

IMAGINARY BOOLEANS

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Lou Kauffman is a mathematician's mathematician. He cares about beauty more than approval. He is the synchronistically joint originator (with Francisco Varela) of the imaginary Boolean value, and has formalized its mechanics.

I-ING AND J-ING

By analogy to the square root of minus-one, (check it out, dudes!):

We know that when we mix multiplication with negative numbers, we blow out of our system. It's, like, cosmic, and it's been the bane of mathematics for quite a while. Specifically:

$$x * x = 1 \quad \text{has} \quad \text{real roots} \quad 1 \text{ and } -1$$

$$x * -x = 1 \quad \text{has imaginary roots } i \text{ and } -i$$

Imaginary! Sure, the old imaginary number trick! In

$$(a + ib)$$

form, it's the imaginary operator, which is more accurate. We can make any number imaginary by *i-ing* it.

The proper name of *i*, the operator, is THE SQUARE ROOT OF MINUS. A nice way to write it as a self-referential equation is:

$$i = 1/-i.$$

Now let's apply the same principle to knowledge.

Ask yourself this (if you don't, I will):

What number is it that if it is multiplied by its negative, gives 1?

i

What operator converts a real number into an imaginary number?

i

What knowledge is it that when ANDed with its negation, gives TRUE?

j

What operator converts a real fact into an imaginary fact?

j

What knowledge is it that is *invariant under negation*?

j

Sure, the old/new imaginary knowledge trick! It's the imaginary operator again, this time addressing a domain of facts rather than numbers. We can make any fact imaginary by *j-ing* it.

It took about 200 years for folks to figure out just what an imaginary number is (well, its *imaginary* and it waves...). You can either spend 200 more years to figure out what an imaginary fact is, or you can believe this:

An imaginary fact, j , is a real fact that contradicts itself.

Lets say we KNOW "a", and lets say we also KNOW "not a". The composite fact is

$$(a \ \& \ \neg a) = \text{false}$$

We know this form is FALSE from Boolean axioms. Well, it's *false* from the "real" perspective, but we don't have to be real, due to our imagination operator. Let's say the form is true rather than false:

$$j (a \ \& \ \neg a) = \text{true}$$

or more simply:

$$a = \neg a$$

Both at the same time. SUSPEND JUDGMENT about a . Be IMAGINATIVE. Admit the POSSIBILITY. Entertain DOUBT in addition to certainty.

An imaginary fact is a contradiction we choose to ignore, or rather, accept.

Thus, the basis of CONTRADICTION MAINTENANCE. We're talking CHANGE OF MIND, folks. Oscillation of knowledge. Female prerogative. Tolerance of AMBIGUITY. Hippy philosophy. The sound of one bit flipping.

The imaginary Boolean operator, j , is the SQUARE ROOT OF NEGATION.

The *LoSp Contradiction Maintenance System* uses j to compute over contradictions in the database, without degrading logical structure or the validity of deductions. Yes, this is a brand new form of evidential reasoning that provides all the facilities of probabilistic techniques, without engaging in quantification and the messy problem of numerical composition.

An imaginary fact enters its own definition, rotated in truth, just like

$$x = 1/-x$$

describes a number that enters its own definition, rotated in negativity.

Technical note: the division operator is needed to keep the system defined in Unity, One-ness, to suppress counting. Whatever x is, its a type of unity. With this understanding, we can just say

$$x = -x$$

for imaginary numbers and

$$a = -a$$

for imaginary facts.

"The square root of negation is an imaginary operator that rotates from the domain of necessity to the domain of possibility."

-- Louis Kauffman

And the braid weaves on...

FOR THE Hardcore

Philosophy, for the hardcore, is bullshit. Show me mathematics. Check it out, dudes:

Numerical and Logical imaginary operators

```
-- = +           premise
i = i
ii = -           by definition
iii = -i        by substitution
iiii = -- ==> + by premise
```

```
¬¬ = false
j = j
jj = ¬
jjj = ¬j
jjjj = ¬¬ ==> false
```

Applying j to truth-values:

```
j true = j true           imaginary truth
jj true = ¬ true ==> false
jjj true = j¬ true ==> j false
jjjj true = ¬¬ true ==> true

j false = j false        imaginary falsity
jj false = ¬ false ==> true
jjj false = j¬ false ==> j true
jjjj false = ¬¬ false ==> false
```

In parens notation (the Losp punch line):

```
j      = {
jj     = ( )   ==> true
jjj    = {( )
jjjj   = (( )) ==> <void> ==> false
```

Totally awesome! The half-parens is an imaginary logical operator that yields negation when composed with itself. An imaginary boundary is one that does not distinguish spaces, the inside is the outside.

AXIOMS

$a ((a) b) = a$	<i>Occlusion</i>
$a ((b)(c)) = ((a b)(a c))$	<i>Distribution</i>
$\{ ((a) a) = \{$	<i>Imaginary</i>

where a, b, c can be reduced to <void> , (), or { and

$$\{() = \{$$

And you thought that NOT was a basic logical operator. Ha! The half-parens is an imaginary form that can be used for computation over logical contradictions. It represents the SQUARE ROOT OF NEGATION. The Losp computation mechanism continues to work when using a half-parens, { .

This provides a complete and consistent formalism for deduction over contradictory facts and paradoxes.

Kauffman's punch line: The imaginary calculus

"... is a *minimal* and *complete* description of the skeletal situation of the emergence of a third [logical] value. Thus it should appear in nearly all contexts that go beyond a Boolean framework."

That is:

Multi-valued logics, evidential reasoning and uncertainty calculi are DERIVATIONS of the imaginary logical calculus.

That is:

Probability theory is an UNNECESSARY COMPLICATION for computing with uncertainty.

Psychological Appendix: THE CALCULUS OF SELF-REFERENCE

Let "me" identify SELF.

(NOT me) = NOT-SELF

(NOT (NOT me)) = me

(IMAGINE me) = IMAGINARY-SELF *the fantasy-identity*

(IMAGINE (IMAGINE me)) = (NOT me)

"You can't find your real-self by fantasizing about your imaginary-self."

This provides a formalism for addressing the mind-body-soul confusion.

BODY is NOT-MIND

MIND is NOT-BODY

IMAGINE-BODY is SOUL

IMAGINE-SOUL is MIND

IMAGINE-MIND is NOT-SOUL

"The soul is the real-root of the mind, and the imaginary-root of the body."