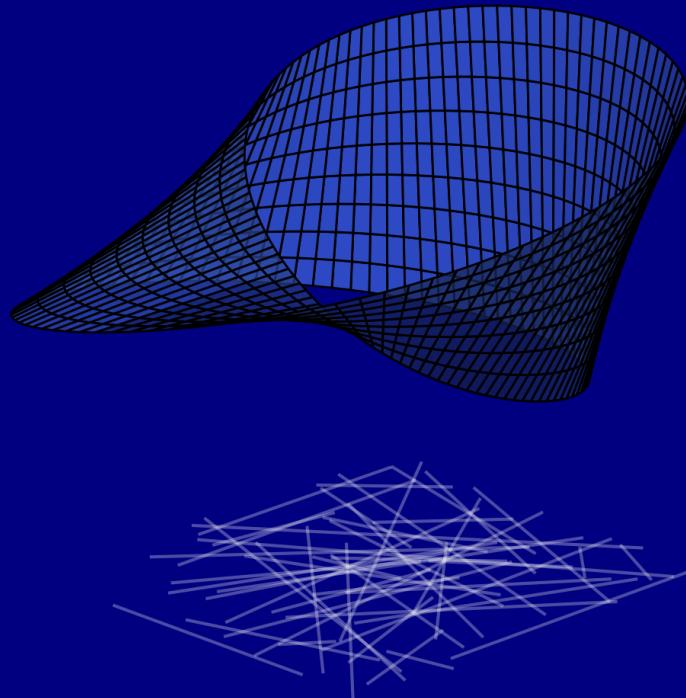


# I am a Strange Loop

for saxophone quartet



Juan S. Vassallo  
2024

# I am a Strange Loop

*For Saxophone Quartet, Accordion and Organetto Portativo/Synthesizer*

## ***Synopsis***

A *strange loop* can be seen as a form of recursion that creates a sense of infinity: it describes elements that appear repeated in self-similar ways. The piece 'I am a Strange Loop' is inspired by this idea but in relation to how *our* self and consciousness can arise out of mere organic matter. According to Douglas Hofstadter, our consciousness and self are a result of complex self-referential loops in the brain. Our sense of self arises from the recursive processes of thought, reflection, and self-awareness. In this piece, I investigated this idea and its metaphorical translation into a musical narrative. From a constructive standpoint, I have formalized several musical parameters from a preexistent composition -the Canon N. 3 from The Musical Offering BWV 1079 by J.S. Bach- and resynthesized them into a new musical work in a way that these parameters emerge across multiple new musical dimensions, such as scales, tuning, rhythm, dynamics, and timbre. In addition, part of the artistic investigation in this piece was focused on generating real-time synthesis and sound processing based on brain data readings using an fNIRS helmet via the use of a newly developed software interface that communicates between the fNIRS helmet and Ableton Live.

## ***fNIRS***

Functional near-infrared spectroscopy (fNIRS) is a non-invasive tool to continuously assess the oxygenation of localized areas of the brain. By utilizing the near-infrared spectrum, fNIRS allows light to pass through biological tissues, where it is absorbed by chromophores like oxyhemoglobin and deoxyhemoglobin<sup>1</sup>. The key advantage of fNIRS lies in its portability, as it consists only of a helmet connected wirelessly to a signal amplifier, and its capacity for monitoring natural-life situations, such as a musical performance<sup>2</sup>.

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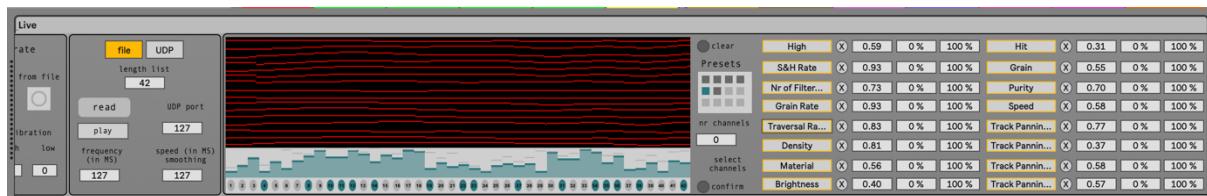
<sup>1</sup> Hasan Ayaz et al., "Chapter 3 - The Use of Functional Near-Infrared Spectroscopy in Neuroergonomics," in *Neuroergonomics*, ed. Hasan Ayaz and Frédéric Dehais (Academic Press, 2019).

