# Why Myth?
## Tech's Defense of Stories

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# Overview

- Declining enrollment in liberal arts and humanities disciplines (Heller, 2023)
- General attitude (among some) that these skills are not useful
- The humanities use story, narrative, and case study to make sense of the world
- I will argue from the perspective of complexity science that these tools are in fact useful
- **Though they are not predictive, stories provide comprehensible descriptions of the world**
- **Stories are also a way to intervene in social systems**

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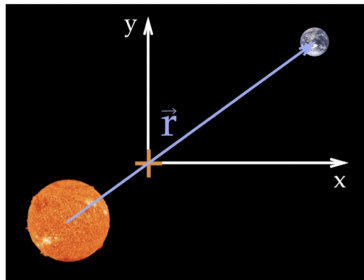
# Three types of problems
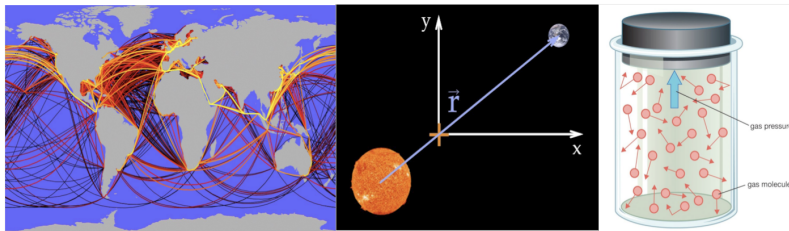


- Warren Weaver's classic paper "Science and Complexity" distinguishes between problems of **simplicity**, problems of **disorganized complexity**, and problems of **organized complexity** (Weaver, 1948)
- Shows that scientific methods have only had success at solving two of these three types of problems
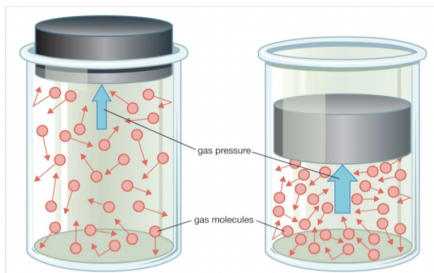
# Problems of simplicity



$$F = \frac{Gm_1 m_2}{r^2}$$

- Small number of relevant variables, simple and robust mathematical laws, few empirical statements
- Classical mechanics, continuum mechanics, electricity & magnetism, classical thermodynamics, etc.
- Broad scope and extremely predictive

# Problems of disorganized complexity



$$p(E_A, V_A) = \frac{e^{-(E_A + PV_A)/kT}}{Z}$$

- Need to reconcile atomic nature of matter with phenomenological laws (Eastman, 2014)
- Statistical mechanics developed powerful tools for extracting deterministic laws from underlying randomness
- Predictive of macroscopic observables

# Organized complexity: pretty much everything else
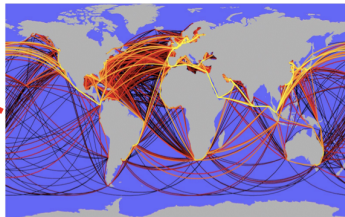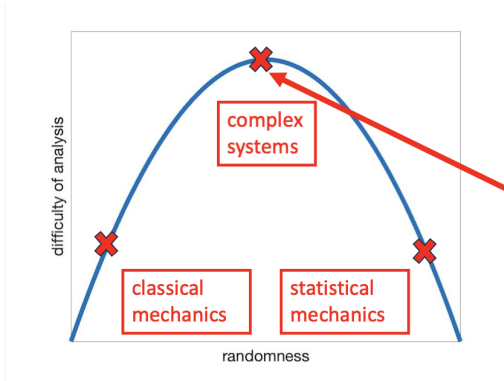


- Most phenomena lie somewhere "in between" classical and statistical mechanics (biology, ecology, economics, politics, etc.)
- Complex systems characterized by large number of variables, complicated descriptions of state, nonlinearity/chaos, emergent behavior (Holland, 1995)
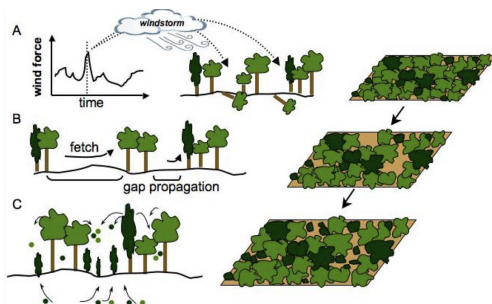
- Understanding dynamics of the distribution of trees in a forest is a problem of organized complexity (Anand et al., 2010)
- There are many deterministic and stochastic effects, the system has memory, adaptation, dynamics at multiple scales, nonlinearity, etc.

