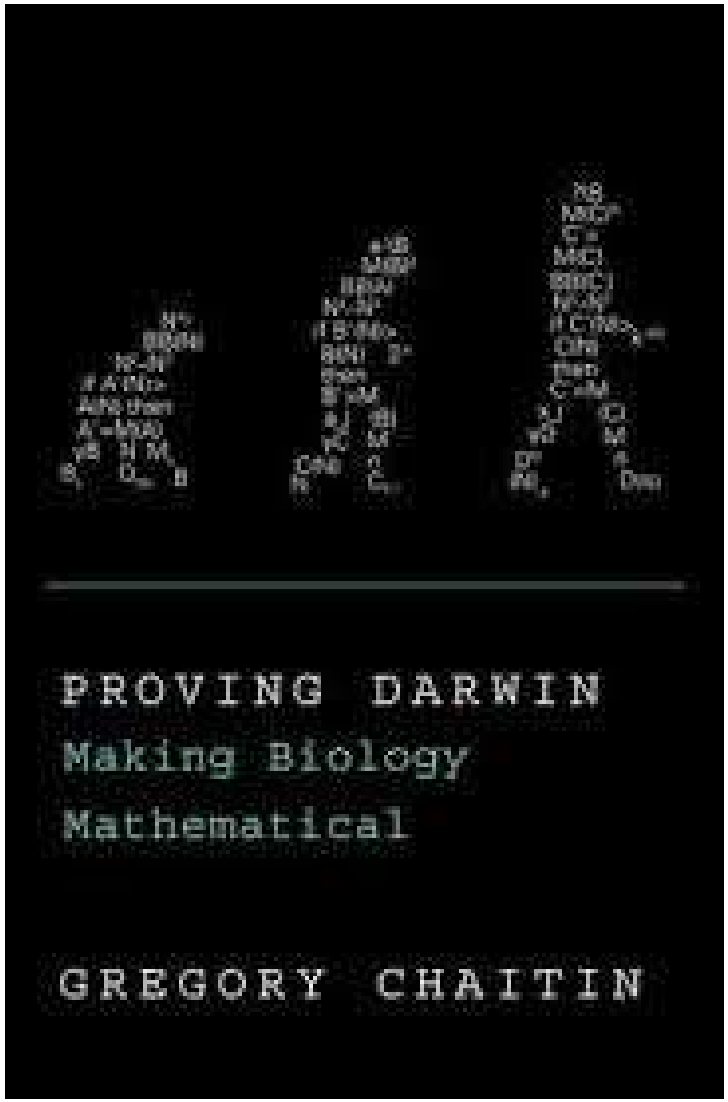
Industrial Perspectives on Third Wave AI

