EigenForm

Louis H. Kauffman
UIC, Chicago

" I am the observed link
between myself and
observing myself."

Heinz von Foerster

"We take as given the idea of distinction and the idea of indication, and that it is not possible to make an indication without drawing a distinction.

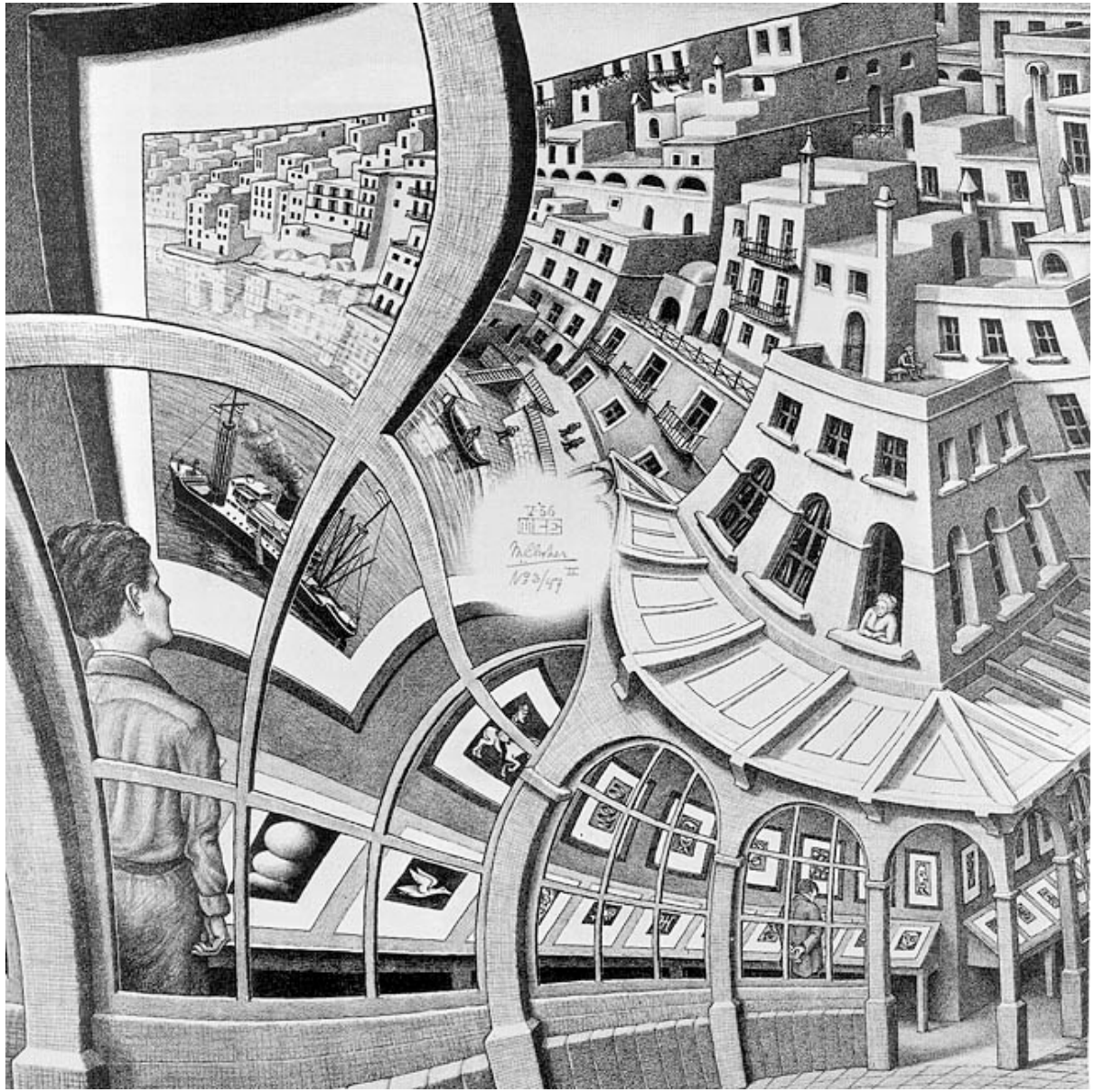
We take, therefore, the form of distinction for the form."

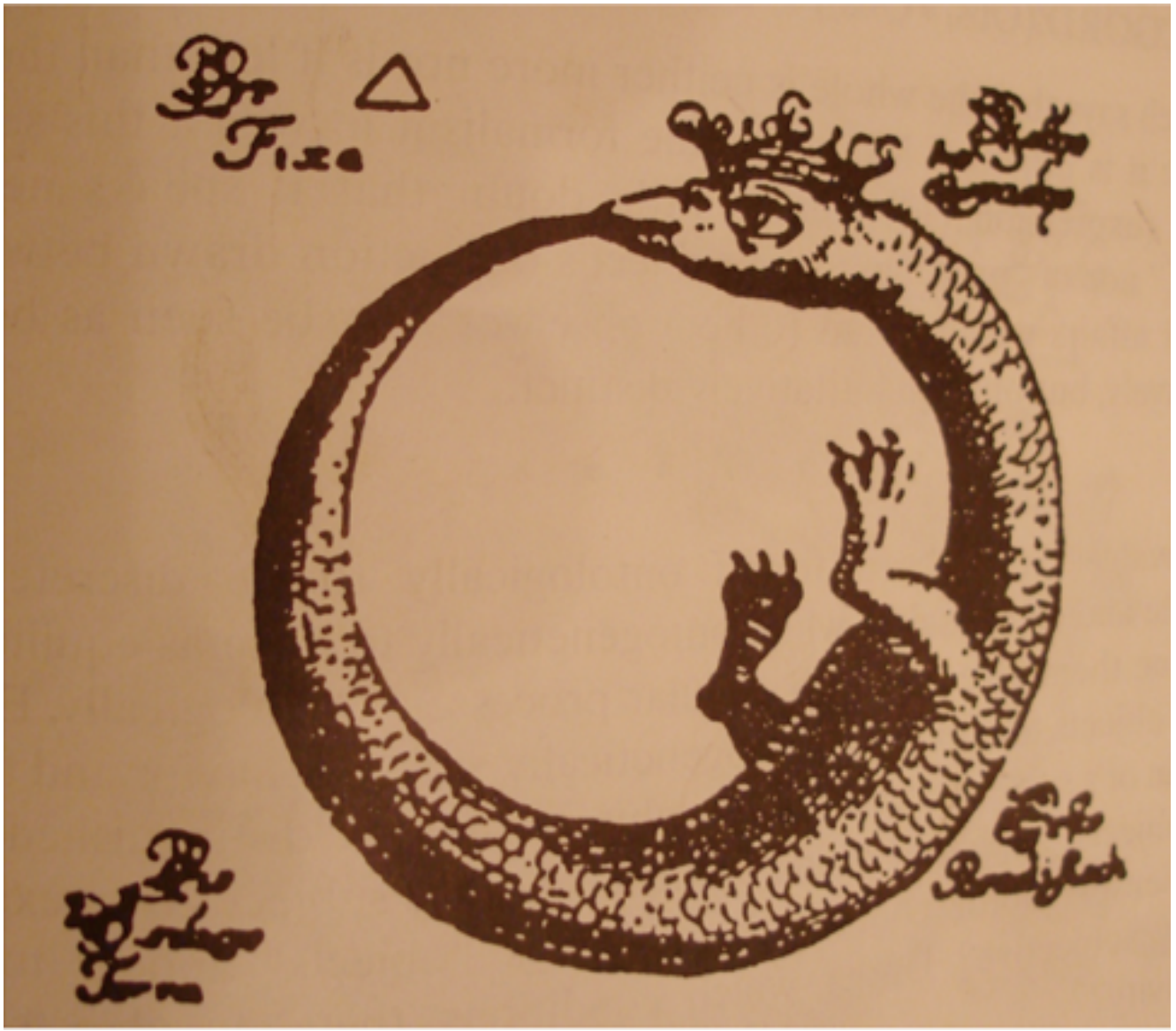
G. Spencer-Brown

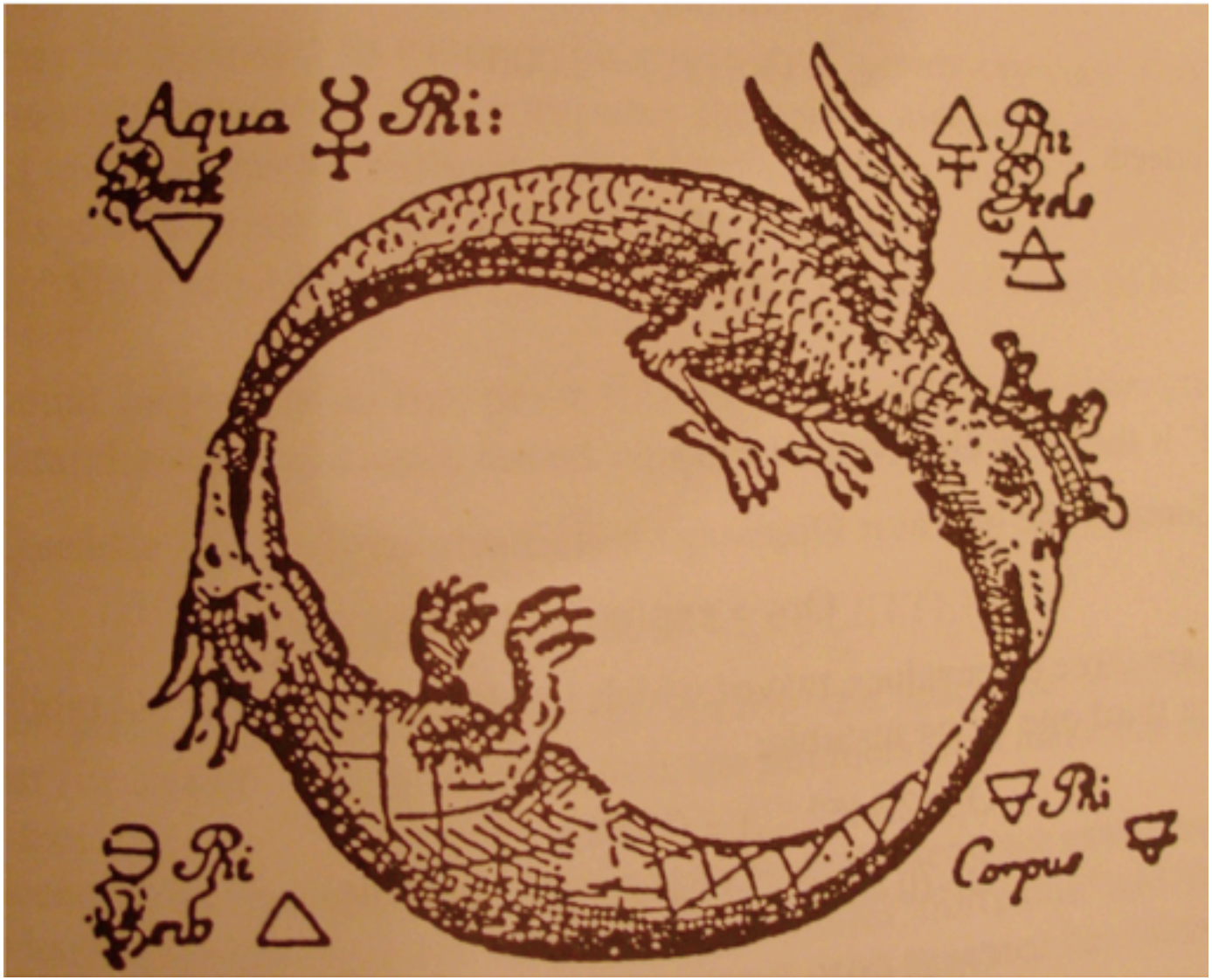
We take the Form
Of Distinction
For the Form.

