

Daniel Petti

## **PART 1:**

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LSYSTEM:

VOCABULARY:

[A B C]

A -> B B A

B -> C C B

C -> A A C

START : CAB

GENERATION 1: A A C B B A C C B

GENERATION 2: B B A B B A A A C C C B C C B B B A A A C A A C C C B

Clay Commands :

LPATTERN: SB SB SA SB SB SA SA SA SC SC SC SB SC SC SB SB SB SA SA SA SC SA

SA SC SC SC SB

LPIECE >> AGOGO S3 4LPATTERN X3

SA >> X2 PLAY S2

SB >> PLAY 1RP PLAY PLAY 2RP PLAY 2LP PLAY 1LP

SC >> PLAY LP PLAY RP

The Midi file was unable to save to my machine on my configuration, so it has been omitted.

## PART 2:

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Turtle Player:

LSYSTEM:

VOCABULARY [A B C D]

A : B C

B : D A

C : D C

D : D B

Start: A B C D

G0: A B C D

G1: B C D A D C D B

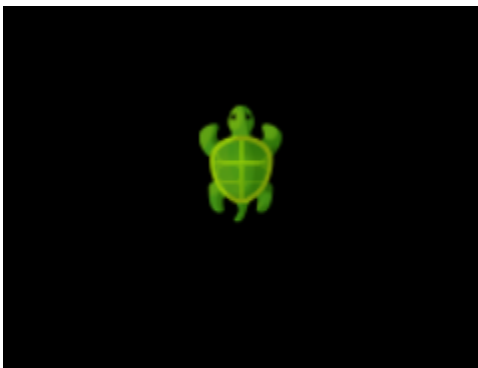
G2: D A D C D B B C D B D C D B D A

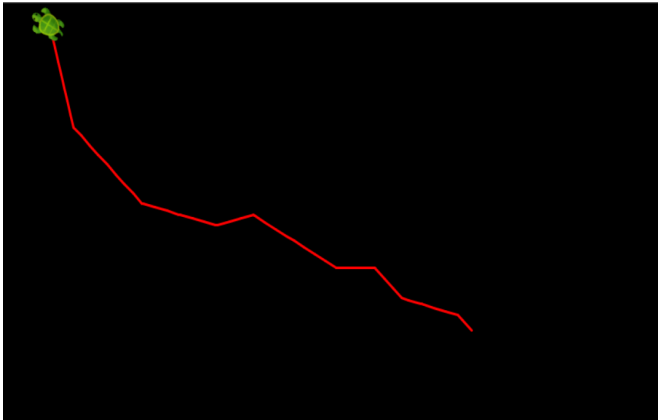
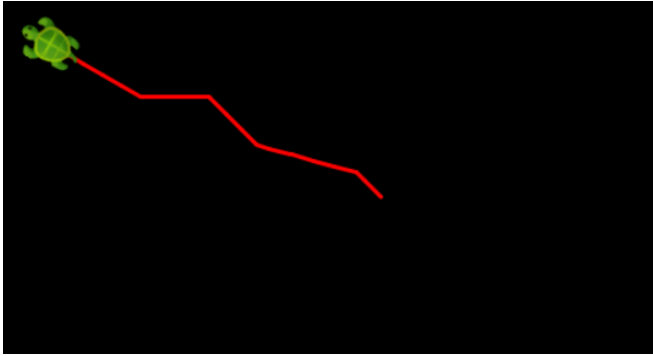
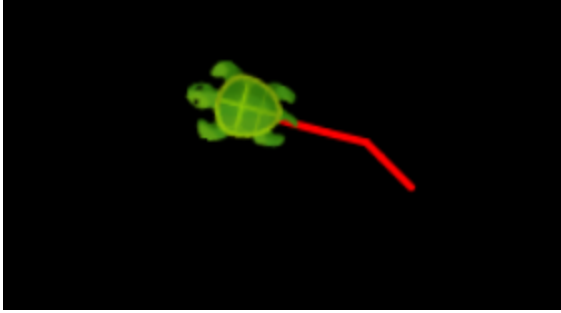
A = Turn left, 45 degrees

B = Move forward by 25

C = Turn right, 30 degrees

D = Move forward by 50





## PART 3:

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G5:

Alphabet: {L, M, R}

Start: M

Productions:

