

The Corporation as an Artificial Cognitive Entity

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One Motivation: The Fate of Humanity

- People like to worry about AI taking over the world



The more we
understand about how
corporations think,
the better our
chances will be

- Corporations have already done it



Another Motivation: Challenges Faced by Businesses

- What happens to “Martha Stewart Living Omnimedia” when Martha Stewart is no longer “Living”? Where will MSLO find their persona and muse?
- “Shocking no one, Facebook/Meta earns title of the worst company of the year.” What kind of attitude does this reflect? Corporate psychopathology?
- IBM’s® Watson® won “Jeopardy!”®, but then IBM apparently lost \$ billions pursuing cognitive computing. Could they have been smarter about that?

We can view these all as issues of corporate cognition

Terms and Concepts

- Corporation
- Cognition
- Cognitive Process

What Do I Mean by “Corporation”?

- A legally defined entity that is organized for some purpose and operated by people
- The ideas I propose
 - Won't make sense for all corporations
 - Are not restricted to corporations
- I presume that there is a substantial population of businesses to which these idea may well apply

What Do I Mean by “Cognition” in Humans?

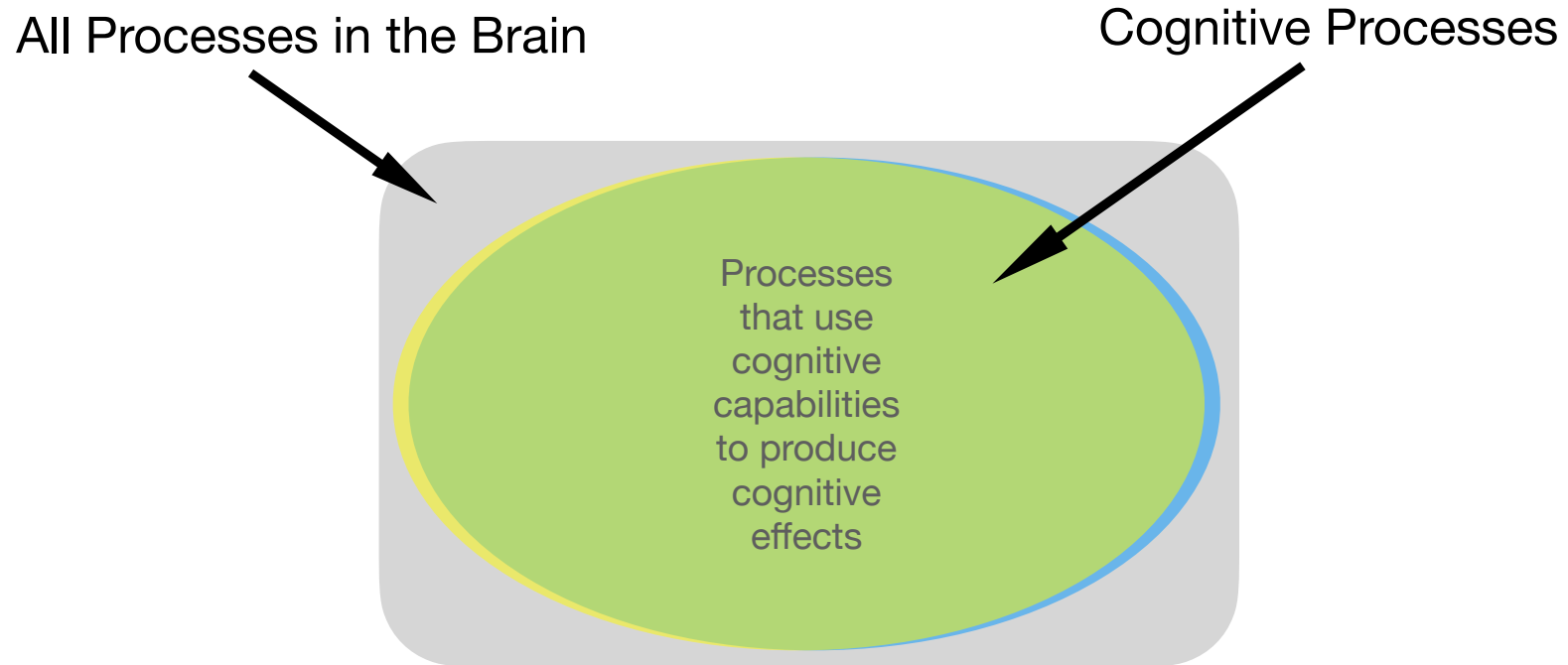
- What goes on in a **typical waking human mind**
- Characterized in terms of
 - Cognitive **effects**: perception, intelligence, memory, maturity, attention, ratiocination, reflection, etc.
 - Cognitive **capabilities**: the information processing structures and functions that operate to produce cognitive effects
- Premised on a **computational view** of how the human mind works

What Do I Mean by “Cognition” in Corporations?