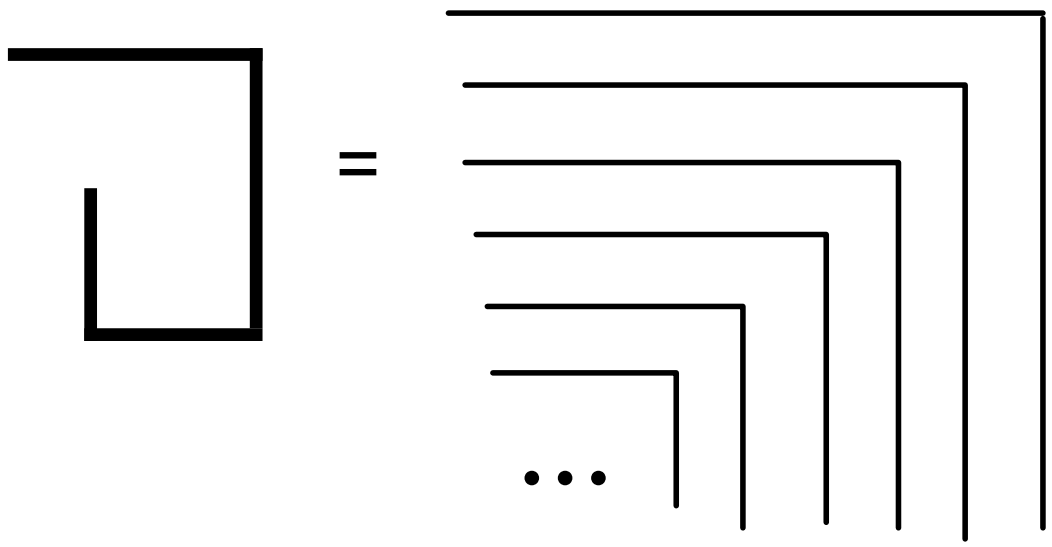
"The laws of physics, the so-called 'laws of nature', can be described by us. The laws of brain functions - or ever more generally - the laws of biology, must be written in such a way that the writing of these laws can be deduced from them, i.e. that they have to write themselves."

HVF, Cybernetics of Epistemology (1973).