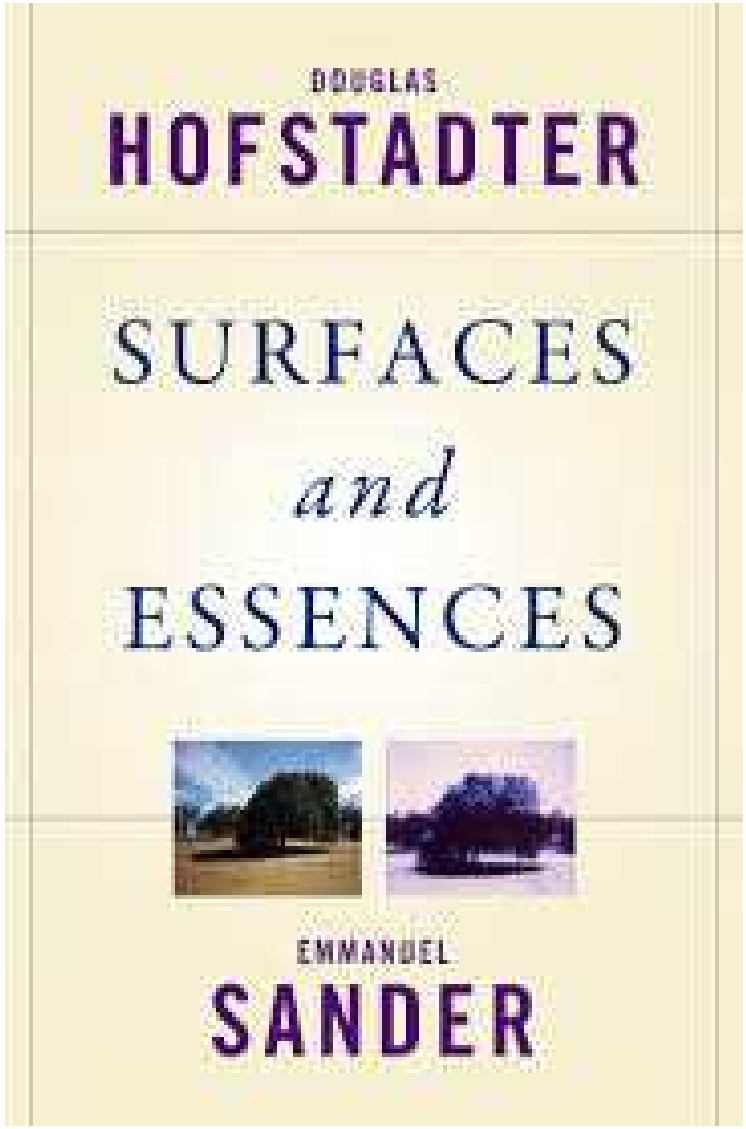
imagination at work

Creativity?



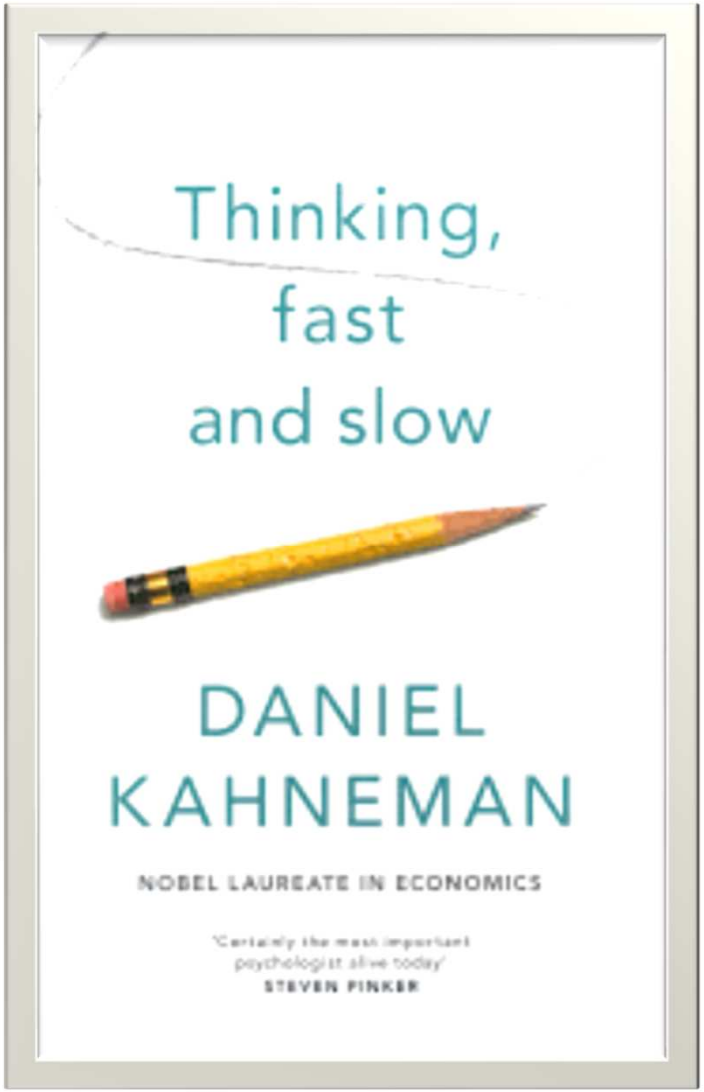
- No Universal Axioms -> there is always room for mathematical creativity! (Kurt Godel).
- Evolution should not be viewed as a search for optimal solutions – it is a quest for creativity

Analogies?



- Every act of classification can be viewed as an analogy.
- Analogies are the currency of thought.
- A military definition of intelligence: A soldier enters a chaotic situation, quickly grasps the gist of things and takes the appropriate actions…
- The Flynn effect – is this because culture not DNA is the repository for our useful analogies?

Associative Memory?



- Associated ideas come to mind via a spreading activation.
- The world is represented by a vast network of associated ideas.
- Associative coherency: a self reinforcing pattern of cognitive, emotional, and physical responses.

Mean old John Searle

The urge to think of consciousness in terms of building blocks is tempting but probably wrong.