- Features found in corporations that are **analogous** to the features associated with cognition in humans
- Characterized in terms of
 - Corporate cognitive **effects**: perception, intelligence, memory, maturity, attention, ratiocination, reflection, etc.
 - Corporate cognitive **capabilities**: the information processing structures and functions that operate to produce corporate cognitive effects
- Premised on a **computational view** of how corporations works

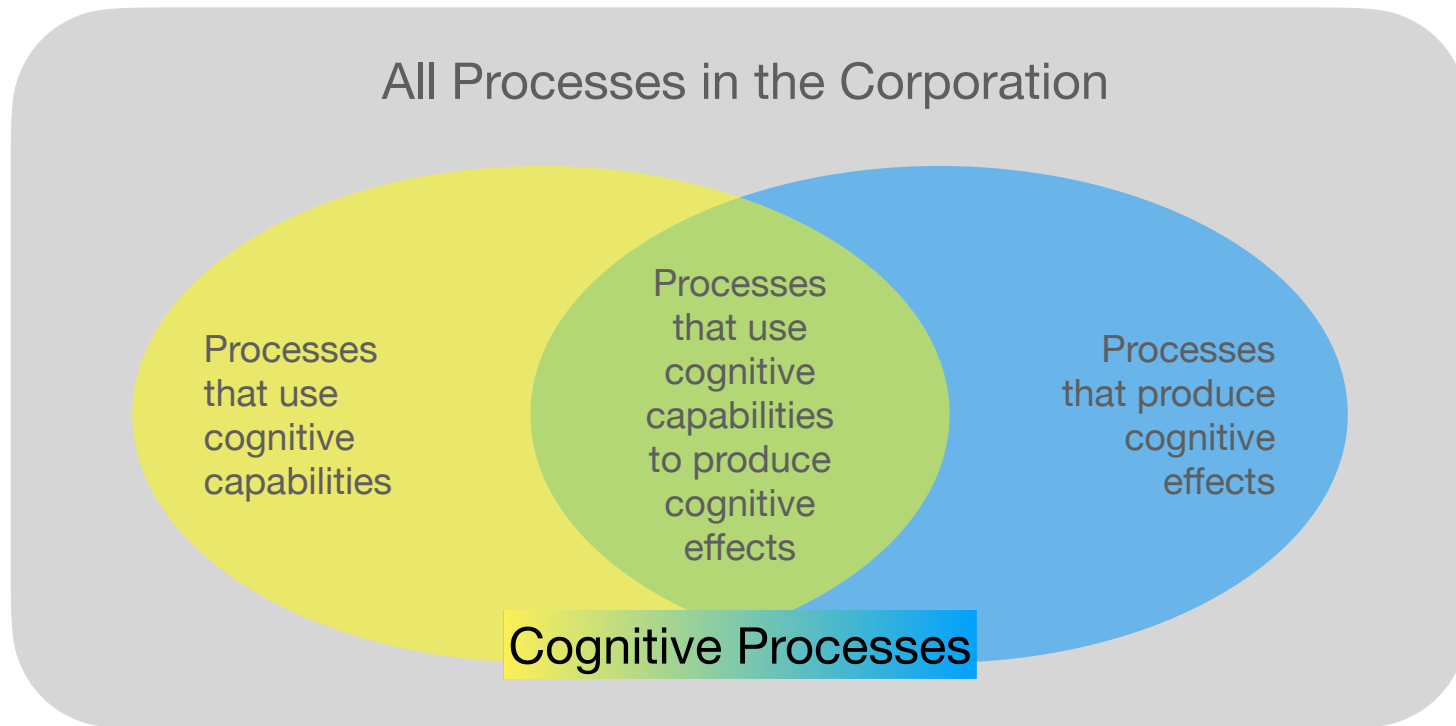
What Do I Mean by “Cognitive Process”?

In humans



What Do I Mean by “Cognitive Process”?

In corporations



(That corporations are a kind of cognitive entity)

Plausibility of the Proposal

- Corporations as seen from the outside
- Corporations as seen on the inside

Why Might This Proposal Seem Plausible?