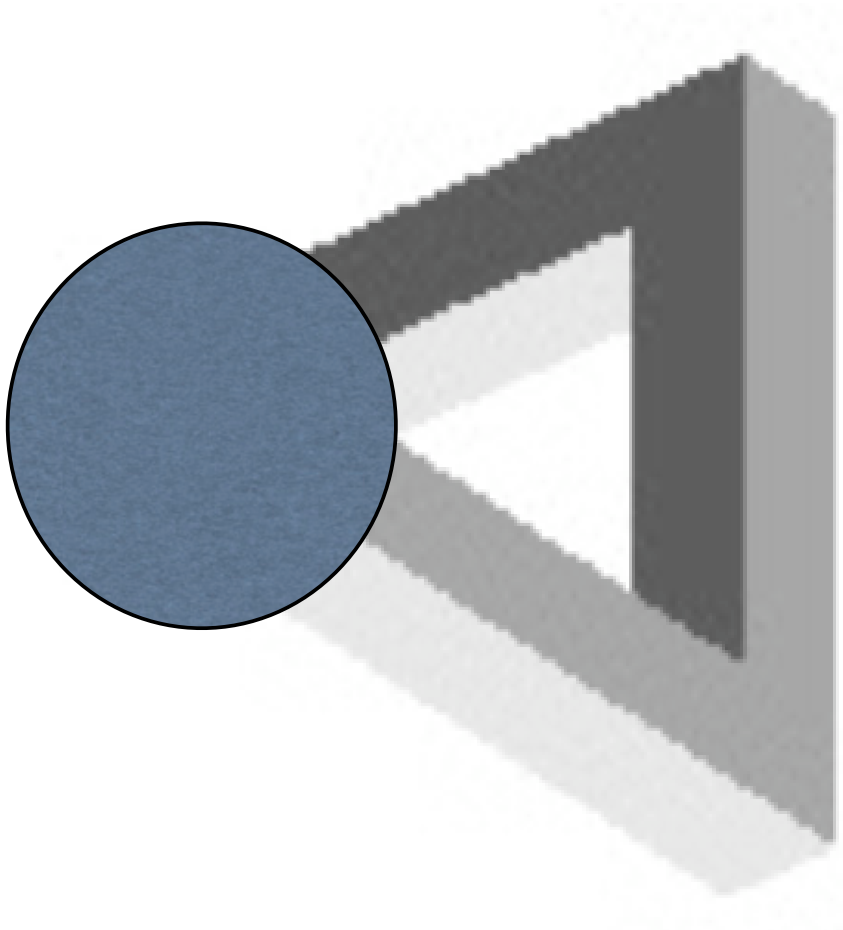


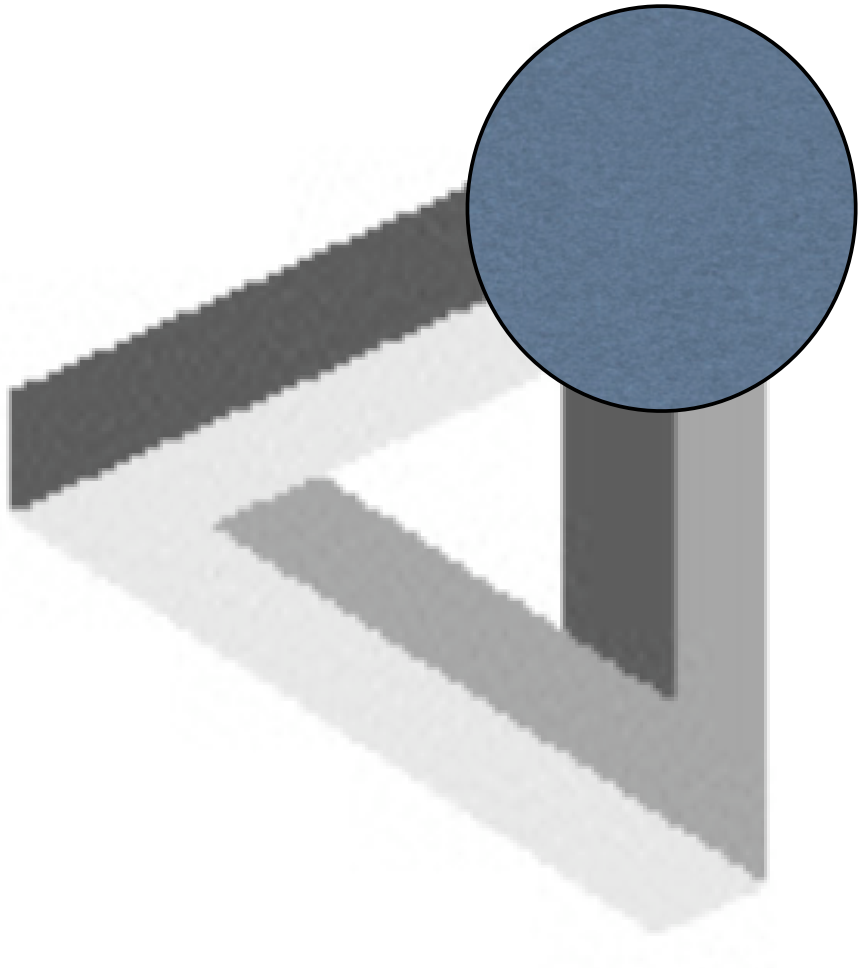

Fixe

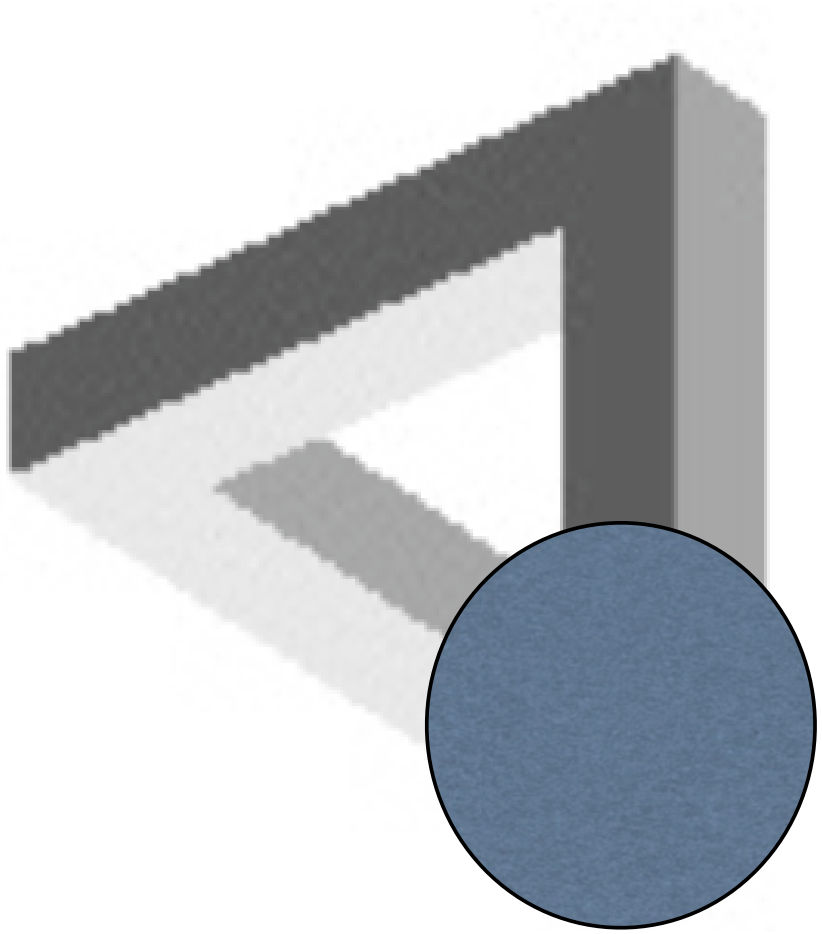

Aqua
Ri:
Ri
Ri
Corpus
Ri

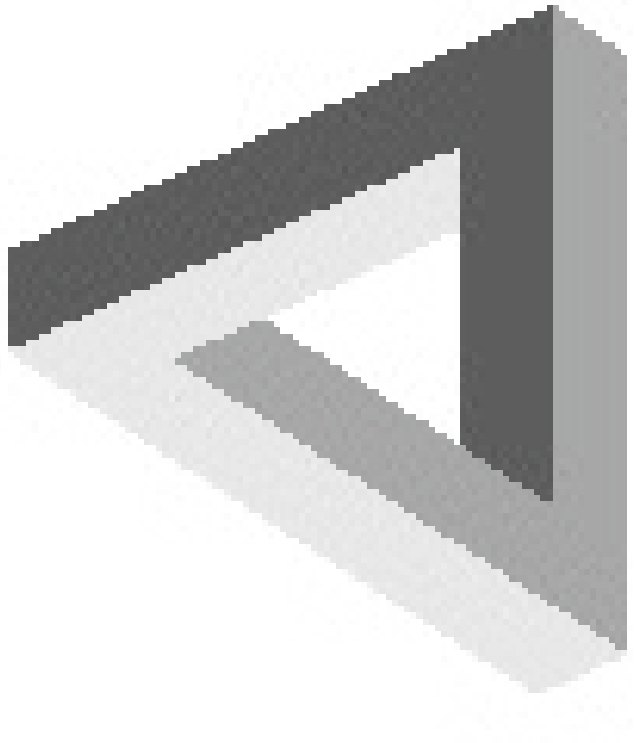


The Non-Locality of Impossibility

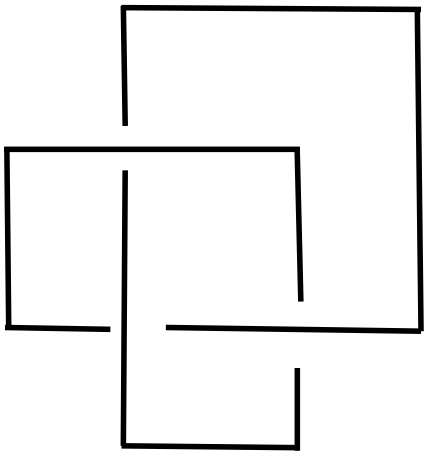


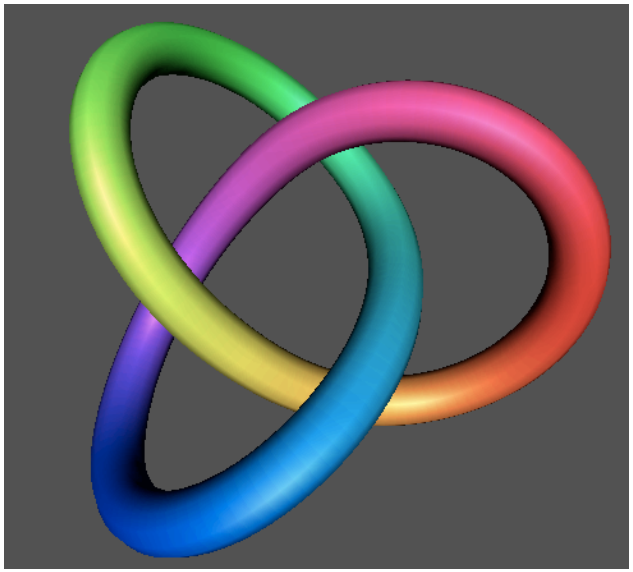


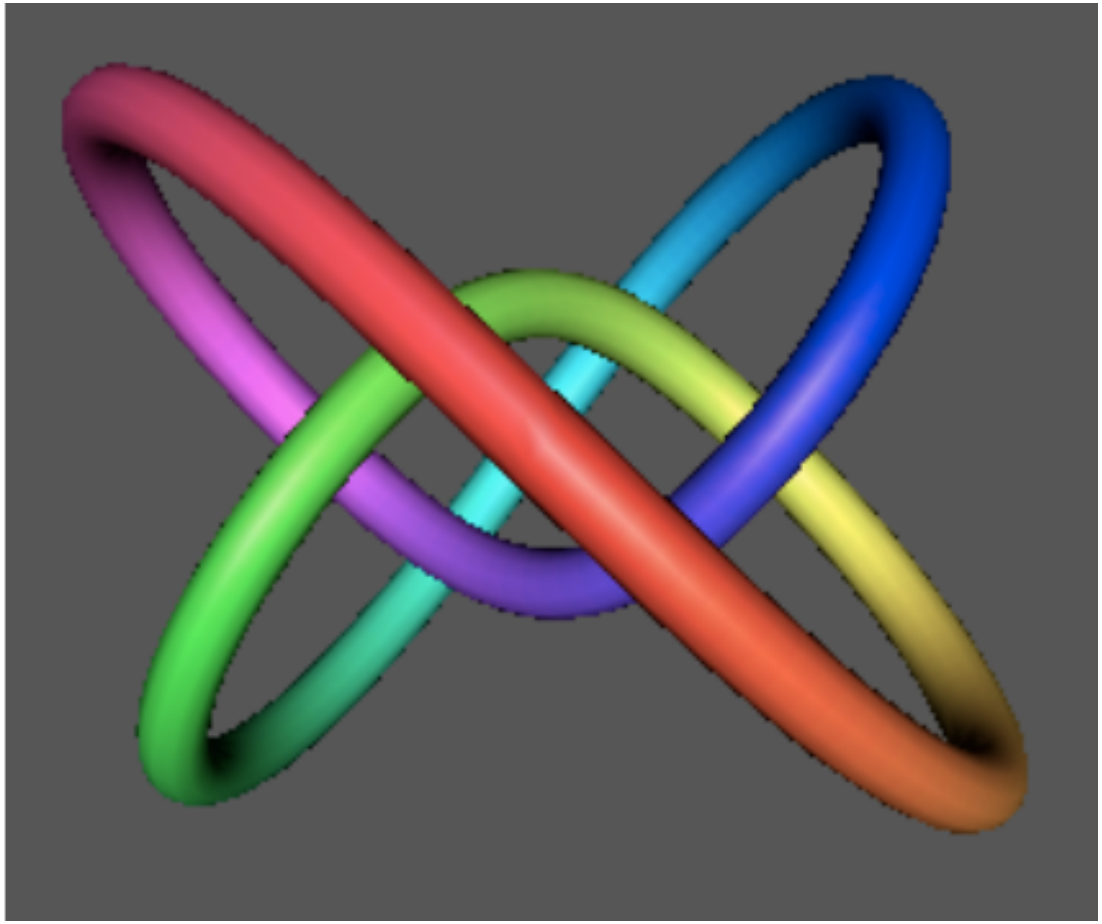


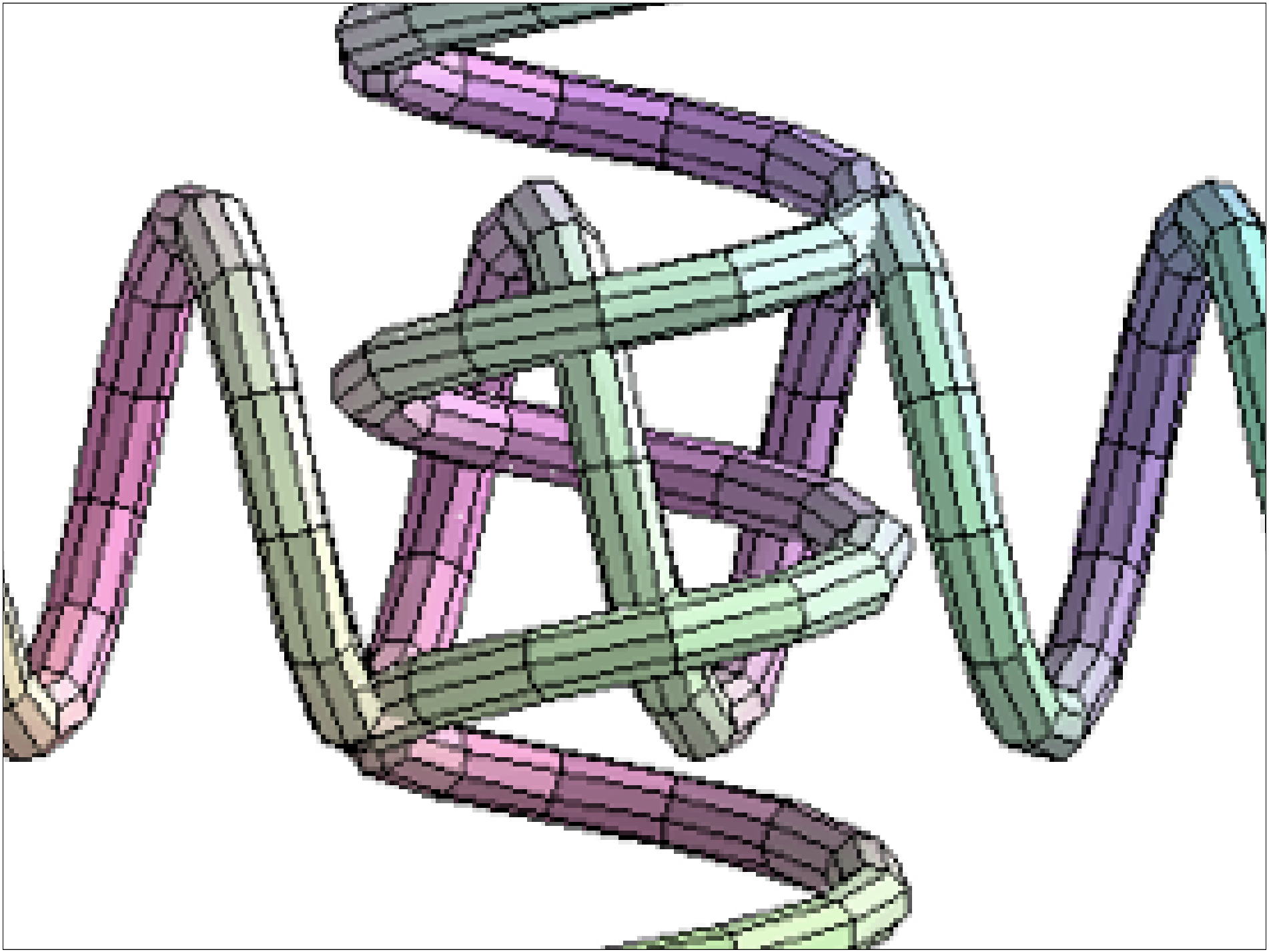


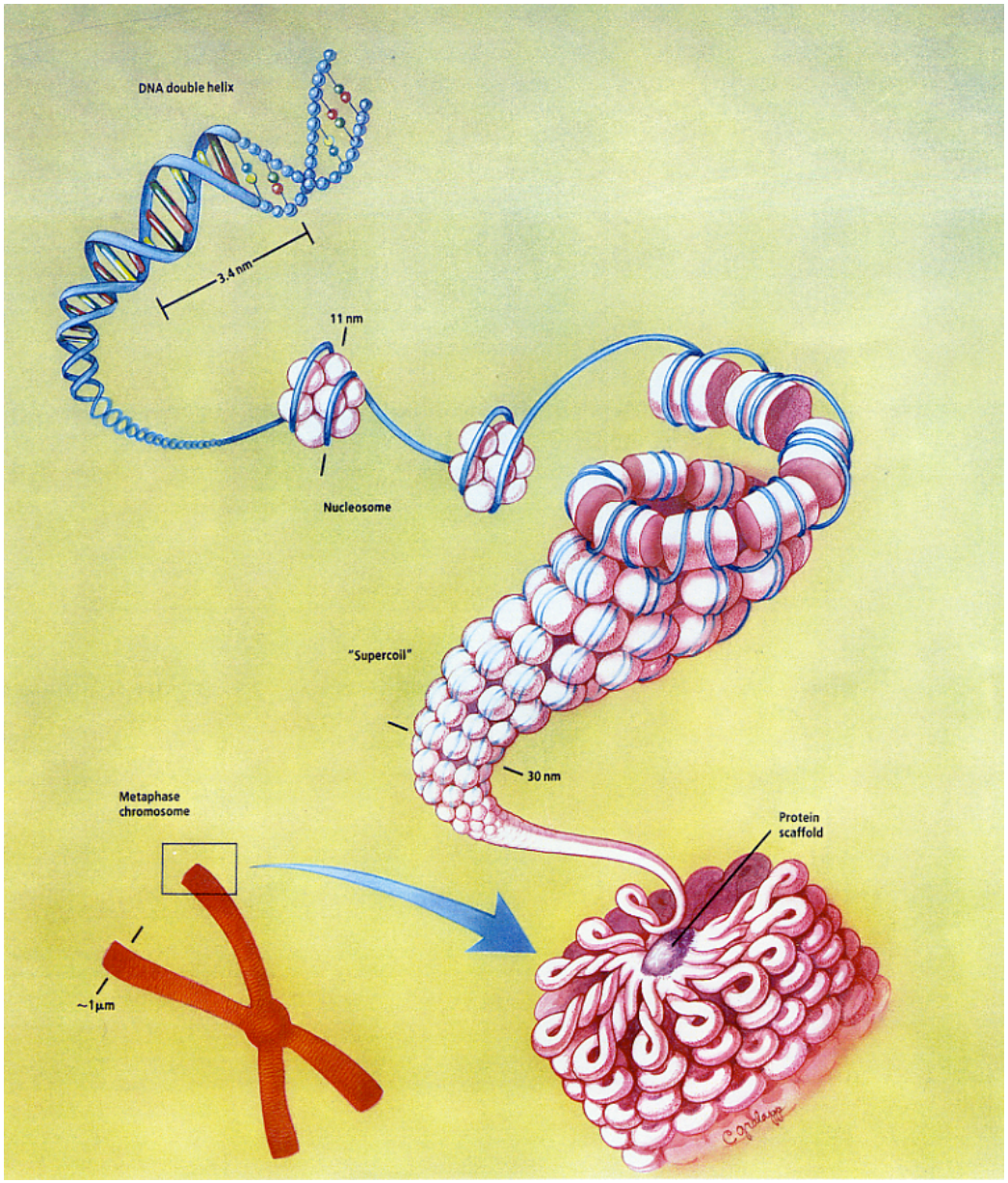
The Schematic, The Imaginary and The "Real"

