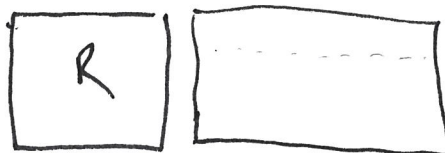
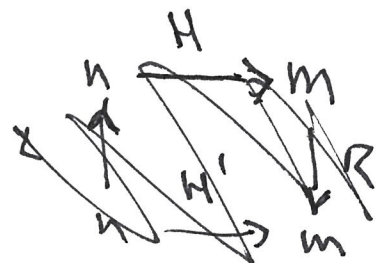


James Nolan | ①

1/9/19

~~Scramble~~



$$S = \begin{pmatrix} 1 & 0 \\ 0 & i \end{pmatrix}$$

$$S = \begin{pmatrix} 1 & 0 & & \\ 0 & 1 & & \\ & & 0 & 1 \\ & & -1 & 0 \end{pmatrix}$$

$$\mathbb{C} = \overline{\mathbb{R}}$$

Complex numbers are the algebraic completion of the real numbers.

*-algebra is an algebra with an anti-involution:

$$(AB)^* = B^* A^*$$

~~show scrambled glue~~

James

- * field extensions
- * quantum computing
- * special codes
- * Hecke operators
- * probability = $\alpha \bar{\alpha}$

$$= \langle a/b \rangle \langle b/a \rangle$$

Born rule

* quantum measurements are like adding predicates to a theory.

What is the extra structure on a real Hilbert space that makes it a complex Hilbert space?

Endomorphism for infinitesimal isometry: skew-adjoint
gives one parameter group of isometries

Also need angles...
"rotates angles around at standard angular speed"

" i is an infinitesimal generator"

1) universal property of complex numbers
freely adjoin $x^2 + 1 = 0$ as extension ring over \mathbb{R}

2) as exterior \ast algebra over \mathbb{R} .
freely adjoin a skew adjoint idempotent:

$$X^\dagger = -X$$

$$X X^\dagger = X^\dagger X = 1$$

So

$$X X = -X X^\dagger = -1.$$

\ast -algebras have \ast -modules
Just like we construct modules by hom algebra into ~~the~~ endomorphism algebra of a vector space, we can build \ast -modules from \ast -algebra into endomorphisms \ast -algebra of an inner product space.

James Dolan

③ 1/9/19

Borchers 1997

Michèle Morley experiment
(Derek Wise & Mentin)
There is no "spatial ether"

Categorified Grobner basis
method

"seeing is believing"
the belief method is an
old idea in category theory
see also "seeing"

Galois ambiguity
Noether's theorem

Symmetry

Versus observable
in Khovanov geometry