Corporations as seen from the outside

- Corporations are **legal persons** (which assumes they have cognitive capabilities)
- **People regard corporations** as if they are cognitive entities
- **Corporations represent themselves** as if they are cognitive entities

Why Else Might This Proposal Seem Plausible?

Corporations as seen from the inside

- Corporations have **features** that are analogous to the **cognitive capabilities** found in humans
- Corporations have **processes** that give rise to **cognitive effects** analogous to those manifest by humans

Putting These Views Together

- It seems reasonable to regard corporations **as if** they are cognitive entities
- Of course, there would be **significant differences** between corporate cognition and human cognition
- But there are many similarities that may be **informative and useful**
- I propose that we should consider corporations as being a kind of **artificial** cognitive entity

Relevance to Software and Systems Process

- Process programming 👍
- Process maturity 👍
- An abundance of interesting research questions 👍

Reasons to Pursue the Idea

- Business
- Scientific

Why View Corporations as Cognitive Entities?

Business reasons

- Cognitive aspects of corporations have been linked to **business results** and **stakeholder attitudes**
- If process maturity can improve business outcomes then **cognitive maturity** may also improve business outcomes
- Business are **already transforming** themselves to enhance their cognitive capabilities
 - Think of business intelligence, organizational maturity, social awareness

Corporate Cognition and Cognitive Science

- Cognitive science for people versus
cognitive science for corporations

Domains of Cognitive Science

Traditional versus corporate

- Traditional cognitive science combines many different disciplines:
 - Neuroscience, Anesthesia, Biology, Psychiatry, Psychology, Education, Linguistics, Philosophy, Anthropology, Systemics, Logic, Artificial Intelligence
- Corporate cognitive science would also combine many different disciplines:
 - Cognitive Science (trad.), Psychology, Linguistics, Philosophy, Anthropology, Systemics, Business, Management Science/OR, Statistics and Probability, Artificial Intelligence, Software Engineering, Systems Engineering

Domains of Cognitive Science

Shared fields

- Traditional cognitive science combines many different disciplines:
 - Neuroscience, Anesthesia, Biology, Psychiatry, **Psychology**, Education, **Linguistics**, **Philosophy**, **Anthropology**, **Systemics**, Logic, **Artificial Intelligence**
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Domains of Cognitive Science

Distinctive fields

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Domains of Cognitive Science

Distinctive fields

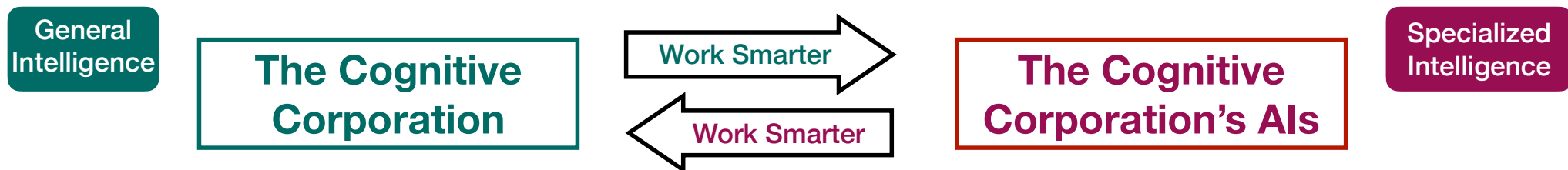
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Interdisciplinary

Corporate Cognition and AI

AI Is a Part of Corporate Cognition

- Corporate cognition is the **natural paradigm** for thinking about the role of AI in corporations
- Mechanisms and effects of corporate cognition are **fundamental** to mitigating risks and realizing opportunities around AI
- Corporate cognition can provide **context, motivation, direction, and support** for the development, deployment, and use of AI



Corporate Cognitive Attributes for Managing AI— Examples

- Information gathering and awareness
- Observation and monitoring
- Identifying goals
- Planning
- Consideration and assessment of alternatives
- Assessment of likelihood
- Prioritization
- Social awareness
- Communication and engagement
- Assessment of prospective impacts
- Measurement, evaluation, and feedback
- Classification
- Principles and values
- Attitude

Adapted from the NIST AI Risk Management Framework: Initial Draft (March 17, 2022)

Are There Interesting Research Questions in Corporate Cognition?