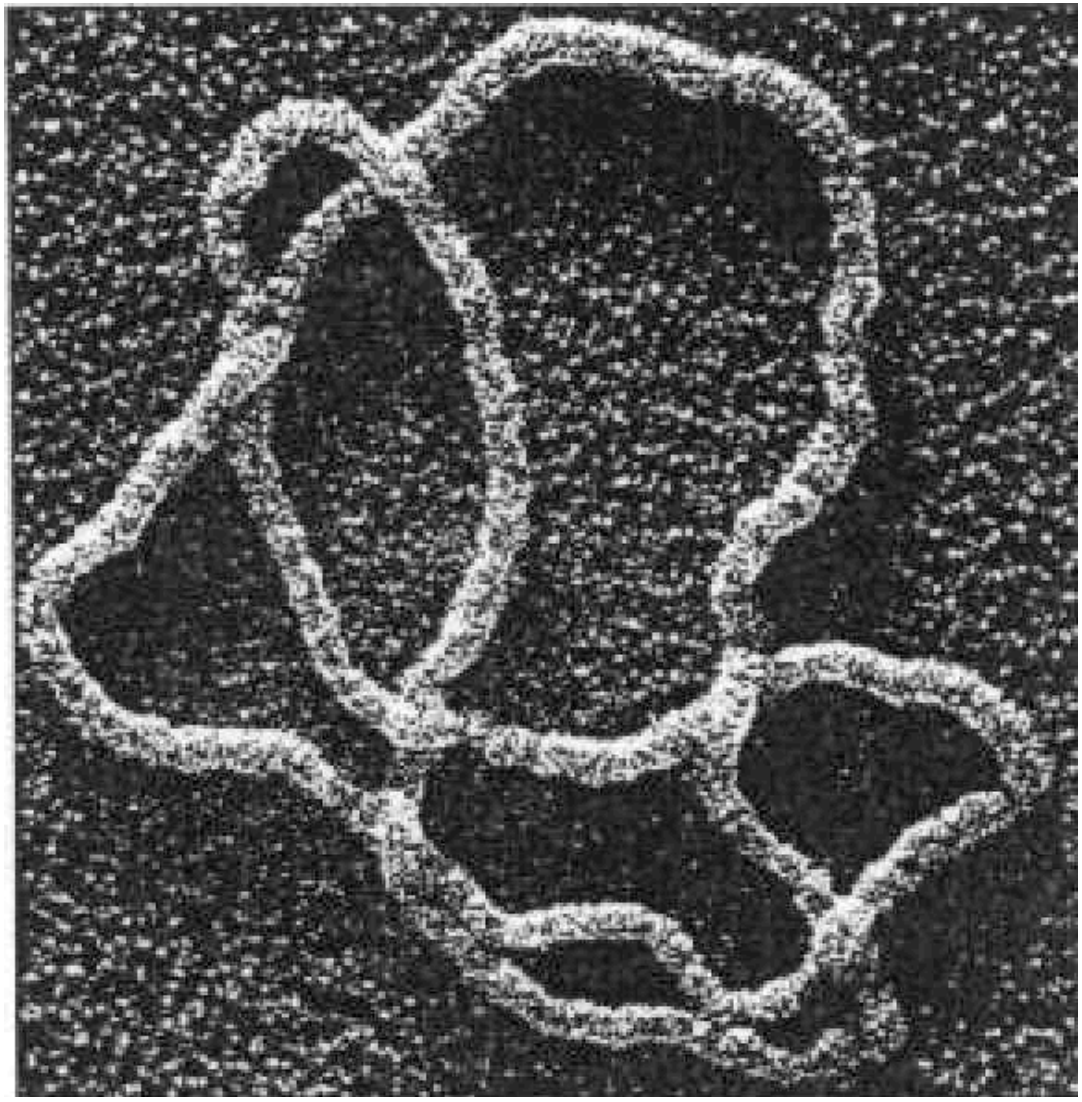




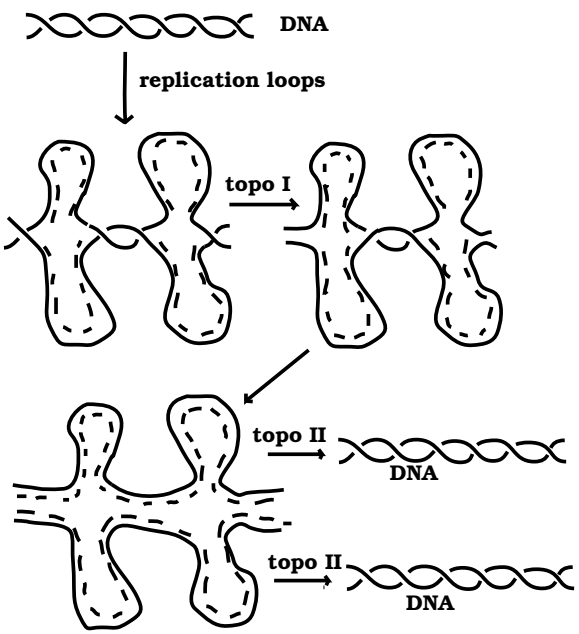





DNA double helix
3.4 nm
11 nm
Nucleosome
"Supercoil"
30 nm
Metaphase chromosome
Protein scaffold
~1 µm



DNA is a Self-Replicating EigenForm



$$DNA =< W|C >$$

$$< W| =< ...TTAGAATAGGTACGCG...|$$

$$|C >= |...AATCTTATCCATGCGC... > .$$

$$< W| + E \longrightarrow < W|C >= DNA$$

$$E + |C > \longrightarrow < W|C >= DNA$$

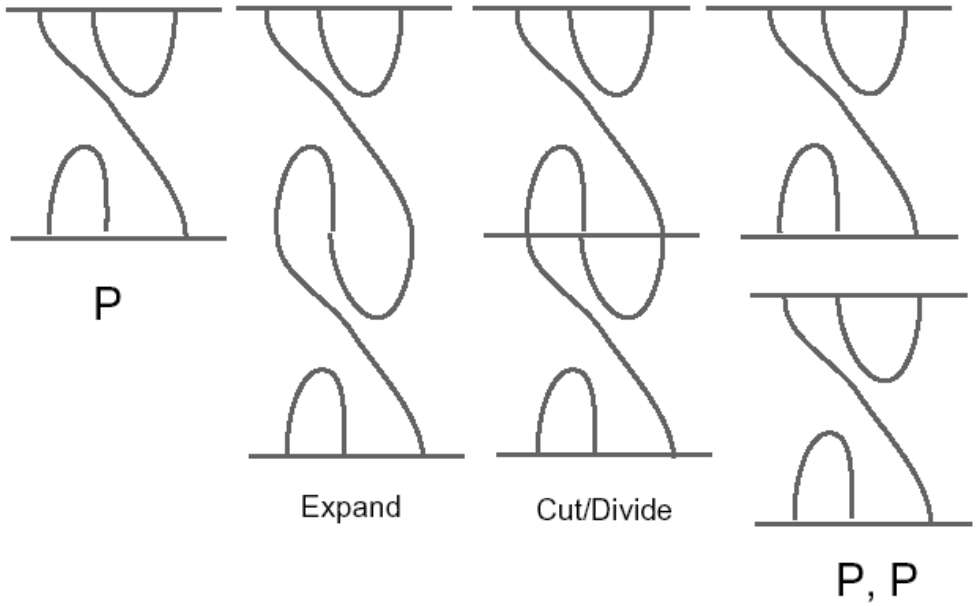
$$< W|C > \longrightarrow < W| + E + |C >=< W|C >< W|C >$$

