

Lecture 2:

Triangulating across fields

Summer Institute in Computational Social Science @ CU Boulder
August 13th, 2018



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Principal Dimensions of Journalism Culture

<u>Institutional Roles</u>	<u>Epistemologies</u>	<u>Ideologies*</u>
Interventionism <i>Intervention vs. Passive</i>	Objectivism <i>Correspondence vs. Subjective</i>	Relativism <i>Contextual vs. Universal</i>
Power Distance <i>Adversarial vs. Loyal</i>	Empiricism <i>Empirical vs. Analytical</i>	Idealism <i>Means vs. Outcomes</i>
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What other dimensions should be added for computational social science?

What other “kinds” of computational social science could exist?

Hanitzsch, T. (2007) "Deconstructing Journalism Culture." *Communication Theory*: 367-385



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Social computing examples

- **Recommender systems:** Netflix, Amazon, Spotify
- **Groupware:** Google Docs, GitHub, Slack
- **Collective intelligence:** Wikipedia, MTurk, FoldIt
- **Information exchange:** Facebook, Twitter, Reddit
- “Coordination, Cooperation, Collaboration” triumvirate



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Overlaps in methods

- Log data
- Surveys
- Experiments
- Natural language processing
- Network analysis
- Crowdsourcing
- Agent-based models



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What's the difference?

- **Computational social science**
 - Roots in statistics and complex systems
 - Deductive and observational methods
 - “Adversarial” and “citizen” orientations
 - “Universal” and “empirical” epistemologies
 - Challenges: micro/macro, structure/agency
 - Focus on explanation and theory-building
 - Social theory *from* technical systems
- **Social computing**
 - Roots in human-computer interaction
 - Inductive and design methods
 - “Loyalty” and “consumer” orientations
 - “Contextual” and “subjective” epistemologies
 - Challenges: motivation, governance
 - Focus on prediction and system-building
 - Social theory *as* technical systems



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Methods - Action Research

- Action research: “engaging with a community to address some challenge and through this problem solving to develop scholarly knowledge”
- Research “with” people, rather than “about” them
 - **Scientific-technical:** evaluating interventions based on theory
 - **Practical-deliberative:** evaluating interventions based on needs
 - **Critical-emancipatory:** identifying interventions to enhance equity
- Transferability and trustworthiness over generalizability