<sup>2</sup> Atsumichi Tachibana et al., "Prefrontal activation related to spontaneous creativity with rock music improvisation: A functional near-infrared spectroscopy study," *Scientific Reports* 9, no. 1 (2019), <https://doi.org/10.1038/s41598-019-52348-6>, <http://dx.doi.org/10.1038/s41598-019-52348-6>, and

## *fNIRS\_to\_Live*

In order to be performed with electronics coming from brain readings, the piece requires a NIRSport2 fNIRS helmet<sup>3</sup> and the Max4Live device *fNIRS\_to\_Live*. This software can be requested to [juan.vassallo@uib.no](mailto:juan.vassallo@uib.no).

The *fNIRS\_to\_Live* device, developed by Juan S. Vassallo and Ryan McCardle, directly communicates between an fNIRS helmet and Ableton Live, enabling real-time work with spectroscopic brain readings as a source for live artistic experimentation, both in sound and video. It is capable of receiving a stream of 42 channels as OSC messages via a UDP receiver function. From these 42, it is possible to choose those to be shown on the graphic viewer and map these lines (up to 8 simultaneously) as control signals for diverse Live -and external- audio and MIDI effects via the *mapping* function. In addition, the device includes a *calibration* function that learns the maximum and minimum values of each channel over a desired time and a *hand scaling* tool that allows for choosing manually the upper and lower values to be scaled. In a second version, I adjusted the normalization function, added a filter function, and a speed limit for the data reception, which yields a smoother stream of numbers.



User interface of fNIRS\_to\_Live

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<sup>3</sup> More information here: <https://nirx.net/nirsport>

# I am a strange loop

Performer's notes

## Vibrato

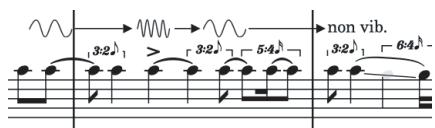
Different types of vibrato are indicated with a wavy line above the notehead:

wide and slow:

wide and fast:

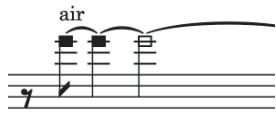
no vibrato: no vib.

The arrows indicate transitions between them. E.G.:

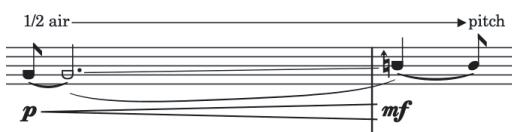


## Air sounds

Air sounds means the sound of air through the instrument (no pitch). A square notehead indicates only air sound, and different degrees of 'airiness' are indicated as 'air' (only air sound); '3/4 air' (a little of pitch sound); '1/2 air' (half air/half pitch); '1/4 air' (almost no air sound); 'pitch' (no air, normal sound). Of course these indications with fractions are relative.



Transitions are indicated with an arrow and changes in the shape of the notehead (square to half square/half round notehead, and viceversa).



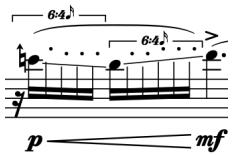
## Articulations

Bisbigliando means timbral/microtonal changes over a repeated pitch. It is indicated with 'bisb.' over the notehead, a staccato dot plus a slur:



## Embochure bending

Bend from the initial to destination note using the embochure. If not possible, use half-open keys. Articulate the notes slightly staccato.



## Microtonality

Microtonal symbols:

= slightly higher than flat

= slightly higher than natural

= slightly lower than natural

= slightly higher than sharp

= slightly lower than sharp

= quarter-tone sharp (in-between natural and sharp)

= quarter-tone sharp (in-between natural and sharp)

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## I am a strange loop

13

S. Sax.

A. Sax.

T. Sax.

Bar. Sax.

poco accel.  $\text{♩} = 72$

17

S. Sax.

A. Sax.

T. Sax.

Bar. Sax.

21

S. Sax.

A. Sax.

T. Sax.

Bar. Sax.

25

S. Sax.

A. Sax.

T. Sax.

Bar. Sax.

*poco accel.* = ca. 85

29

S. Sax.

A. Sax.

T. Sax.

Bar. Sax.

32

S. Sax.

A. Sax.

T. Sax.

Bar. Sax.