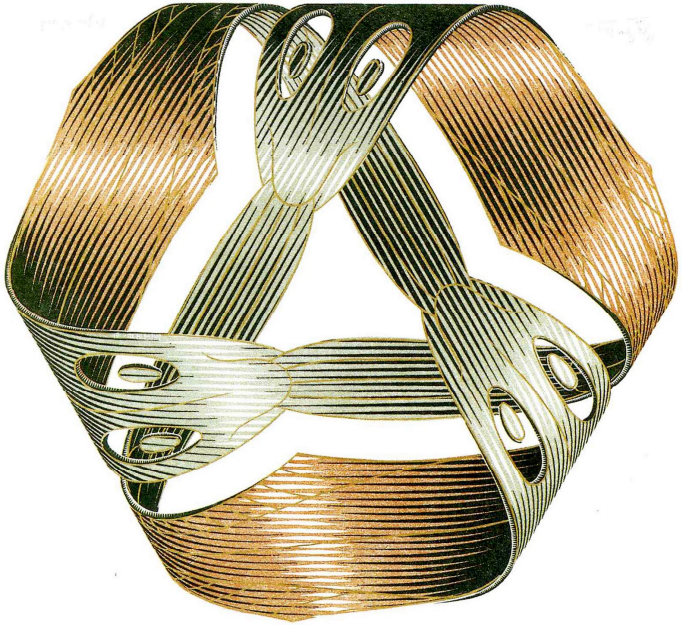
Self Replication Schematic

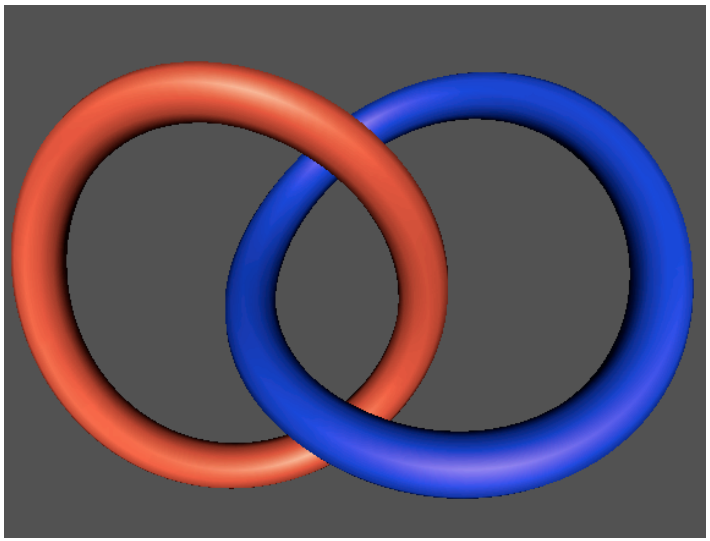
DNA = <Watson|Crick>

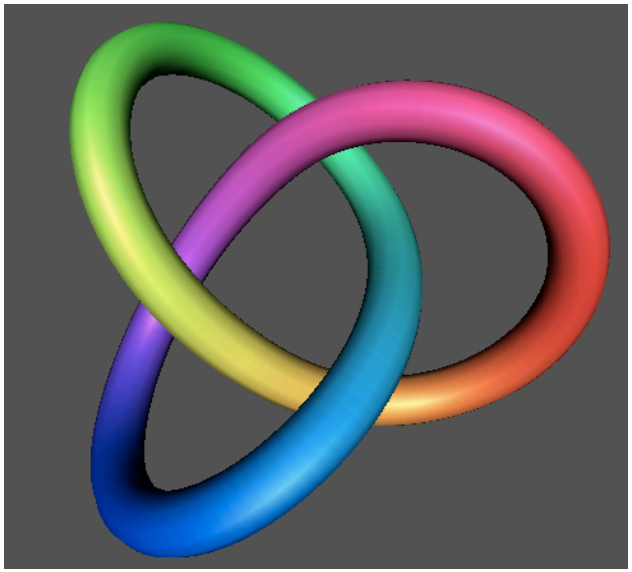
E = Environment

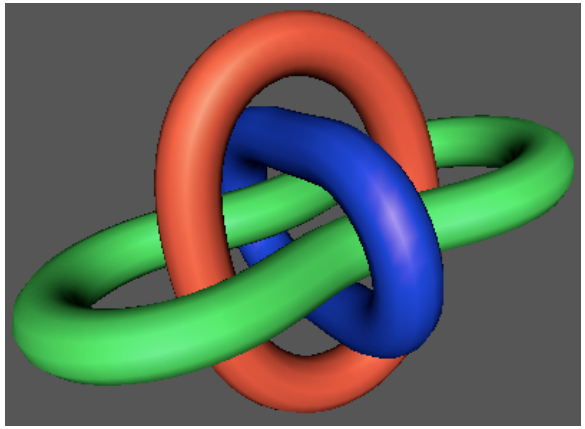
Topological Replication



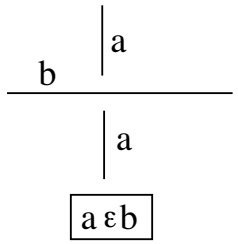




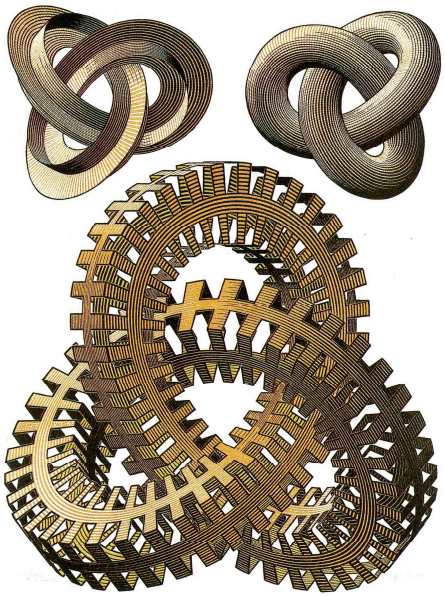


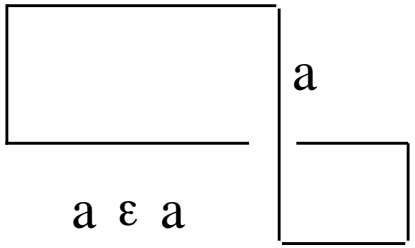


(K)not Sets

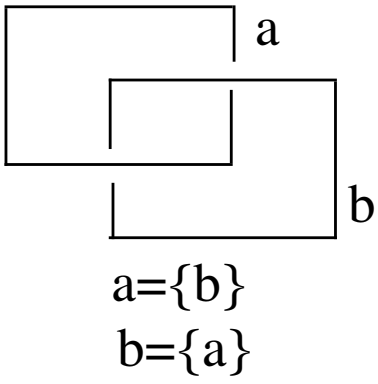


Crossing as Relationship





Self-Membership

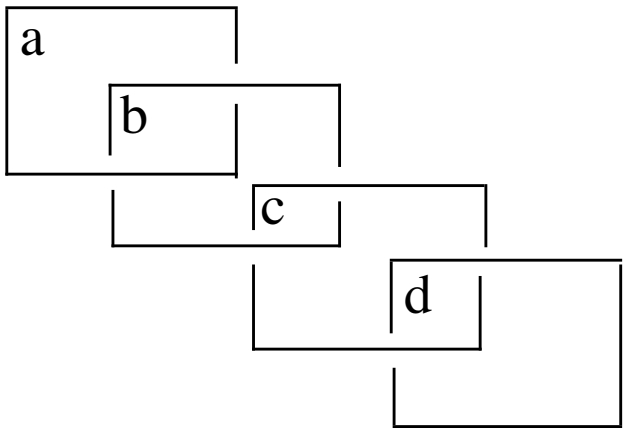


Mutuality

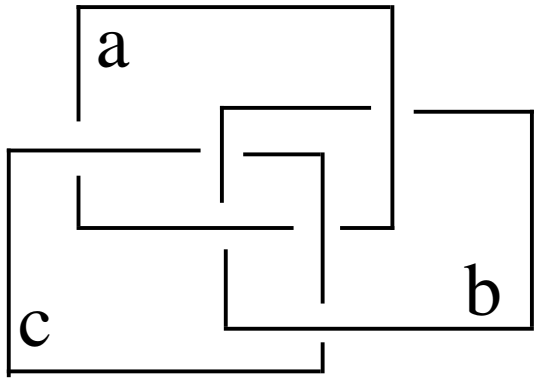
Topological Russell (K)not Paradox

A
belongs to A.

A does not
belong to A.



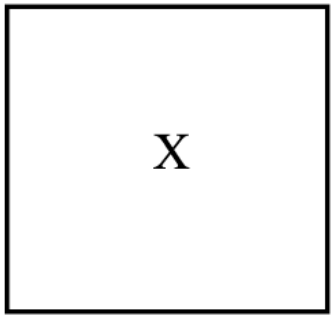
a = {b}
b = {a, c}
c = {b, d}
d = {c}



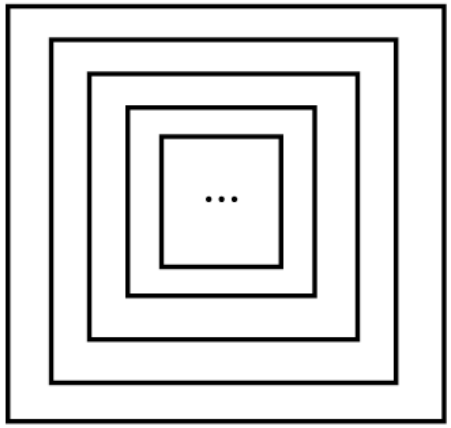
a = {b,b}
b = {c,c}
c = {a,a}

The Borrommean Rings

Fixed Point at Infinity

F(X) = 

F(J) = J.

F(F(F(...))) = 

= J =

An EigenPuzzle

1

11

21

1211

111221

312211

WHAT IS THE NEXT NUMBER?

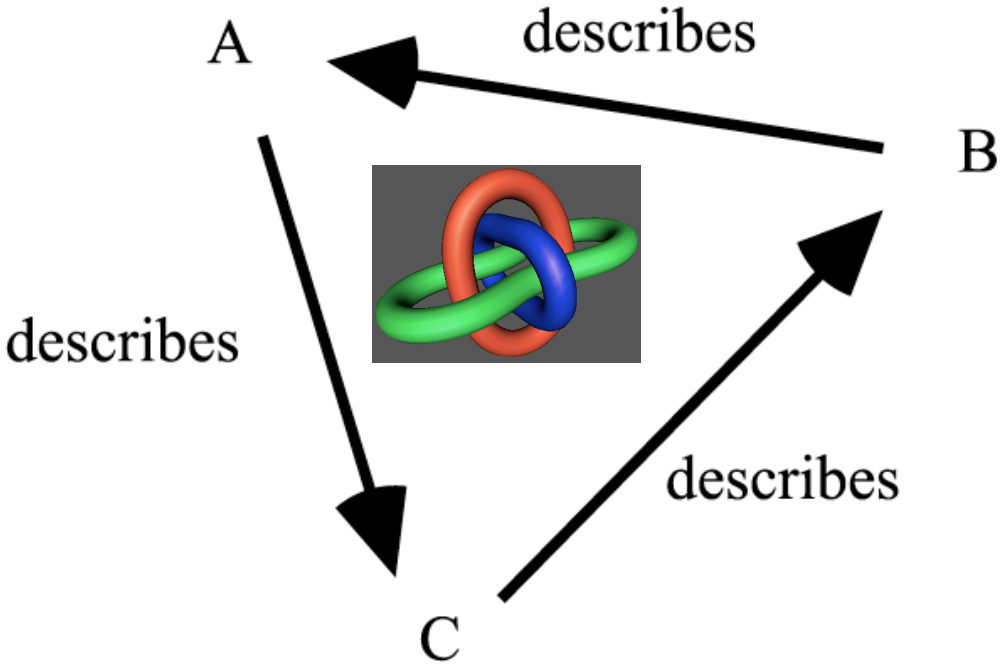
John Conway's Audioactive Sequence

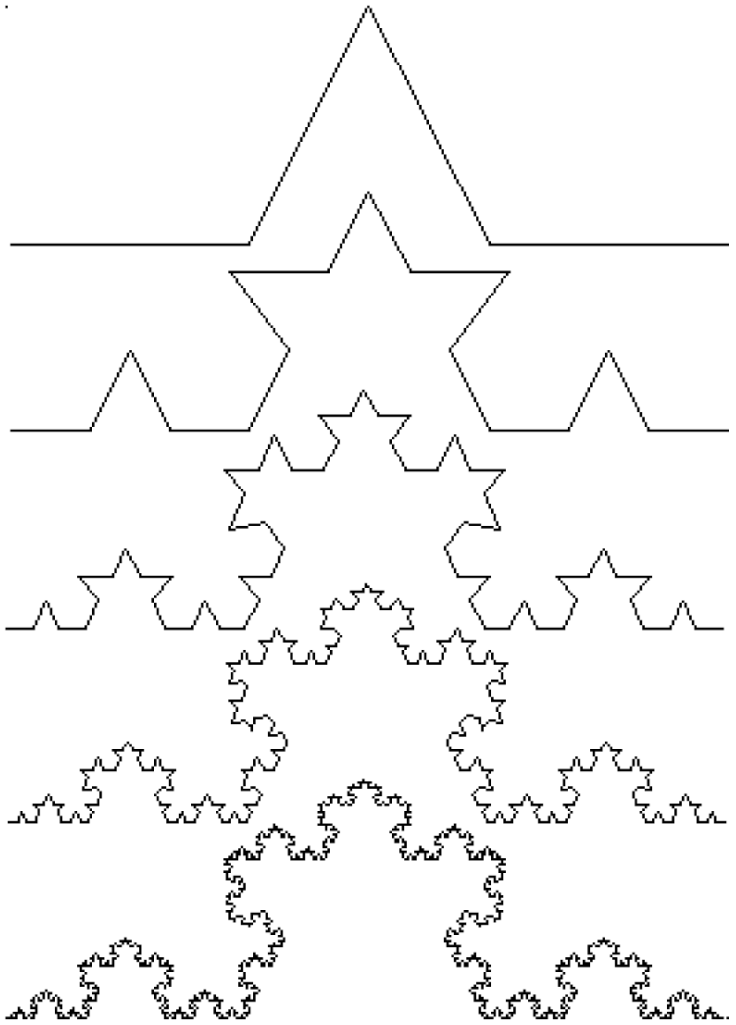
1
11
21
1211
111221
312211
13112221
1113213211
31131211131221
13211311123113112211
11131221133112132113212221
3113222123211211131221131211321l
1321133211121312211231131122211311221131221