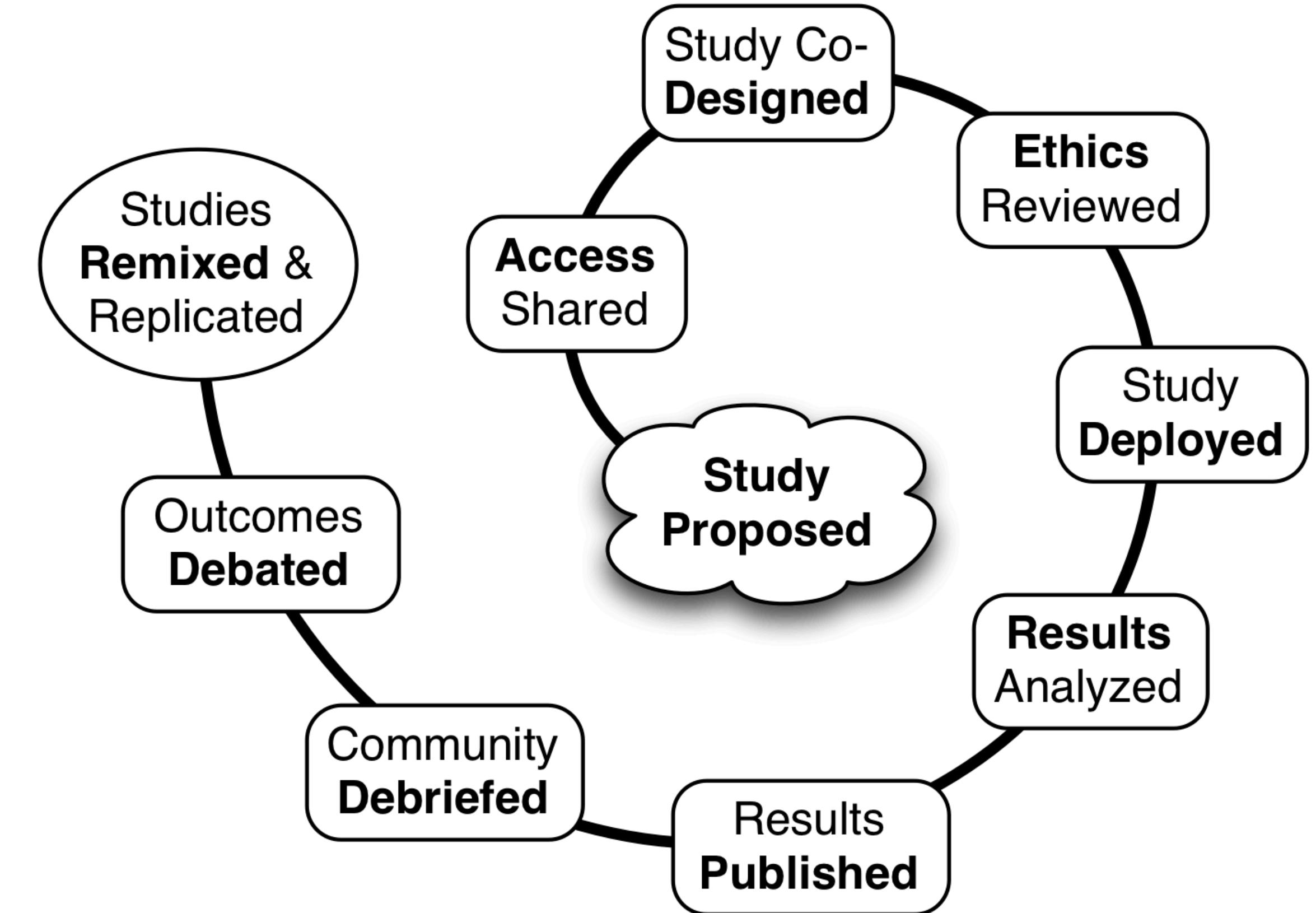


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CivilServant.io

- “Behavioral experiments tend to be designed for top-down control”
- Popper’s *The Open Society and Its Enemies*
 - Closed: experts use science to shape public behavior towards own goals
 - Open: public uses experiments to evaluate government policies
- Campbell’s “The Experimenting Society” proposes democratic field experiments where citizens shape goals, variables, interventions, analysis, and discussion
- How would community-led experiments operate?
 - Community participation
 - Research ethics
 - Transparency
 - Deliberative replication



<https://medium.com/@natematias/remaking-large-scale-behavioral-research-for-democracy-new-paper-at-chi-2018-4569ee17f07a>



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Methods - Design

- Making and critiquing artifacts that function as proposed solutions, investigating provocative artifacts and speculative futures, instantiating specific values rather than optimizing for commercial success
- “Participatory design” emphasizes involving stakeholders, rapid prototyping, iterating from low-to-high fidelity concepts, and developing practices around artifacts
- Define, discover, synthesize, construct, refine, reflect
- Identify technical opportunities, expose gaps in prevailing theories, create new social contexts for inquiry, compare solutions to same problem



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Value-sensitive design

- Low costs of scaling/sharing computing technologies means the values embedded in a given implementation are likely to become pervasive: “Creating technologies that we can and want to live with”
- Different values more agreeable in people than technology: Welfare, Property, Privacy, Bias, Usability, Trust, Autonomy, Consent, Accountability, Identity, Calmness, Sustainability
- Tripartite methodology:
 - Iterative conceptual, empirical, and technical investigations
 - Considering direct and indirect stakeholders
 - Relationship between values and technologies



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Turkopticon

- Mechanical Turk as “humans-as-a-service” abstracts labor into APIs and strips away protections: “requesters” not “employers”
- Turkopticon: “An activist system that allows workers to publicize and evaluate their relationships with employers”
- Surveys and interviews with workers express lack of fairness in disputes, few rights, and desire for mutual aid
- Builds a reputation system for requesters where Turkers can leave reviews, reviewers are moderated by administrators,



Irani, L.C. and Silberman, M.S. (2013) “Turkopticon: Interrupting worker invisible in Amazon Mechanical Turk.” In Proc. CHI 2013.