1. L: - M L

2. M: - R M

3. R: - L R

G0 : M

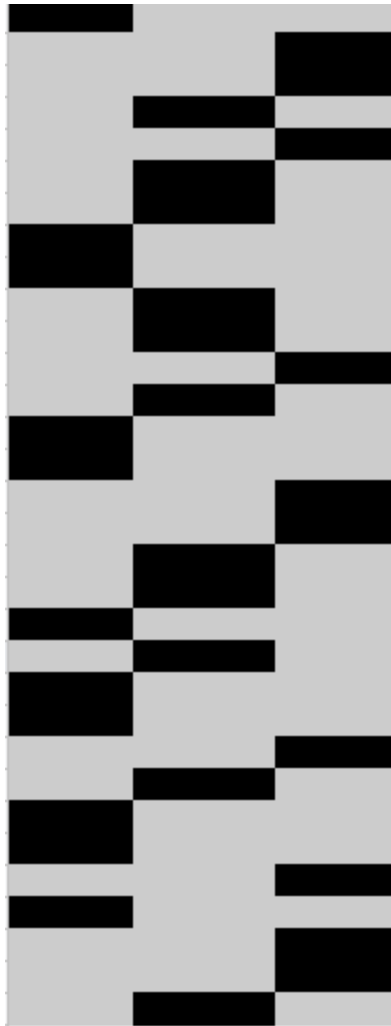
G1 : R M

G2 : L R R M

G3 : M L L R L R R M

G4: R M M L M L L R M L L R L R R M

G5: L R R M R M M L R M M L M L L R R M M L M L L R M L L R L R R M



## **PART 4:**

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### Fractals as a Cognitive Infrastructure

Fractals can be found almost everywhere, on many interdisciplinary levels of study. They are present in logic, mathematics, psychology, medicine, computer science, physics, art, and more subjects besides. Their ubiquitousness implies a significant degree of importance. One must wonder what the evolutionary consequences of existence in a fractal universe might bring. Such a question should first look at the creations of humanity in an attempt to see how fractals have affected us. A good example of this is Jackson Pollack's work in drip paintings. On the surface, one would assume the drips of paint onto the canvas are purely random. With a closer examination, it has been discovered that Pollack's art, as well as many other enduring artworks, incorporate fractals. Indeed, many scholars are using an artist's unique fractal pattern found within their work to determine common authors between unclaimed works. This is because fractals are highly unique, and so an artist's specific fractals are like a signature. Pollack's own unique style has been consternating to some. They may argue his works are mere paint splatters. But if fractals are understood to be crucial to human consciousness, then the fractal nature of Pollack's work might lend it a subconscious appeal. There is certainly evidence to support this. The effect of fractals on the psyche has not been directly measured, but there are strong correlations. For example, it is known that viewing scenes of nature can reduce stress. It is also a fact that nature itself is highly fractal, and that humans are excellent at recognizing fractals. Natural fractals, in fact, may explain the presence of fractals in so much of art. Humans are excellent at pattern recognition, and part of that is linked to our ability to recognize fractals.

Humans also find patterns pleasing, and so fractal patterns, even at the smallest level, may increase the pleasure derived from art, and thus make it more appealing. Being so closely tied to fractals, it may be possible to model human cognition via fractals. There are many theories as to how this might be done, including quantum computing and temporal fractal data processing. Any concrete developments in such an area of study may have tremendous impact on any field affected by fractals, which may very well be all of them.

### Works Cited

(a) “Is Consciousness Fractal”

<http://nautil.us/issue/47/consciousness/is-consciousness-fractal>

(b) Ira Flatow interview with Richard Taylor: “Jackson Pollack Fractals”

<https://www.npr.org/transcripts/6631149>



Q1: What relevance do fractals have in Jackson Pollack's work?

A1: Fractals were used by Pollack unintentionally to create his paintings- the seemingly random way the drips are aligned on the page actually are formed via fractals.

Q2: What relevance do fractals have in identifying artwork?

A2: Fractals can be used to determine the author of art because each author has a specific fractal pattern, or type of pattern, that is included in their art, to some degree or capacity.

Q3: Can fractals have an effect on the psyche?

A3: That is something that is currently being looked into. It is true that nature can reduce stress, and fractals are found within nature as they are found within art, so fractal geometry within art may be shown to reduce stress. It is a promising field of research.

Q4: Why are fractals in nature so important?

Natural fractals are important due to their relevance to human cognition. We are best able to look at fractals on a 1.4 scale, while nature's fractals exist in a similar fashion.

Q5: What could the immense presence of fractals in art signify?

A5: One must wonder if our evolution alongside fractals has made human cognition most closely align with fractals, or possibly our entire system of cognition is fractally based.

Q6: In what way might cognition be fractal?

A6: Fractal consciousness may take many forms, from quantum computation at the electron level to how we process mass amounts of data. Certainly concretely finding more out on the subject may have massive implications for artificial intelligence, computing, psychology, and more.

## **Part 6:**

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### 1. Antenna construction

Antennae must increasingly be smaller and smaller, with more and more capabilities, in order to meet market demands. One method of doing this is including fractal geometries in their construction. Many proposed designs that included fractal geometries have massively improved antennae features, making this a promising field of interest.

### 2. Image Compression

Fractals can be used in image compression algorithms. A fractal algorithm is best suited for nature photos, as they appear similar in many portions of the picture. As the algorithm gets more complex, it is possible that it becomes more suited to different types of image.

### 3. Medicine

The human body contains many fractals. The lung is a fractal organ, as is the distribution of neurons in the brain. The rhythm of the heart can also be pointed to as fractally relevant. This is because a heart's beating should be fractal, but not too random or ordered. This is indicative of a healthy heart, as too much in one way or the other is an indication of disease or malady.

### 4. Computer Graphics

Fractal rendering models have allowed computer graphics to massively soar into near-realism. By implementing fractal rendering methods, the cost in processing power of geometric objects massively decreases, such that 3d games and models can be rendered using normal computers, which would otherwise be impossible.