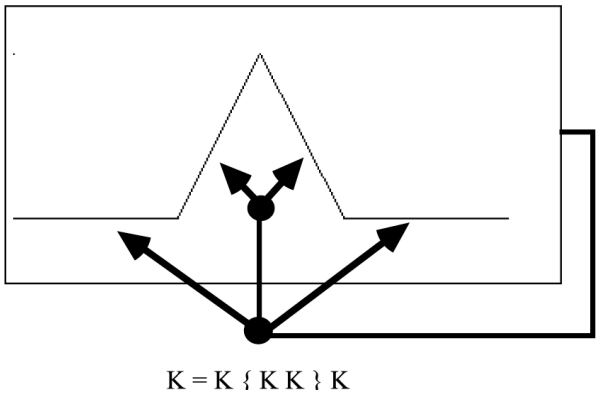
$$A = 1113122113121113222 1\ldots$$

$$B = 3113112221131112311332\ldots$$

$$C = 13211321322113311213212 3\ldots$$



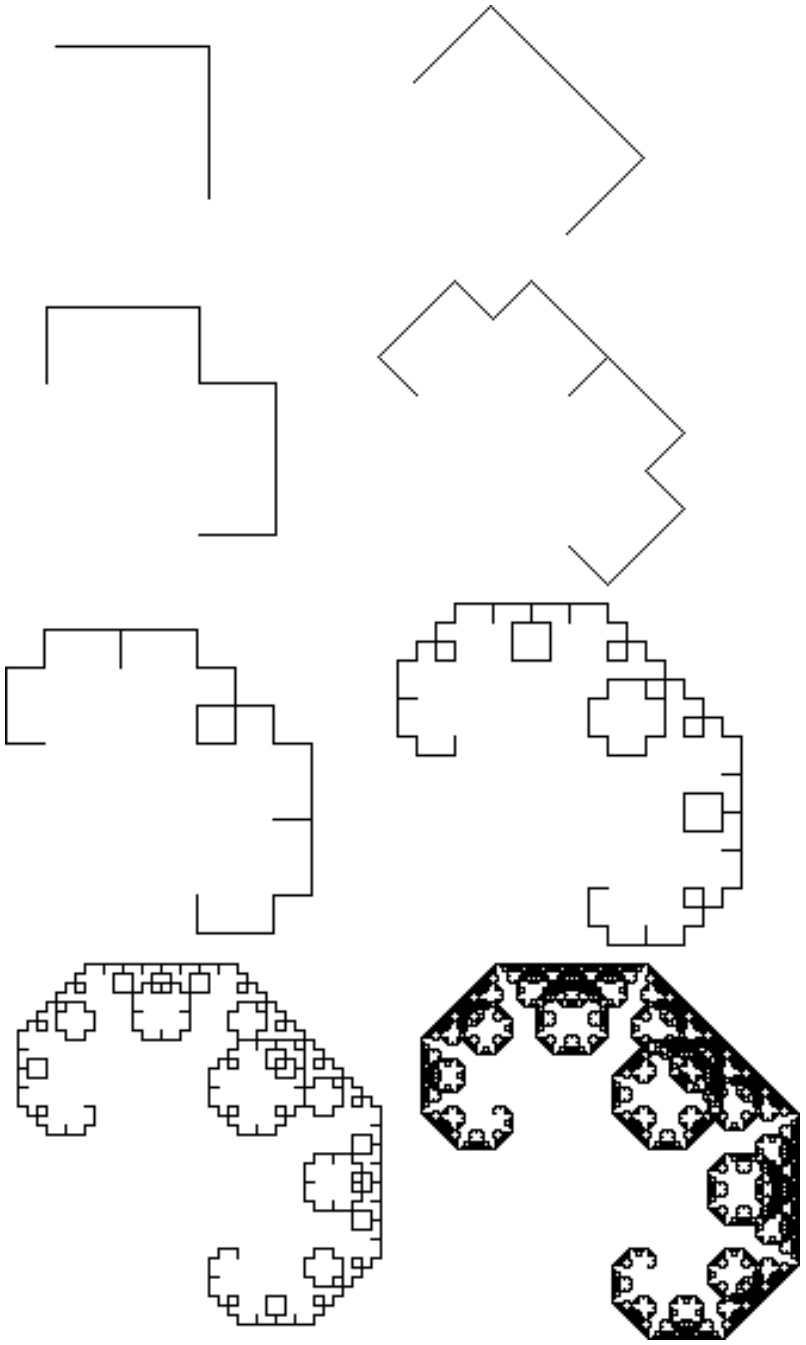


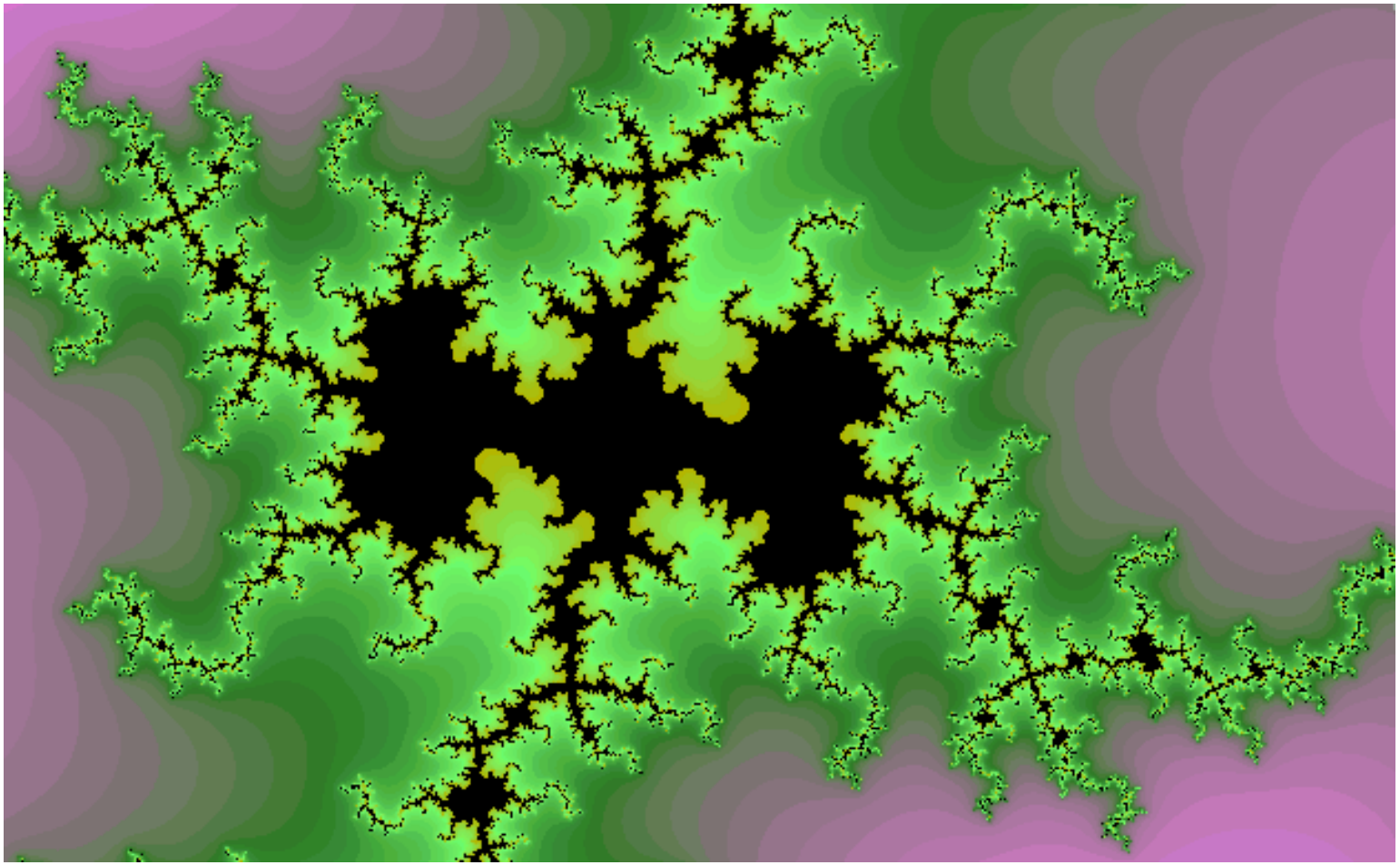


$$\mathbf{K = K\{K\ K\}K}$$

The Framing of Imaginary Space.

Fractal Re-entering Mark





Eigenforms "Exist"

Theorem. Every recursion has a fixed point.

Proof. Let the recursion be given by an equation of the form

$$\mathbf{X}' = \mathbf{F}(\mathbf{X})$$

where $\mathbf{X}'$ denotes the next value of $\mathbf{X}$ and $\mathbf{F}$ encapsulates the function or rule that brings the recursion to its next step. Here $\mathbf{F}$ and $\mathbf{X}$ can be any descriptors of actor and actant that are relevant to the recursion being studied. Now form

$$\mathbf{J} = \mathbf{F}(\mathbf{F}(\mathbf{F}(\mathbf{F}(\ldots)))),$$

the infinite concatenation of $\mathbf{F}$ upon itself.

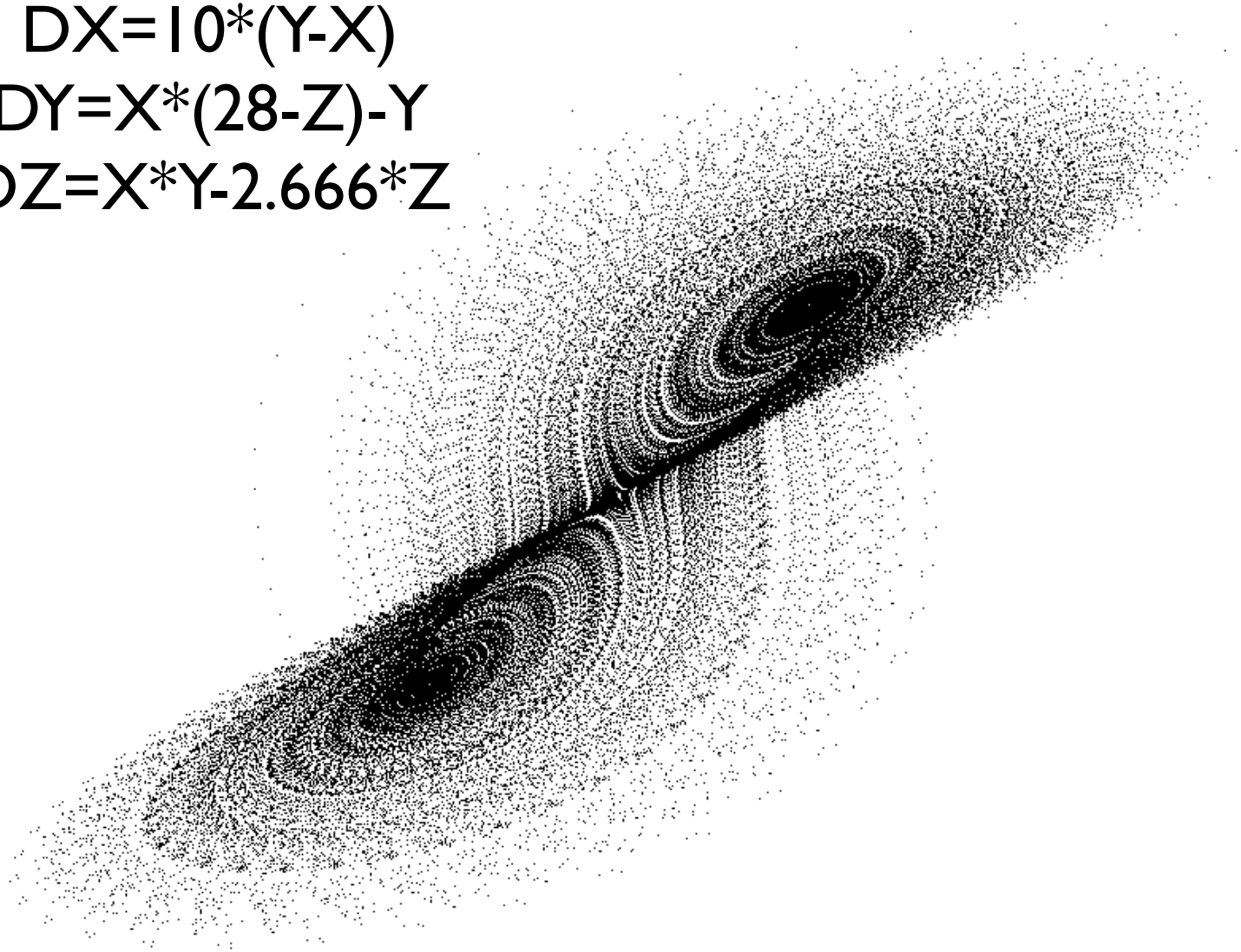
Then, we see that

$$\mathbf{F}(\mathbf{J}) = \mathbf{F}(\mathbf{F}(\mathbf{F}(\mathbf{F}(\mathbf{F}(\ldots))))) = \mathbf{J}.$$

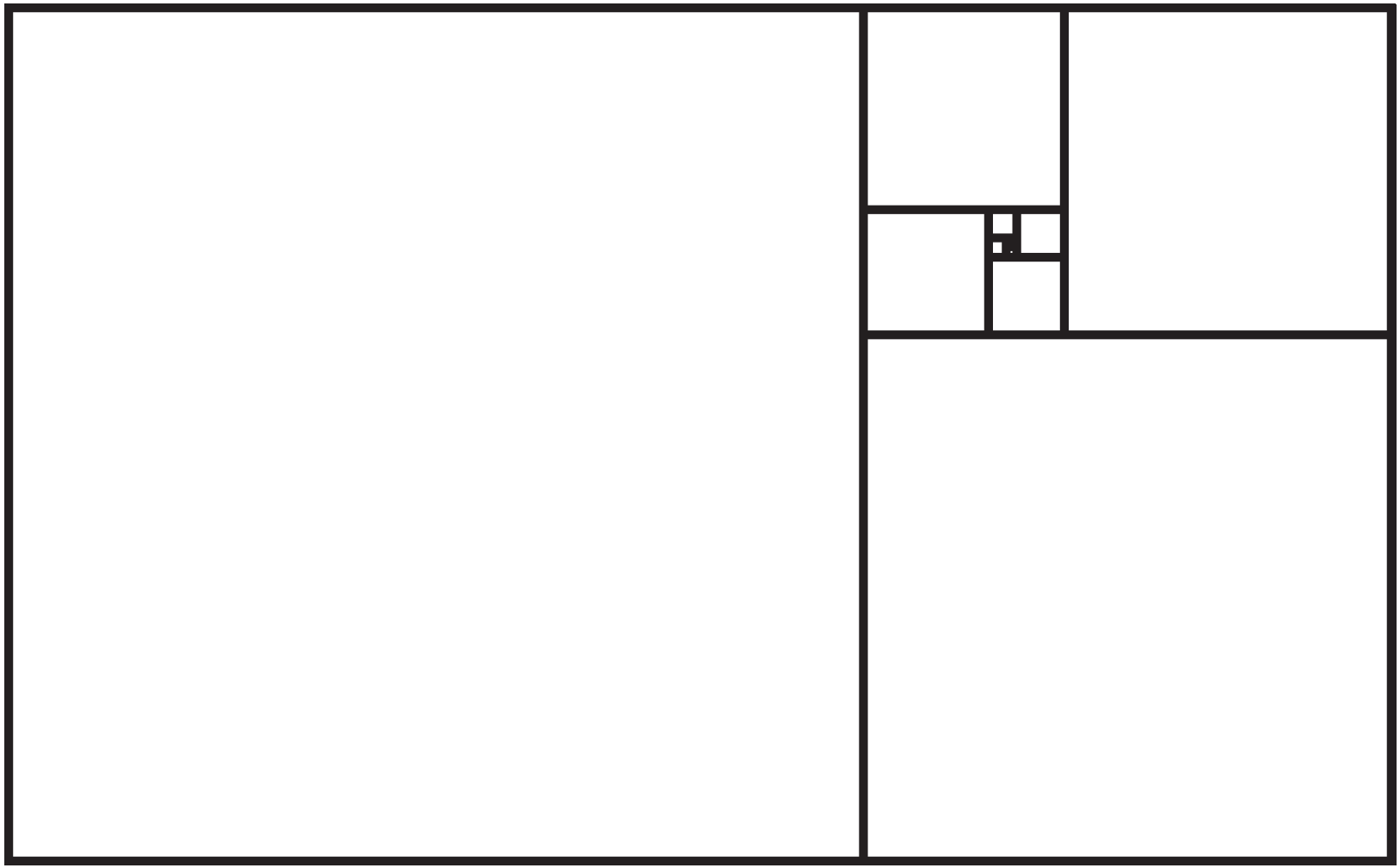
Hence, $\mathbf{J}$ is a fixed point for the recursion and we have proved that every recursion has a fixed point. QED □

Lorenz EigenForm

DX=10*(Y-X)
DY=X*(28-Z)-Y
DZ=X*Y-2.666*Z



The Golden Rectangle



Church-Curry Fixed Point Theorem

THE DUPLICATING GREMLIN

When the gremlin (g) meets some thing, he duplicates that thing and puts it inside a form F( ).