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Methods - Implementation

- Build technical proofs-of-concept: “does it work?”
- Demonstrations of “minimum viable product” by testing & deployment if feasible, alternatively with Wizard of Oz and simulation if not yet feasible
- Validation with usability tests, human performance, expert judgment: will people use it, and if they do, will they benefit from it?
- “Study, Build, Repeat”: questions of recruitment (convenience vs. random), scale (controlled vs. wild), duration (test vs. patch), instrumentation
- Tensions: users’ needs vs. research questions, “thing before theory”

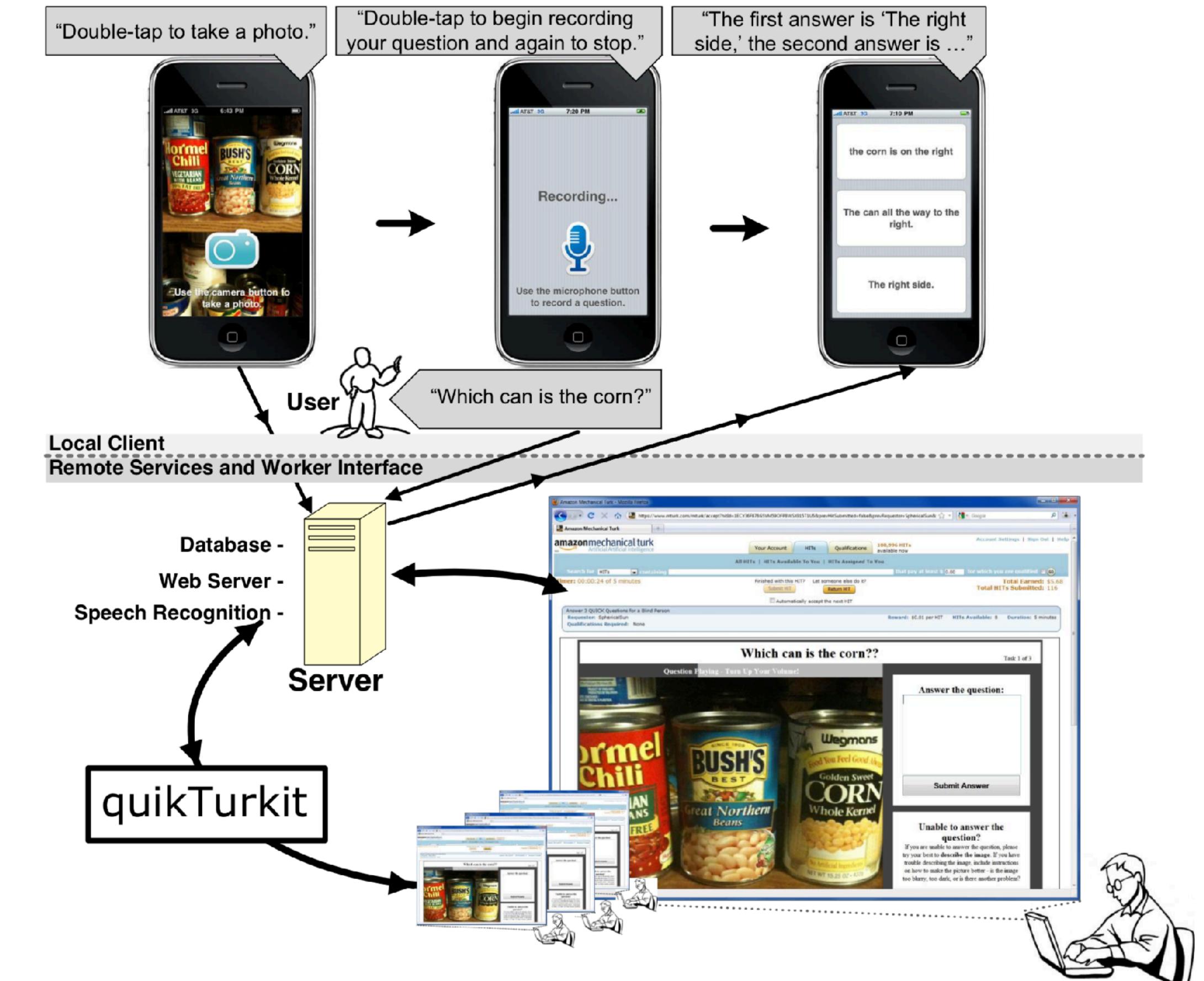


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VizWiz

- Blind people need to access visual information which cannot be easily automated
- Build system to recruiting MTurk workers in advance to quickly provide feedback to blind users' photos (27 seconds to respond)
- Emergent challenges of incentive design, taking photos, answer quality in Study 1
- Locating tasks not anticipated, leads to LocateIt extension incorporating human annotation, machine vision, and sonification



Bigham, J.P., Jayant, C., et al. (2010) "VizWiz: Nearly Real-time Answers to Visual Questions." In Proc. ACM UIST.



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Limits of computational methods

- Social engineering
- Performativity
- Governmentality



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Social engineering

- Manipulating people into undermining technical security or sharing privileged information
- Key principles of influence (Cialdini 2002):
 - **Reciprocity:** providing a favor, expecting it to be returned
 - **Commitment:** people strive for consistency with self-image
 - **Social proof:** people do what others are doing
 - **Authority:** people obey powerful figures
 - **Liking:** people are influenced by persuasive/attractive/interesting alters
 - **Scarcity:** demand increases in response to beliefs about limited supply