Consciousness defies reductionism

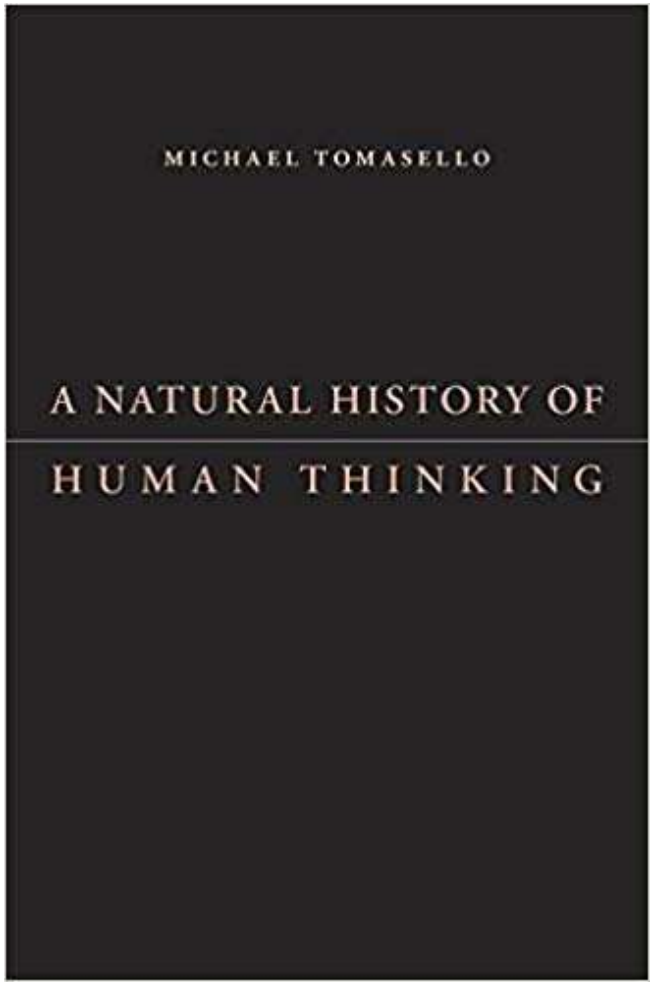
Do we have an answer to the Chinese room?

Should we be looking for the neurobiological correlates of conscious states?

Should we think of consciousness more as a physical property as opposed to an emergent capability?

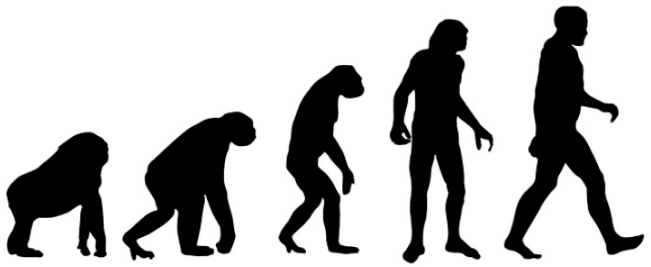
His words are so hateful because they are so true

Origins of Human Communication



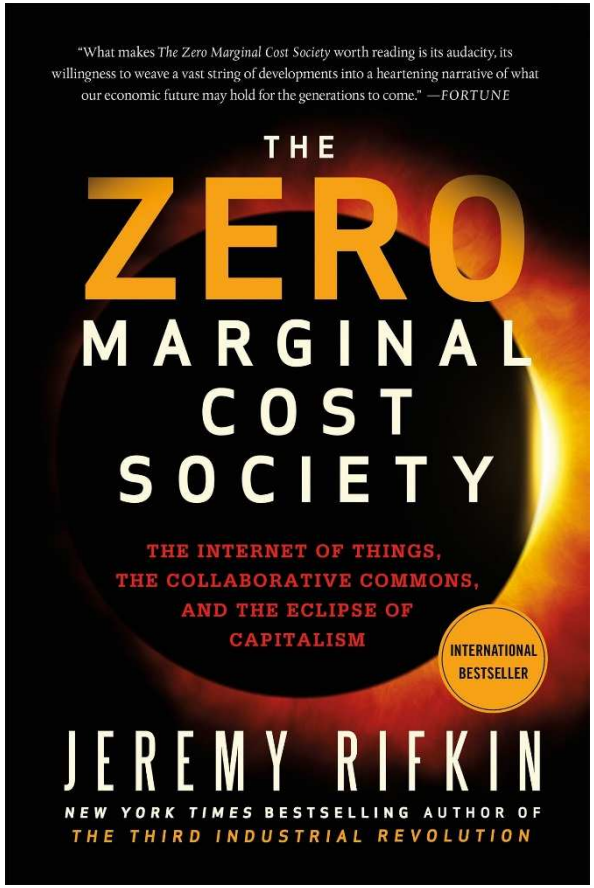
- Early humans used pointing, gestures and pantomime to:
  - Request assistance
  - Offer assistance
  - Establish conceptual common ground
- This leads to recursive mind reading over established conceptual common ground.
- Gestures became conventionalized and then arbitrary allowing for spoken language.
- Spoken language enables the characterization of actions and events over space and time which become narratives.
- Narratives can then be internalized so that individuals can make sense of their experiences.