YES

Prospective Research in Corporate Cognition

Possibilities in many different areas

- Corporate psychology, anthropology, etc.
- Process programming and process maturity for corporate cognition
- Process contributions to the understanding corporate cognition
- Global cognition of multi-national corporations
- Business challenges as problems in corporate cognition
- Corporate cognition as one of multiple kinds of extended cognition
- Process issues in the development, deployment, and use of AI

Some Questions on Corporate Psychology

- What are the features of corporate psychology and how do they arise?
- Do corporations have cognitive biases? How do these biases arise and how can they be overcome?

Some Questions on Corporate Anthropology

- How does corporate culture relate to corporate cognition?
- Do corporations in different cultures “think” differently?
- How can you best align corporate culture and corporate cognitive development?

Some Questions on Process Programming for Corporate Cognition

- What are instructive examples of corporate cognitive processes?
- How are these processes currently specified and supported?
- What technologies do we need to better support the software engineering of corporate cognitive processes? (Languages, runtimes, middleware, tools, systems, etc.)
- What are suitable methods for the programming of corporate cognitive processes?

Some Questions on Process Maturity for Corporate Cognition

- What capabilities are needed to support corporate cognitive processes?
- What maturity levels are appropriate for corporate cognition?
Could corporate cognition have multiple maturity scales?
- How should corporate cognitive maturity be assessed?

Some Questions in Global Corporate Cognition

- What models of cognition apply to multinational corporations?
- How is the scale of cognitive processes in a corporation affected by geographic distribution?
- Does the geographic distribution of a corporation engender the development of different cognitive styles in different locations?
 - Is this a good thing? If not, what can be done about it?

Some Additional Process Questions for Corporate Cognition

- How can we best support the integration of human, social, AI, and other automated (non-AI) agents?
- What role do non-cognitive capabilities play in support of corporate cognition?
- What role may cognitive capabilities play in support of non-cognitive processes?
- What are effective ways to (re)engineering corporate processes for cognitive development? (CPINs)

The End of My Planned Remarks

Credits

- Photograph of Jeff Bezos taken by Steve Jurvetson, downloaded from https://upload.wikimedia.org/wikipedia/commons/2/2b/Jeff_Bezos%27_iconic_laugh_%28cropped%29.jpg, license [CC BY 2.0](#).
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- Photograph of Terminator Robot taken by Nathan Rupert, downloaded from <https://www.flickr.com/photos/nathaninsandiego/4826486429> on 25 Apr 2022, license [CC BY-NC-ND 2.0](#).
- Quote regarding Facebook/Meta is the title of an article by José Adorno written on 19 Dec 2021 for 9to5Mac.com regarding the result of an annual poll performed by Yahoo! Finance and accessed at <https://9to5mac.com/2021/12/19/shocking-no-one-facebook-meta-earns-title-of-the-worst-company-of-the-year/> on 26 Apr 2022.
- For information on IBM's experience with Watson, see "Whatever Happened to IBM's Watson", by Steve Lohr in The New York Times on 16 Jul 2021 and updated 17 Jul 2021, accessed 13 Jan 2022. Also see "IBM is selling off Watson Health to a private equity firm", by Steve Lohr in The New York Times on 21 Jan 2022, accessed on 5 May 2022.
- Thanks to Peri Tarr for reviewing earlier versions of this presentation and finding the photographs that are included in the final version.
- Yin and Yang symbol by Klem - This vector image was created with Inkscape by Klem, and then manually edited by Mnmazur, Public Domain, <https://commons.wikimedia.org/w/index.php?curid=3213322>.

Could Corporations Have Consciousness?

“Although centuries of philosophical dualism have led us to consider consciousness as unreducible to physical interactions, the empirical evidence is compatible with the possibility that consciousness arises from nothing more than specific computations”

What is consciousness, and could machines have it?

Dehaene et al., Science 358, 486–492 (2017) 27 October 2017

Higher Levels of Corporate Cognitive Maturity in Relation to AI

Level 4

General
Intelligence

**The Cognitive
Corporation**

Work Smarter

Work Smarter

**The Cognitive
Corporation's AIs**

Specialized
Intelligence

Level 5

General
Intelligence

**The Cognitive
Corporation**

Work Wisely

**The Cognitive
Corporation's AIs**

Specialized
Intelligence

Another Question for Research



George Conway  

@gtconway3d



Molly ask him if he believes corporate life begins when a deal is signed or when it actually closes



Molly Jong-Fast  @MollyJongFast · 1h

Replying to @elonmusk

What issues do you care about besides taxes?

12:52 PM · May 19, 2022 from Alpine, NJ · Twitter for iPhone