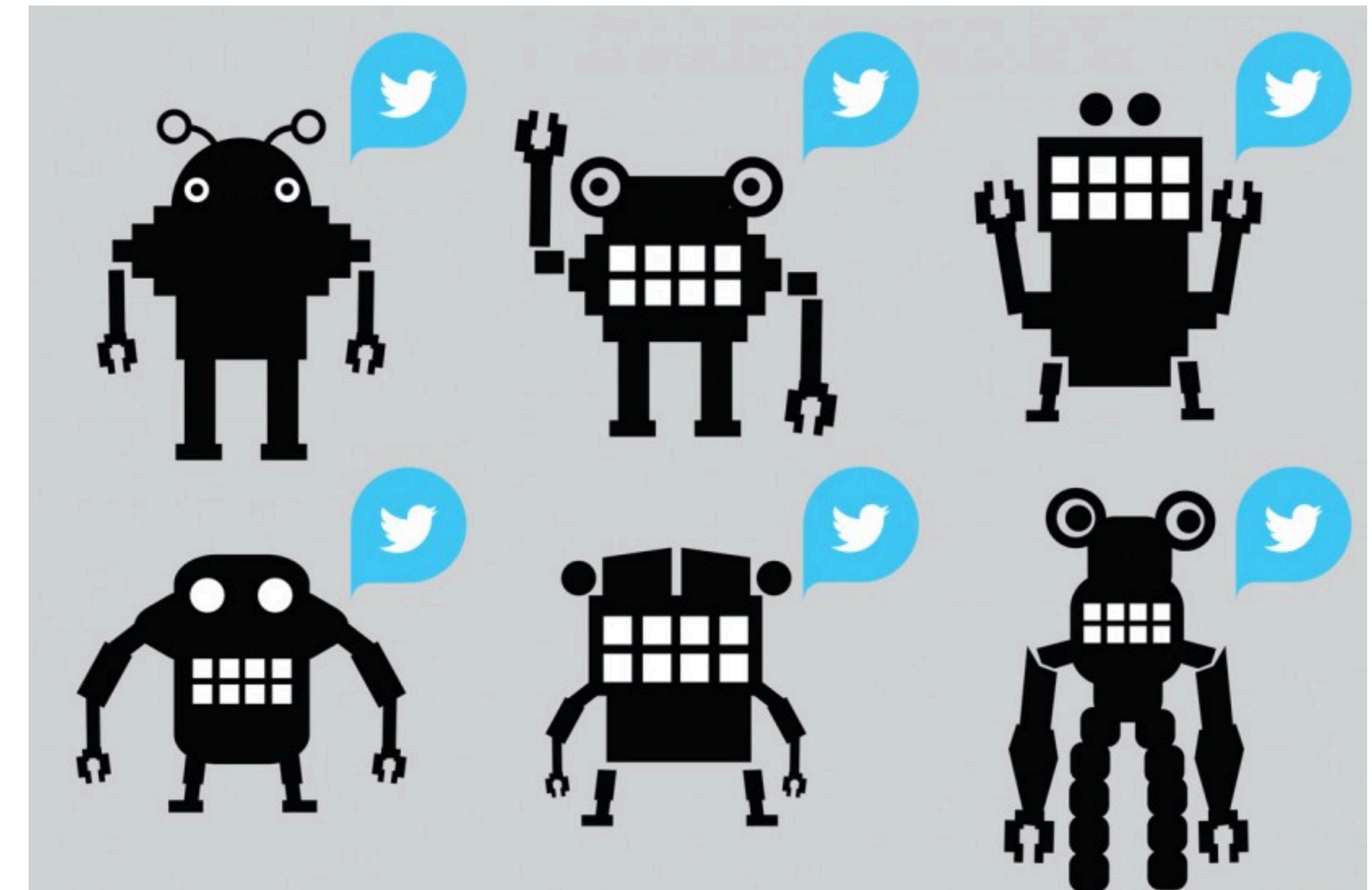


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Social bots and disinformation

- Strategic use of social media platforms as vectors for disinformation campaigns to influence political outcomes
- **Social proof:** sharing what's popular
 - Coordinate multiple accounts
- **Authority:** sharing what influentials share
 - Create accounts with fake followers
- **Commitment:** sharing what's compatible
 - Generate content that invites engagement
- **Liking:** sharing what's trending
 - Trending/recommendations amplify engagement



MacPherson, S. "How Twitter bots paved the way..." Medium.