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# Deterministic-local principle
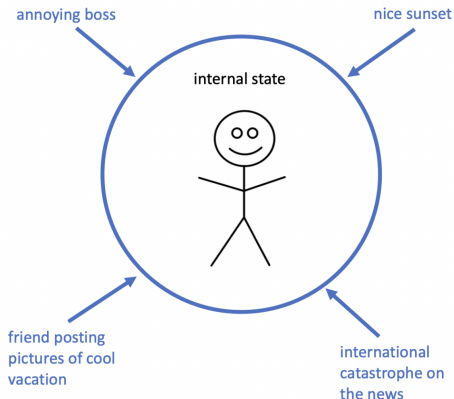


- "If we know everything, we can calculate everything," but knowing less than everything, we might not be able to calculate anything (Ismael, 2017)

# Mechanisms, lever points, algorithms



- Mechanisms of agents in system can be clearly understood
- Another goal for complex systems research is to identify "lever points"
- "Algorithms" which guide evolution of complex systems can be identified in the absence of predictive models (Krakauer, 2023)

# Coarse-graining

- Complex systems exhibit emergent behavior, and can be described at different levels

- Coarse-grained concepts ignore underlying phenomena by treating a level as "autonomous" (Holland, 2014)

- Potential trade-off between simplicity and accuracy

"Modeling" a country
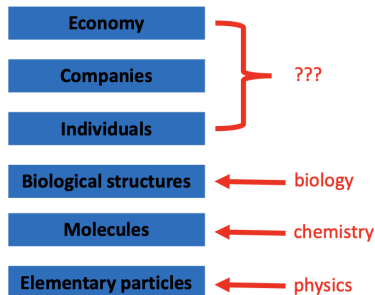
# Intuitive understanding

### On the question of intelligence and consciousness...

"It all depends on what you mean by 'understand' On a gut level, each of us probably has about as good an understanding as is possible of those things, to start with. It is like listening to music. Do you really understand Bach because you have taken him apart? . . . Do we understand how the speed of light is constant in every inertial frame reference frame? We can do the math, but no one in the world has a truly relativistic intuition. And probably no one will ever understand the mysteries of intelligence and consciousness in an intuitive way. Each of us can understand *people*, and that is probably about as close as you can come." (Hofstadter, 2000)

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- Generally speaking, we want to answer two questions: **What is going on?** and **What do we about it?**
- In problems of simplicity and disorganized complexity, the mathematical model explicitly addresses the first question
- **We suspect that myth has something to contribute to both questions as they pertain to tech**

- If we want comprehensible descriptions which accord with experience, we use stories
- Think of stories as a very complicated coarse-graining
- Sacrifice rigor and determinism for comprehensibility

"Modeling" a country
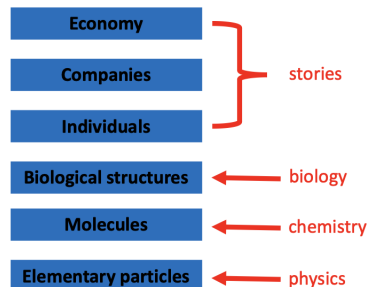
# Holism vs. reductionism



- Don't think of digital images as bit strings stored in transistors
- **The things that are relevant to our goals are often invisible in the low-level descriptions**
- Can you see things like community, injustice, or meaning with a reductionist view of the city?
- Hard to locate important coarse-grained concepts with a purely scientific worldview (Dreyfus & Kelly, 2014)
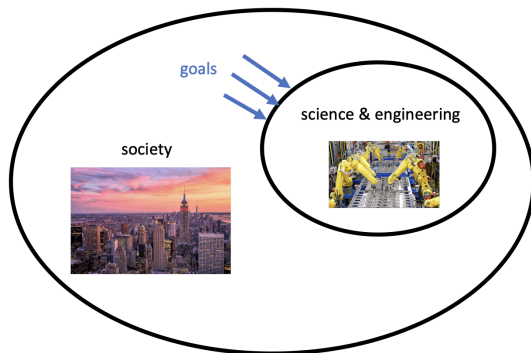
- Even problems of simplicity and disorganized complexity have to address this question
- "I can only answer the question 'What am I to do?' if I can answer the prior question 'Of what story or stories do I find myself a part?'" (MacIntyre, 2013)

# Stories are also normative

- Stories influence what we pay attention to, what we value, how we think, and ultimately how we act
- Compare the following two worldviews...

## Zen Buddhism

*"To concentrate your mind on something is not the true purpose of Zen. The true purpose is to see things as they are, to observe things as they are, and to let everything go as it goes."* (Suzuki, 2020)

## Control theory

*"A control system is considered to be any system which exists for the purpose of regulating or controlling the flow of energy, information, money, or other quantities in some desired fashion."* (Brogan, 1991)

# Christianity, the control system
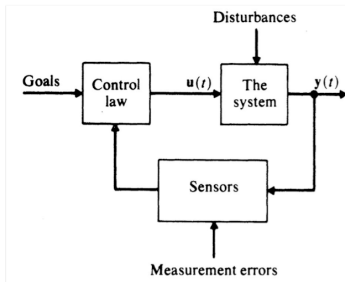


- Just as mathematical models are used to describe and control for simple physical systems, stories can be used to describe and "control" complex social systems
- The loss of determinism is due to operating at an extremely coarse-grained level, and a desire to work with descriptions legible to humans