## I am a strange loop

34

S. Sax. *f* *mf* *mf* *f* *mf* *mf* *f* *mf* *f* *mf*

A. Sax. *mf* *f* *mf* *f* *mf*

T. Sax. *f* *mf* *f* *mf* *f* *mf* *pp* *123\_4\_c3*

Bar. Sax. *mf* *mf* *f* *mf* *f* *mf*

=

37

S. Sax. *mf* *f* *mf* *f* *mf* *f* *mf*

A. Sax. *f* *mf* *pp* *p* *7* *8va\_c1c2c3c4*

T. Sax. *mf* *f*

Bar. Sax. *f* *mf* *f* *mf* *non vib.* *3:2*

=

40

S. Sax. *f* *mf* *f* *mf*

A. Sax. *f* *mf* *f* *mf*

T. Sax. *mf* *pp* *123\_567\_V2*

Bar. Sax. *f*

I am a strange loop

5

43

S. Sax.

A. Sax.

T. Sax.

Bar. Sax.

*f* *mf*

13\_456\_Eb

*mf* *f* *mf* *f*

123\_45\_c3

*f* *mf* *mf*

*ff* *mf*



poco rall.....

123\_Bb\_456\_Eb \*

46

S. Sax.

A. Sax.

T. Sax.

Bar. Sax.

non vib.

*ff* *mf*

*ff* *mf* *ff*

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

*f* *p* *ff*

\* No. 85 in 'Les sons multiples' (Kienzy)



51

**B** ♦ = ca. 85–90

S. Sax.

A. Sax.

T. Sax.

Bar. Sax.

*ppp*

123\_4\_c3

*ppp sub.* *ff* *mf*

*ffff* *mf*

## I am a strange loop

56

S. Sax.  
A. Sax.  
T. Sax.  
Bar. Sax.

59

S. Sax.  
A. Sax.  
T. Sax.  
Bar. Sax.

\* No. 34 in 'Les sons multiples' (Kientzy)

62

S. Sax.  
A. Sax.  
T. Sax.  
Bar. Sax.

I am a strange loop

7

65

S. Sax.

A. Sax.

T. Sax.

Bar. Sax.

bisb.

8va\_c1c2c3

p pp p pp

bisb.

bisb.

p



68

S. Sax.

A. Sax.

T. Sax.

Bar. Sax.

bisb.

(no bisb.)

8va\_c1c2c3c4

pp p pp p pp p pp p

repeat morendose...

123\_Bb\_46

p > pp p > mp p > p pp > pp

bisb.

repeat morendose...

repeat morendose...

repeat morendose...

72

C

$\text{♩} = 65$

ac . . . ce . . . le . . . ran . . . do . . .  $\text{♩} = 130$  ri . tar . dan . do .

S. Sax.

A. Sax.

T. Sax.

Bar. Sax.

12

ppp

12

ppp

12

ppp

12

ppp

## I am a strange loop

75      = 75 ac . ce . le . ran . do      = 120      ral . . . . . len . . . . . tan . . . . . do

S. Sax. 

A. Sax.

T. Sax.

Bar. Sax.



77

S. Sax.  $\text{F} = 100 \text{ ral}$  len tan do  $\text{F} = 80 \text{ ral}$

A. Sax.

T. Sax.  $\text{F} = 14$   $\text{F} = 12$

*ppp*

Bar. Sax.  $\text{F} = 14$   $\text{F} = 12$

*ppp*



Musical score for S. Sax., A. Sax., T. Sax., and Bar. Sax. The score consists of four staves. The first three staves (S. Sax., A. Sax., T. Sax.) play a continuous eighth-note pattern in 12/8 time, with measure 79 ending on a fermata and measure 80 starting with a dynamic *pppp*. The fourth staff (Bar. Sax.) remains silent throughout both measures.

I am a strange loop

9

81

S. Sax.  $\text{♩} = 45$  ral . . . len . . . tan . . . do . . .  $\text{♩} = 35$  ac . . . ce . . . le . . . ran . . . do . . .

A. Sax.

T. Sax.

Bar. Sax.

**12** **14**

**p**



83

S. Sax.  $\text{♩} = 105$  ral . . . len . . . tan . . . do . . .  $\text{♩} = 70$

A. Sax.

T. Sax.

Bar. Sax.

**14** **8** **4** **8va\_123\_457\_c3**

**mp** **ppp**

**mp** **ppp**

**p** **ppp**

**p** **ppp**

**ppp** **<>**

Transition to Improvisation

Choose alternatively from these multiphonics (don't repeat successively). Each multiphonic corresponds to the cresc./dim. gestures in the next box.