Theorem. Every F has a fixed point.

!!

Proof. Let

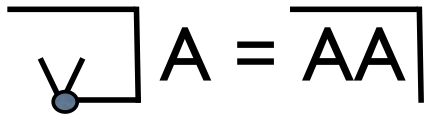
gx = F(xx).

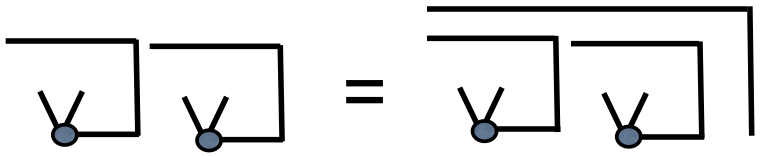
Then

gg = F(gg).

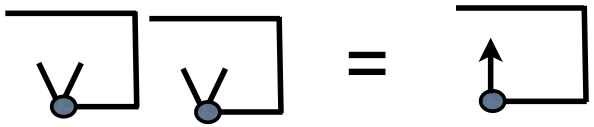
QED

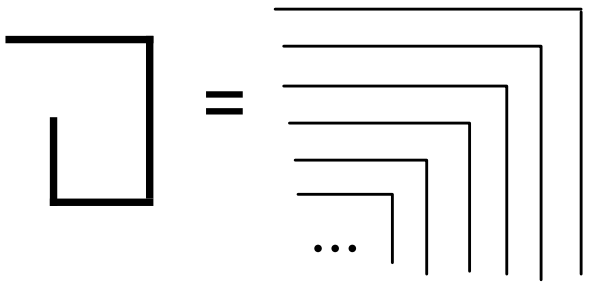
The Duplicating Gremlin Creates The Re-entering Mark.





Hence





Ax means "x belongs to A"

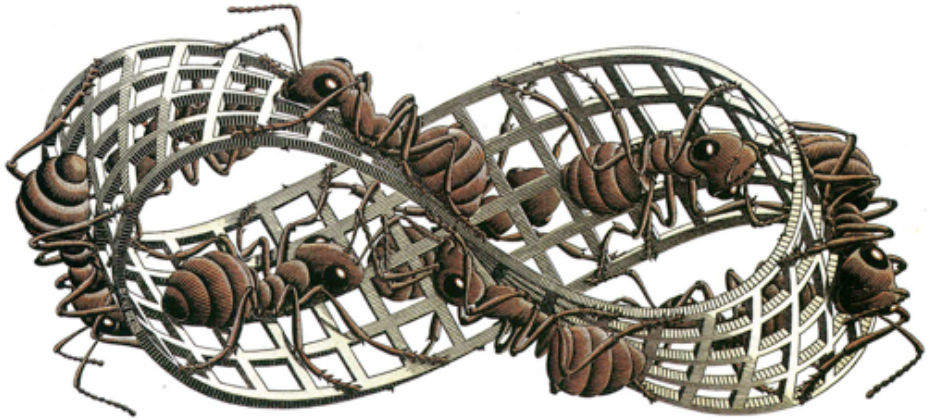
The Russell Gremlin

~ denotes "not".

$Rx = \sim xx$

$RR = \sim RR$

This is the form of the Russell Paradox.



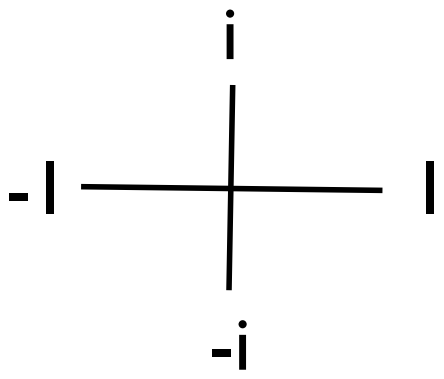
The eigenform always exists, but
it may be imaginary with
respect to our present
"Reality".

If $i = -1/i$,

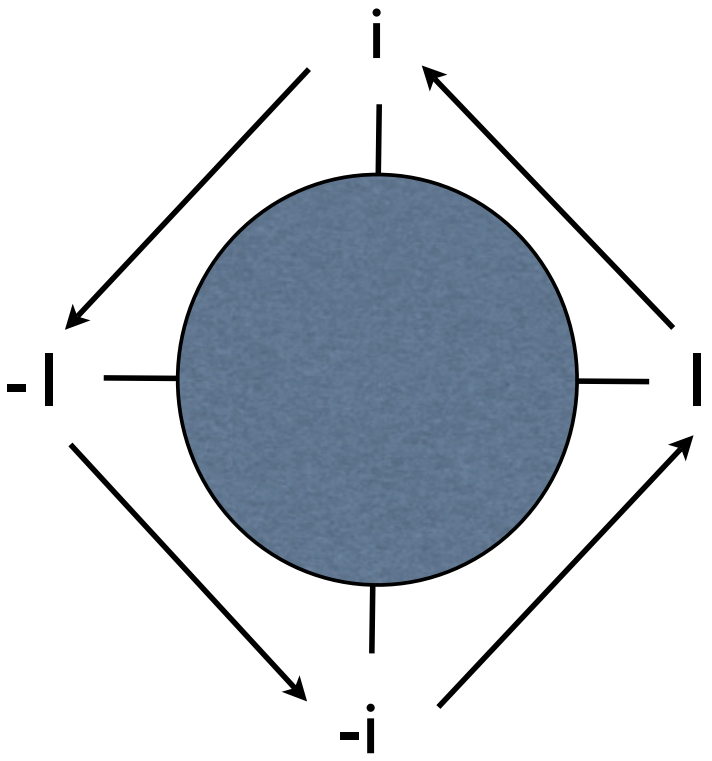
then

$i\,i = -1$.

There is no real number whose
square is minus one.

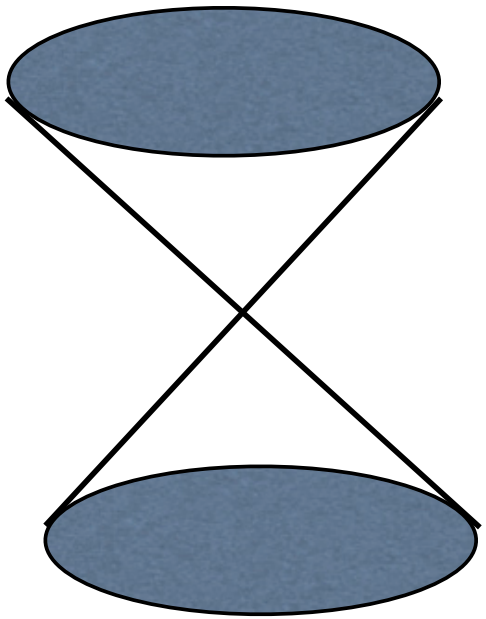


Possibility and Necessity



The Light Cone

$$X^2 + Y^2 + Z^2 + (i\,cT)^2 = 0$$



$$f(x) = a + b/x$$

$$F = \left[a + \frac{b}{} \right]$$

$$f(F) = a + b/F = F$$

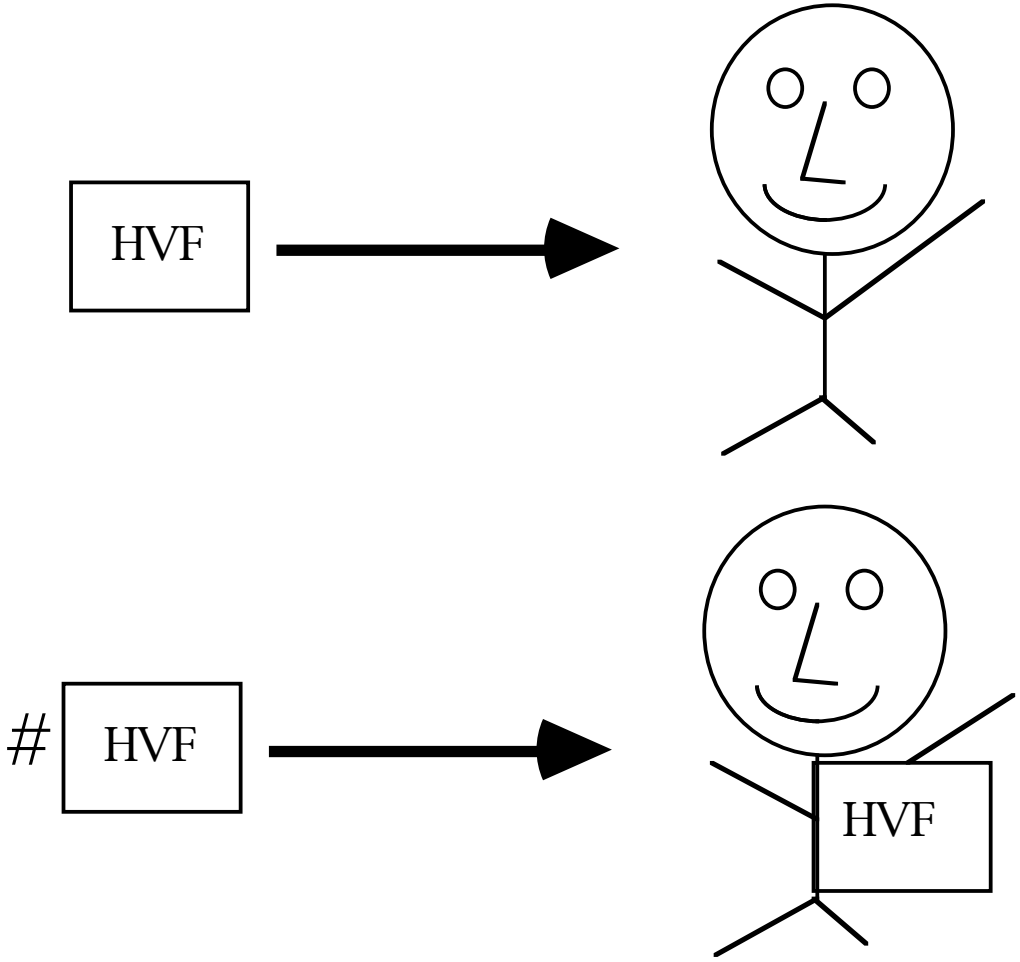
$$\left[1 + \frac{1}{} \right] = \frac{1 + \sqrt{5}}{2}.$$

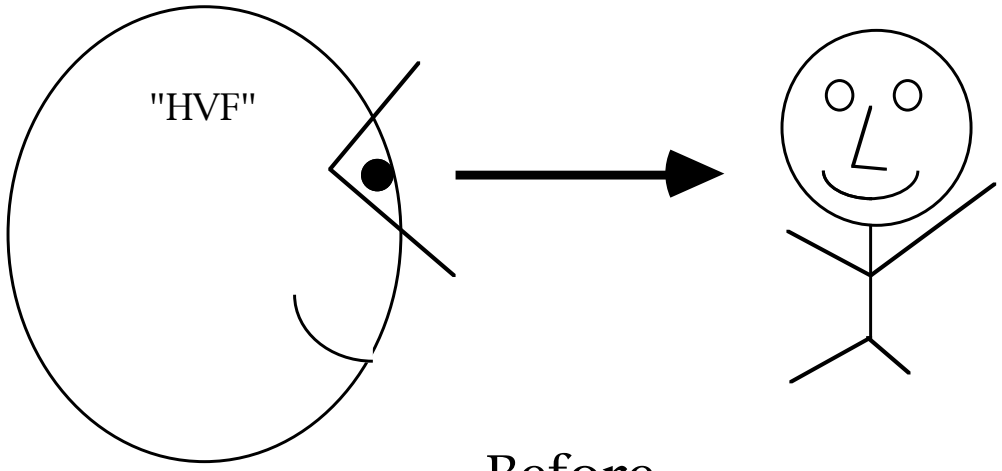
"Irrational"

$$\left[\frac{-1}{} \right] = i$$

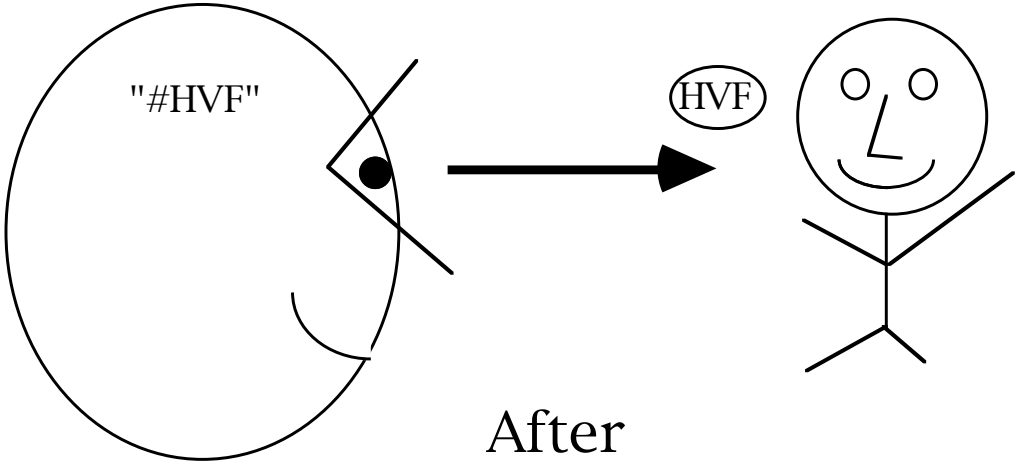
"Imaginary"

The Indicative Shift





Before



After

$$M \longrightarrow \#$$

$$\# M \longrightarrow \# M$$

Self Reference occurs at the Shift
of the Name M of the
Meta-Naming Operator #.