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# Bent Flyvbjerg
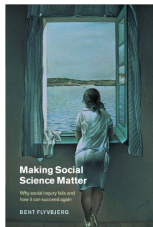


- Aristotle identifies three types of knowledge: analytic knowledge (*episteme*), know-how (*techne*), and prudence/practical common-sense (*phronesis*)
- *Phronesis* is action-oriented, context-dependent, informed by experience and a concept of *the good*
- Case studies and narrative are phronetic: "Good narratives typically approach the complexities and contradictions of real life. Accordingly, such narratives may be difficult or impossible to summarize in neat scientific formulae, general propositions, and theories." (Flyvbjerg, 2014)
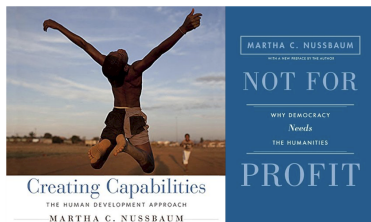
- Motivates her "Capabilities Approach" with a story of a woman named Vasanti living in rural India
- "The dominant theoretical approaches in development economics, approaches used all over the world, are not allies of Vasanti's struggle. They do not 'read' her situation in the way a local activist or concerned observer would . . . They equate doing well with an increase in GDP per capita." (Nussbaum, 2013)
- Passive engagement with stories is insufficient, democracies need critique and imagination (Nussbaum, 2012)

# Other authors

"Dramatic structure is not an arbitrary–or even conscious–invention. It is an organic codification of the human mechanism for ordering information." (Mamet, 2002)

"Although studies such as [those of history and ethnography] make no pretense at generality, their impact can be very large. They can unsettle the categories that are taken for granted in all kinds of decisions, from mundane reflections about how to respond to other people to large matters of social policy." (Kitcher, 2012)

"Innovation is not simply a technical matter but rather one of understanding how people and societies work, what they need and want. America will not dominate the 21st century by making cheaper computer chips but instead by constantly reimagining how computers and other new technologies interact with human beings." (Zakaria, 2015)

goals

society

science & engineering
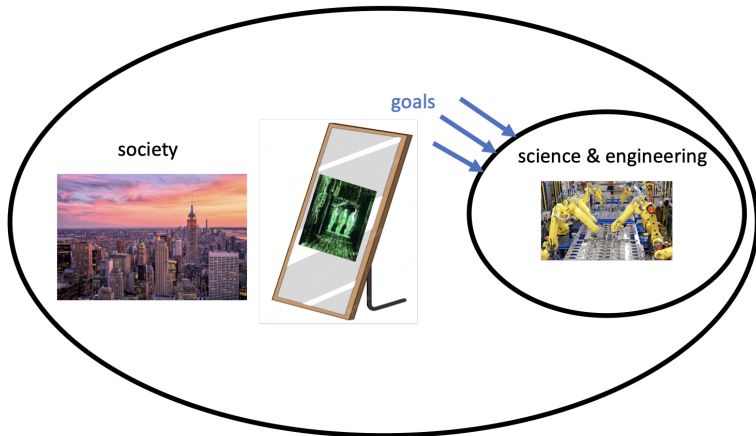
- There is agreement that stories are the right "way of knowing" about social phenomena
- Emphasis on the importance of engaging with values

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# Review

- Three types of problems; most systems we care about are complex
- Complex systems are deterministic, but difficult to model quantitatively
- **We can construct simplified descriptions through coarse-graining, and gain insight into their behavior through understanding algorithms**
- Stories are coarse-grained descriptions which are comprehensible and relevant
- Stories also have normative component; they guide thought and action
- Defenses of the humanities are grounded in the claim that stories are right way to describe and intervene in social/political systems

# My takeaways

- Even if a reductionist account of social phenomena existed, it would be incomprehensible
- The lens of complexity helps understand what stories accomplish
- The more stories you are familiar with, the more candidate "models" you have to make sense of the social world
- **Stories create incentives, analogous to algorithms guiding evolution of complex systems...this is a lever point!**
- Remember that this is not predictive

# Thanks for listening!



## What do you think?

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# Images in order of appearance

"Man at Crossroads" by Diego Rivera, available here
Global trade network, available here
Sun and earth orbits, available here
Gas particles in a piston, available here
Archer drawing, available here
Knight drawing, available here
"Man Formed by Prometheus and Animated by Athena" by Jean-Simon
Berthélemy, available here
Bits, available here here
City street at night, available here

# Images in order of appearance (cont.)

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Assembly line in factory, available here
"Sacrifice of Isaac" by Caravaggio, available here
Mirror cartoon, available here
Matrix image, available here
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Sauron (Lord of the Rings), available here
"Icarus" by William Blake Richmond, available here
The demon Mara, available here