Repeat several times (each musician plays independently)

87

S. Sax.  $\text{23_456_Eb}$   $\text{8va_123_G\#}$

$\text{13_456_EbBb}$   $\text{123_456_Bb_ta}$

A. Sax.  $\text{123_457_C\#_c3}$   $\text{123_457_Bb}$

$\text{s8va_c1c2}$   $\text{123_457}$

T. Sax.  $\text{12_456_Eb}$

$\text{X_23_567_V1}$   $\text{123_c1}$

Bar. Sax.  $\text{8va_123_457_c3}$   $\text{X2_45_ta}$

$\text{8va_123_4567}$   $\text{8va_c1c2}$

**dur: 1:30 min approx.**

**Play the chosen multiphonic cresc./dim.**

**after repeating, arrive to the fermata and wait for the other musicians**

**ppp**

## I am a strange loop

*Repeat several times each box  
(each musician plays independently)*

*Change the speed and the duration  
of the gestures every repetition*

vib.

S. Sax. 88

vib.

A. Sax.

vib.

T. Sax.

vib.

Bar. Sax.

1:30 aprox.



*Repeat several times each line  
(each musician plays independently)*

vib.

S. Sax. 89

pitch → air

pp pp ppp

A. Sax.

pp ppp

T. Sax.

pp ppp pp

Bar. Sax.

pp ppp pp

1:30 aprox.



*Repeat several times each line  
air only*

S. Sax. 90

pp ppp

A. Sax.

pp pp

T. Sax.

pp pp

B. Sax.

pp pp

1:00 aprox.

# I am a strange loop

72 C ♫ 65 ac - ce - le ran do ♫ = 130 ri tar dan do ♫ = 75 ac ce le ran do ♫ = 120 ral - - - - - len - - - - tan - - - -

Soprano Saxophone ♫ 12 ppp 10 6 pp 16 pp 14

Alto Saxophone ♫ 12 ppp 10 6 pp 16 pp 14

Tenor Saxophone ♫ 12 ppp 10 6 pp 16 pp 14

Baritone Saxophone ♫ 12 ppp 10 6 pp 16 pp 14

Accordion ♫ 12 Prolongue the notes from the quartet indicated with arrows. Time is approximate. 10 6 16 14

Organ ♫ 12 ppp scordatura 10 6 16 14

ppp Prolongue the notes from the quartet indicated with arrows. Time is approximate.

.9 ct. -60 ct. -70 ct. -70 ct. -13 ct. -49 ct. -26 ct.

=

77 do - - - - - ♫ = 100 ral - - - - - tan - - - - - do - - - - - ♫ = 80 ral - - - - - len - - - -

S. Sax. ♫ 14 12 12 12 12 12

A. Sax. ♫ 14 12 12 12 12 12

T. Sax. ♫ 14 12 12 12 12 12

Bar. Sax. ♫ 14 ppp 12 12 12 12 12

Accord. ♫ 14 ppp 12 12 12 12 12

Org. ♫ 14 12 12 12 12 12

79 tan do  $\text{ral} = 45$  len tan do  $\text{ac} = 35$  ce le ran do

S. Sax. 12  $\text{ppp}$  10 8 12 14

A. Sax. 12 10 8 12 14

T. Sax. 12 10 8 12 14  $p$

Bar. Sax. 12 10 8 12 14  $p$

Accord. 12 10 8 12 14

Org. 12 10 8 12 14



$\text{ral} = 105$  len tan do  $= 70$  Transition to Improvisation

S. Sax. 14  $mp$  8 4  $ppp$

A. Sax. 14  $mp$  8 4  $ppp$

T. Sax. 14  $p$  8 4  $ppp$

Bar. Sax. 14  $p$  8 4  $ppp$

Accord. 14  $ppp$  8 4

Org. 14  $ppp$  8 4  $pppp$

*Repeat several times (each musician plays independently)*

S. Sax. *Play the chosen multiphonic cresc./dim.*

A. Sax. *after repeating, arrive to the fermata and wait for the other musicians*

T. Sax.

Bar. Sax.

Accord. *Improvise as a response to the saxophone quartet*

Org. *Improvise as a response to the saxophone quartet*

*Repeat several times each box (each musician plays independently)*

*Change the speed and the duration of the gestures every repetition*

87

1:30 approx.

1:30 approx.

1

*Repeat several times each line  
(each musician plays independently)*

89 vib. pitch → air

S. Sax. **ppp**

A. Sax. **ppp**

T. Sax. **ppp**

Bar. Sax. **ppp**

Accord. { *Improvise as a response to the saxophone quartet* →

Org. { *Improvise as a response to the saxophone quartet* →

1:30 approx. | 1:00 approx.