" I am the
Observed link
Between myself
And
Observing myself."

Paradox Generates Time

J = ~J

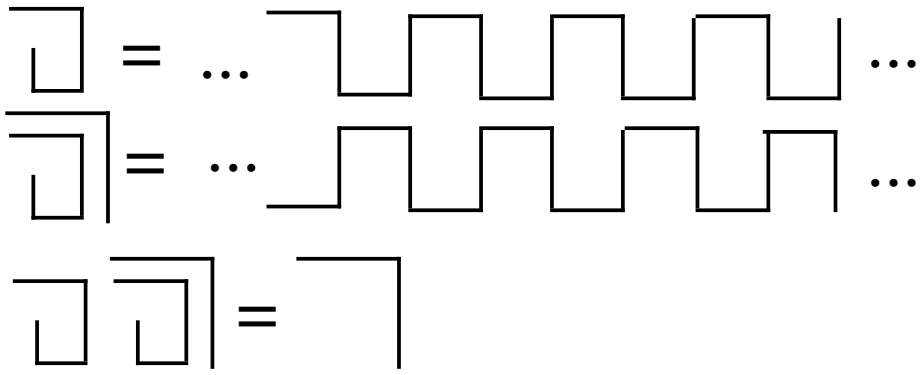
J: ...T F T F T F T F T F ...

~J: ...F T F T F T F T F T ...

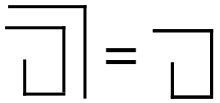
F OR T = T

Therefore

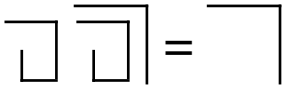
J OR ~J = T.



Aren't the two conditions



and



Logically Contradictory?

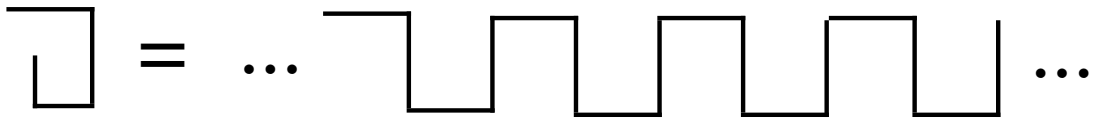
Flagg Resolution:
There is only one .
All appearances of in a given Text
Must be altered together
or not at all.

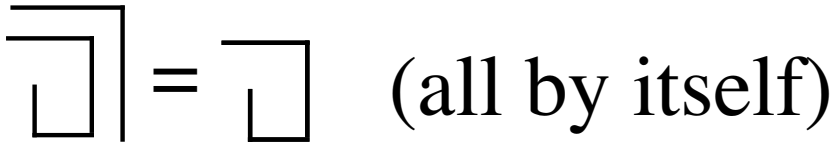
Non-Locality in the Text

The Flagg resolution
allows the entry of eigenforms into our discourse without having to change the essential forms of reasoning.
This, at the cost of
"textual non-locality".

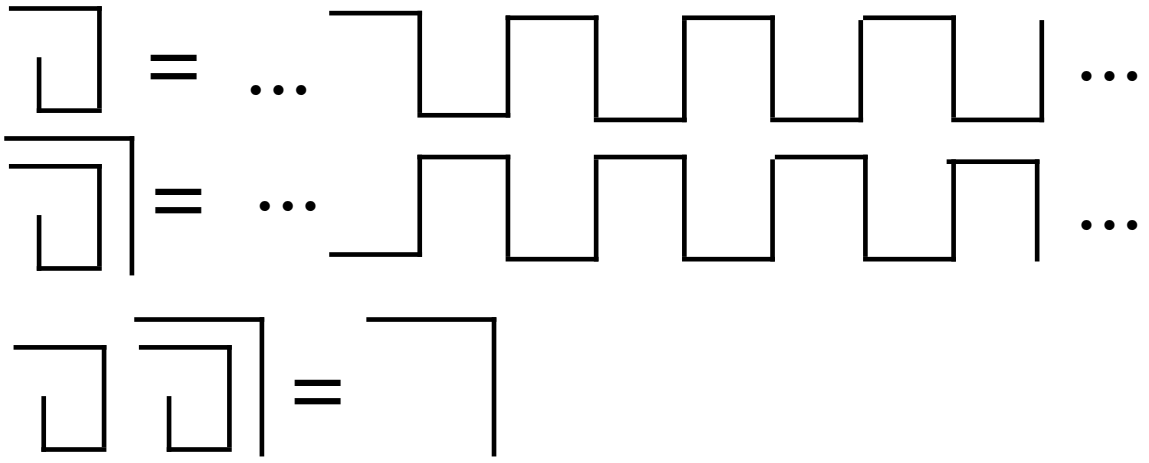
Is this a precursor to the
non-locality of the
quantum world?

The Universe is undoubtedly
Indistinguishable from Itself.





And yet, a Distinction
Shall arise in Mutuality.



Eigenforms such as

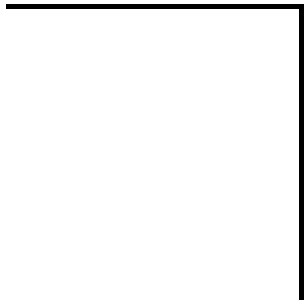
J = ~J

could well

be called

Imaginary values.

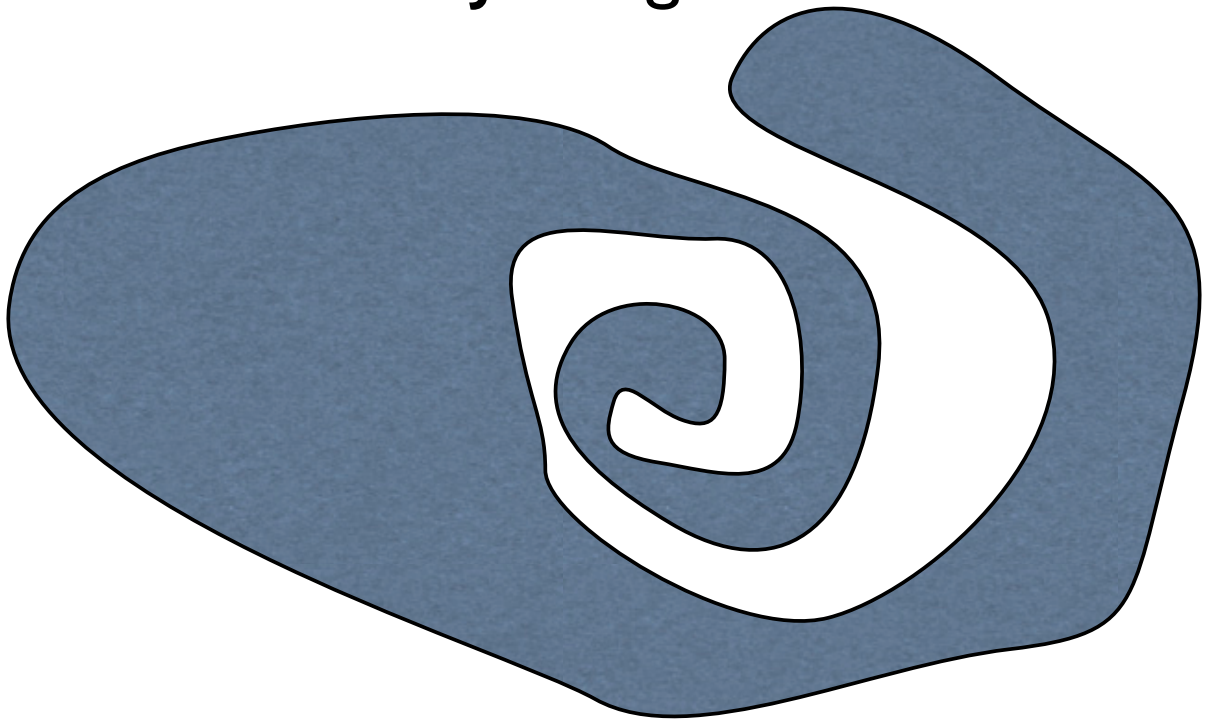
Let us not forget the primordial imaginary value, the act of (making) a distinction.

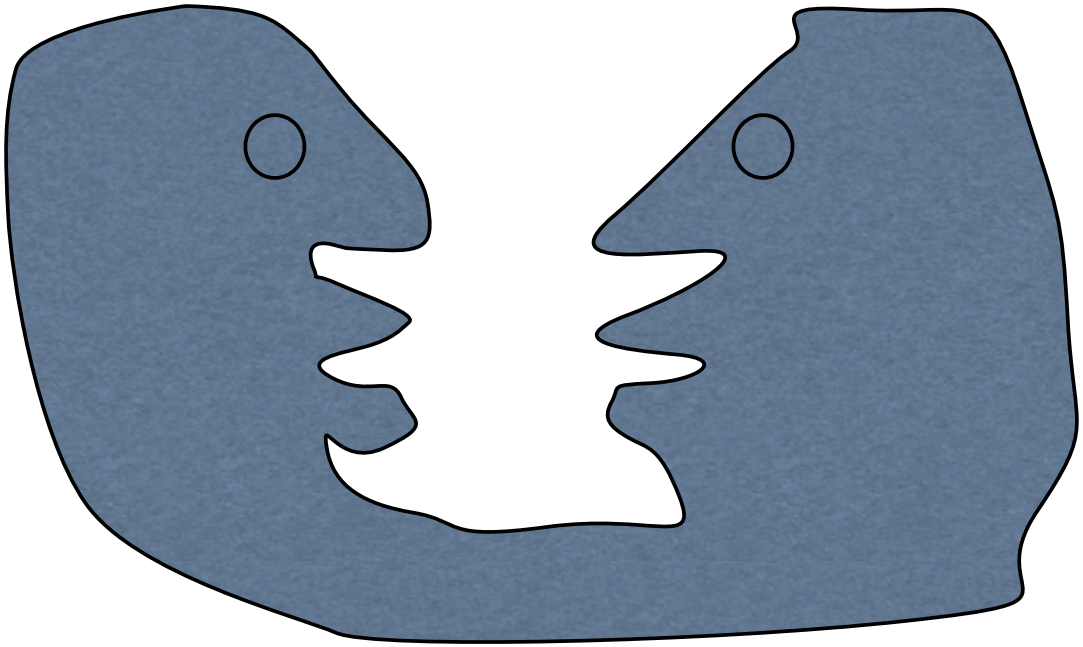


Only the Imaginary is Real.

The universe that we know
Comes into being
Through Imagination
Bringing forth
A world of distinctions that
we take to be
Real.

The art of distinction is
Inseparable from
The art of
Joining.





In order for a universe to come into being the world must act to divide itself into one part that is seen and another part that sees.

Quality, Love
Reality, Imagination, and
Discrimination
are Inseparable.

What IS
is identical
In Form
with
What is not.

The Form
we take to exist
arises from
framing
Nothing.