The Human Experiment?



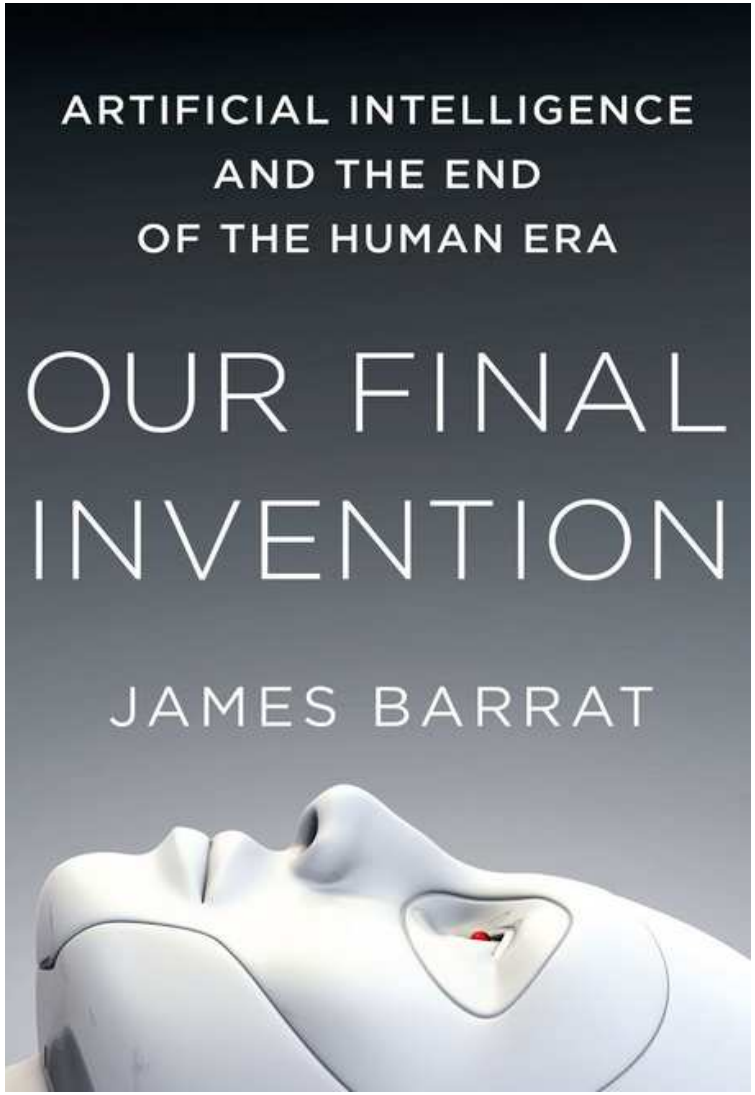
- The human brain has 10^{10} neurons, each with 10^3 connections, each performing $2*10^2$ operations per second.
- The human species has been in existence for roughly 10^4 generations where each generation lasts for 30 years (10^9 seconds).
- There are currently $7*10^9$ humans (although much less during historical times).
- Thus, the human experiment represents $7*2*10^{(10+3+2+5+9+9)} = 14*10^{38}$ calculations.
- As of 2012, The DOE Sequoia can perform $16*10^{20}$ calculations per day. This would imply 10^{18} days of dedicated compute time (Note: the universe is only $4*10^{12}$ days old).
- Assuming a highly optimistic Moore's law like progression where available compute time doubles annually, it would take approximately 50 years to reduce 10^{18} days of present day computation down to one hundred days.

The zero marginal cost economy?



- Rifkin heralds a future where marginal costs (the cost of producing additional units of a product or service once initial fixed costs have been accounted for) shrink asymptotically to zero.
- The cost of living of US workers will be significantly reduced if the ability to produce anything, anywhere at almost no cost can be established on a locality by locality basis.
- Whole communities will be able to decouple themselves from reliance on 21st century global manufacturing.
- Key zero-marginal cost technologies will include:
  - The cost of raw materials: Recycling of waste produced by zero-marginal-cost communities.
  - The cost of physical labor: Robots gifted with the ability to learn and perform any physical task.
  - The cost of specialized manufacturing: 3D printing capable of producing any type of object.
  - The cost of energy: Renewables including solar and wind.
  - The cost of research and management: AI.

The busy child?



Self-aware self-improving AI will develop 4 drives:

- Efficiency – might invent nanotech
- Self-preservation – neutralize all threats, including us
- Resource acquisition – will want to go to space
- Creativity – unpredictable consequences

It will need to achieve goals by avoiding vulnerabilities.

There are very few examples of a stronger species being overly concerned with the fate of a weaker one – we certainly are not.