Twitter Thread by Carlos E. Perez

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Programming in abstractions is very different from a system that is capable of its own 'abstracting'. But what does abstracting mean? We only know of its inputs and outputs, but we fail to describe its inner workings.

I like this short video about living in space. This is because it makes you realize the gaps in your knowledge when you turn off something (i.e. gravity) that you have always assumed to be present. https://t.co/9SRvDoN2lZ

> What does living in space do to the human body? pic.twitter.com/kzIlEEr7pp
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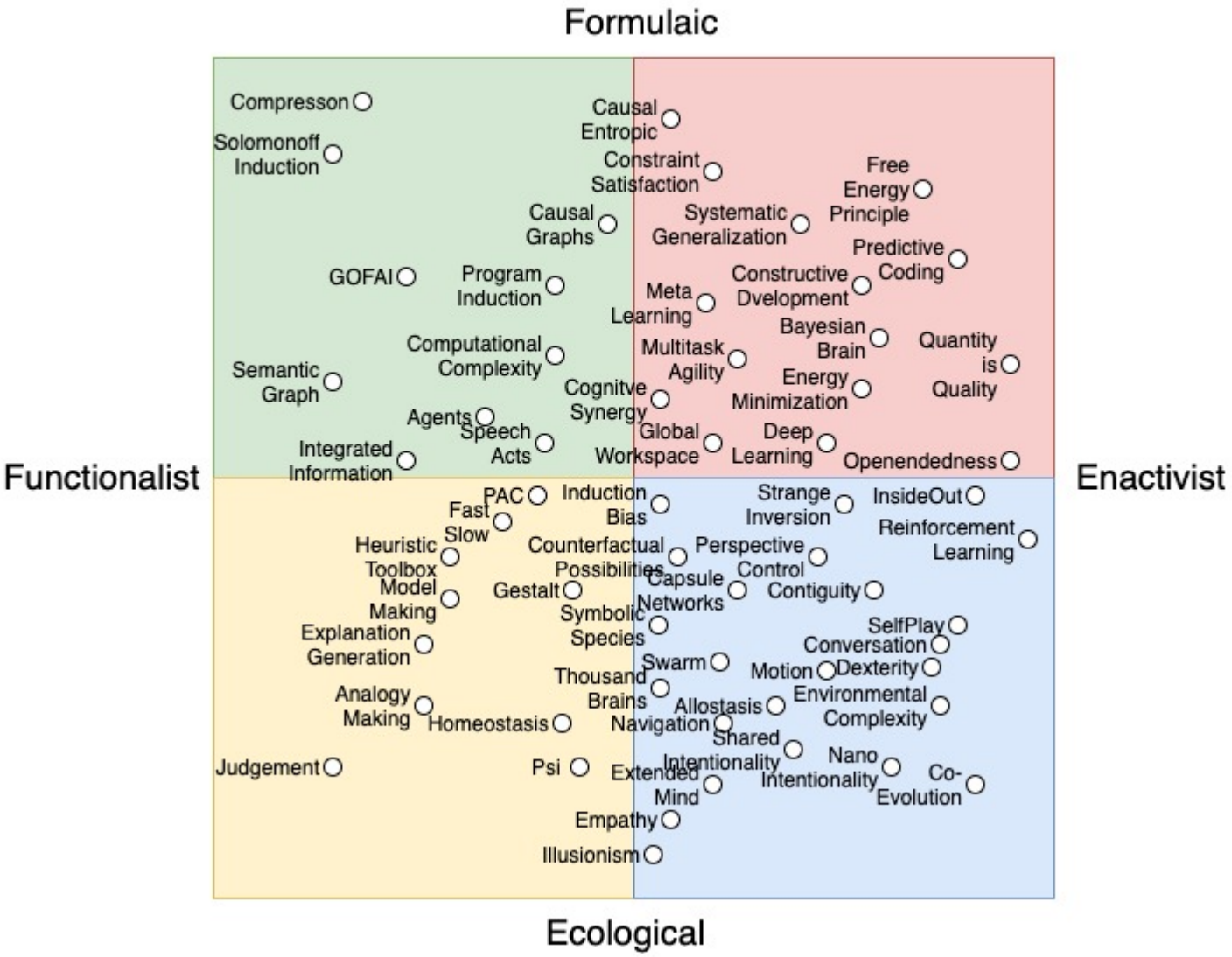
> — Tech Insider (@techinsider) December 20, 2020

Perhaps we can understand 'abstracting' better if we turn of many assumptions that we unconsciously carry around. Perhaps we need to get rid of the excess baggage that is confusing our thinking about abstraction.

Turning off gravity and living in space is a perfect analogy. We somehow have to turn off a cognitive process to understand the meaning of abstraction.

The first step to divorce ourselves from our habitual cognitive processes is to realize the pervasiveness of 'noun-thinking' . https://t.co/GLHdMeEyKX

We want our research agenda focused on the lower right quadrant of this chart:



Here's the paradox. The other quadrants are a consequence of the application of abstraction. We are so acclimatized with abstracting that we don't know how to turn it off to understand abstracting!

So like the absence of gravity reveals to us the effects of gravity, the absence of abstraction reveals to us how abstraction arises from non-abstraction.

Let's challenge two abstractions that are related. The Law of the Excluded Middle and the concept of infinity.
https://t.co/KkdJXtPs36

Numbers are not things, they are processes. This is one of the more shocking ideas that I learned this week. But it should have been obvious.

Indeterministic Physics	Intuitionistic Mathematics
Past, present and future are **not** all given at once	Digits of real numbers are **not** all given at once
Time passes	Numbers are processes
Indeterminism	Numbers contain finite information
The present is thick	The continuum is viscous
Experiencing	Intuitionism
Becoming	Choice sequences
The future is open	No law of the excluded middle (a proposition about the future can be neither true nor false)

The universe is computational and therefore is governed by intuitionistic logic.

The second false abstraction you have to rid yourself of is the notion of the 'all seeing eye'. Ever since formulation of relativity and quantum mechanics, Physics has been telling us that all of reality operates from the first-person perspective.

The consequence of this is the existence of the self and as a logical conclusion, the existence of something other than the self. This sets up a situation of co-evolution that is unimaginably rich and complex as a consequence of the mechanism of biological evolution.

Biological evolution and brains share a commonality. They are creative processes that do not have a single designer. Rather, innovation arises as a consequence of a multitude of designers in constant competition seeking design wins.

The designs that best fit the world in the present are the designs that persist in the future. But it's actually not as simple as this. Evolution and brains are creative in ways we see through the lens of gameplay. https://t.co/S9iv9wZeXe

A system like AlphaZero that is trained without the knowledge of human gameplay is of course unaware of the abstractions humans have invented to describe strategy and tactics. It just does what it does because it works best.

Yet, AlphaZero performs in a intuitionistic manner that demolishes other systems that are driven by abstractions and logic. https://t.co/Wr9nOQ6QB5

AlphaZero tells you that to learn the game, you must play the game. Rules and abstractions that describe the game will always take a back seat to participation and interaction.

Rules and abstractions are communicable expressions of previous designs. However, just like DNA requires a living cell to interpret its instructions, the same can be said about rules and instructions and the human mind.

A mind comes into being because it participates in this world, not because it has given instructions about this world.

What then are abstractions? Abstractions are metaphors that we use to communicate with minds other than ourselves.

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