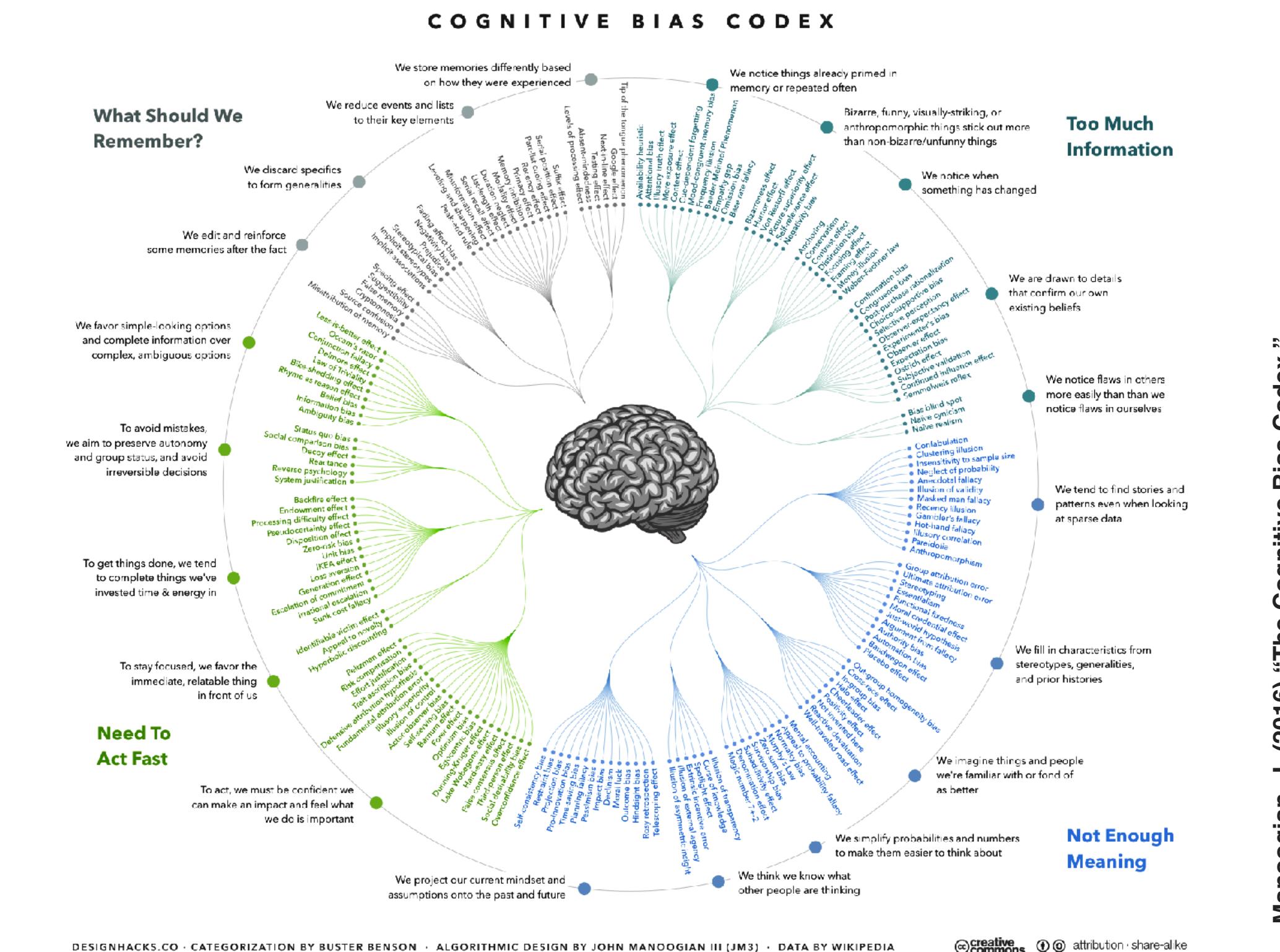


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Social engineering: Discussion questions

- What are especially pernicious cognitive biases in social media?
 - [https://en.wikipedia.org/wiki/
List of cognitive biases](https://en.wikipedia.org/wiki/List_of_cognitive_biases)
 - Other examples of cognitive biases undermining security of engineered systems?
 - What options exist for designing systems in response to cognitive biases?



Performativity

- The models used by professionals shape the phenomena they describe
- Models coordinate mutual expectations, thus shape collective behavior
- Models can produce or reinforce behaviors that they attempt to analyze



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Performativity: Black-Scholes equation

- Model of dynamics in a financial market with derivatives/options
 - Trading strategies *under specific assumptions* eliminates investment risk
- Widely-adopted by banks and traders through 1980s as computing made estimating model easier and more extendable
- Ceased to be a model of market behavior and instead influenced market behavior because of widespread adoption in market
- Overlooked assumptions contributed to 1987 and 1998 crashes

$$\frac{\partial V}{\partial t} + \frac{1}{2}\sigma^2 S^2 \frac{\partial^2 V}{\partial S^2} + rS \frac{\partial V}{\partial S} - rV = 0$$

MacKenzie, D. (2008) "Is Economics Performative? Option Theory and the Construction of Derivatives Markets." In *Do Economists Make Markets?*

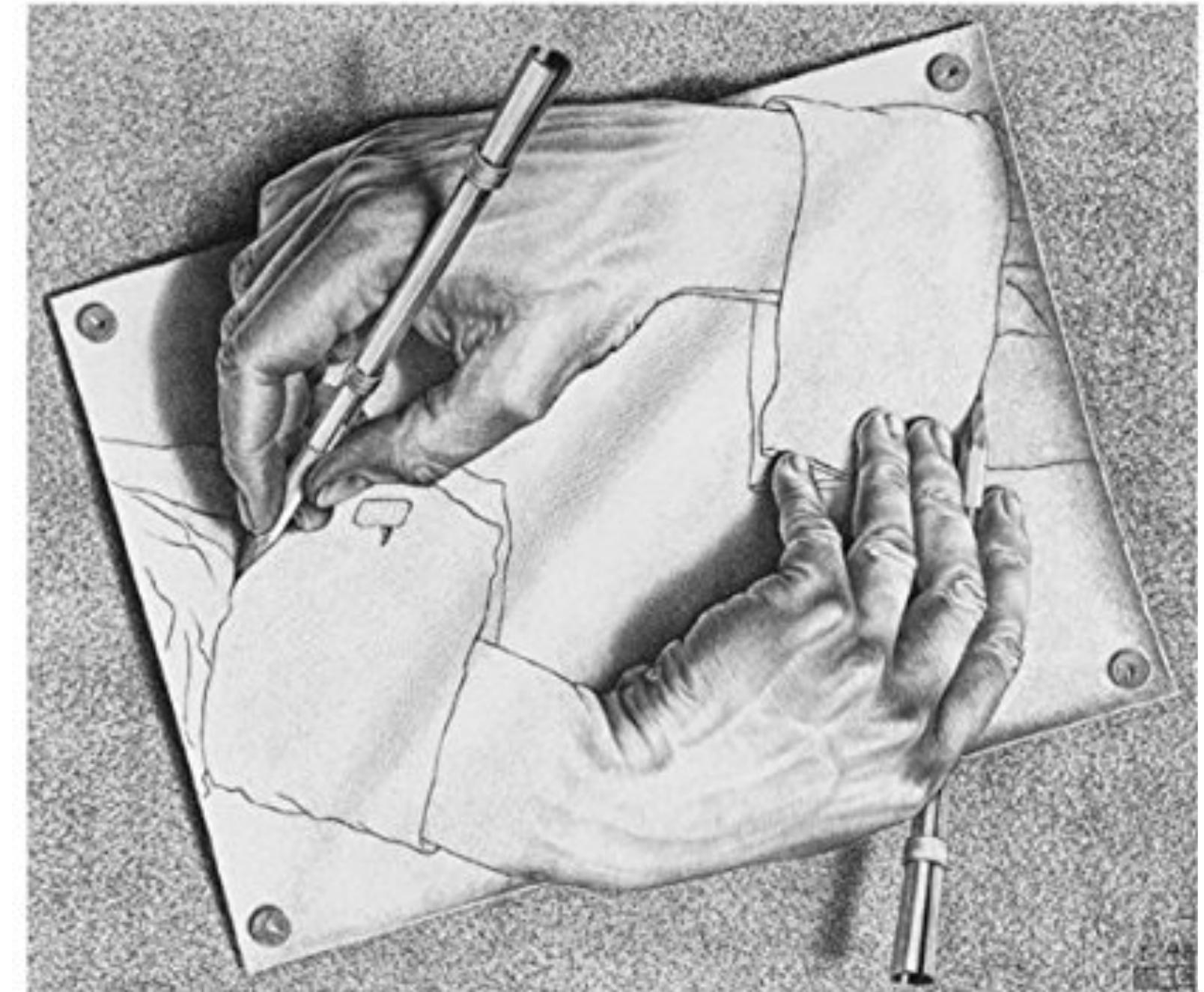


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Performativity: Discussion questions

- Other examples of models influencing the behavior they analyze?
 - College rankings? Election predictions? Parole assessments?
- What are specific mechanisms of models influencing behavior they analyze?
- What are threats and opportunities for detecting model performativity?
- What are options for responding to model performativity?



Drawing Hands by M. C. Escher, 1948, Lithograph.



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Governmentality

- Statistics, from Italian “statista” for statesman or politician, German “statistik” for “data about the state” or “political arithmetic”: administrative data, censuses, etc.
- Comte discovers Quetelet already coined phrase “social physics”, so Comte created a new term: sociology
 - “science which occupies itself with social phenomena... being subject to natural and invariable laws”
- Rose, O’Malley, & Valverde (2006) reviewing Michel Foucault:
 - “an art of governing that assigned priority to all that could **strengthen the state and its power** and... **intervene[s] into and manage[s] the habits and activities of subjects** to achieve that end.”
 - “...to understand how we are governed... we need to investigate the role of the gray sciences, the minor professions, the accountants and insurers, the managers and psychologists, in **the mundane business of governing everyday economic and social life**, in the **shaping of governable domains and governable persons**, in the new forms of power, authority, and subjectivity being formed within these mundane practices”



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Governmentality: Discussion questions

- Who conducts and funds computational social science research? What are their values and interests?
- *Cui bono*: Who benefits from improving the capabilities and adoption of CSS?
- Is beekeeping a productive metaphor for CSS? What other metaphors could shape the future of CSS?



<https://pxhere.com/en/photo/895620>



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Recap

- Similarities between “computational social science” and “social computing”
 - Other methods: Action research, design, implementation
- What are some limits to computational methods?
 - Social engineering, performativity, and governmentality



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