

## Concepts of Information

Spring 2016

“Information” is a versatile word. It’s the name we attach to the age we live in, to and the technologies that define it, to the society and economy that they give rise to, and to the "revolution" that these technologies launch. It characterizes a variety of professions, activities, and social conditions (information architect, CIO, information overload, information haves and have-nots, information warfare), and not incidentally the new faculties that take “information” as their unifying focus. The word figures as a theoretical or technical term in a number of disciplines, including AI, computer science, philosophy, psychology, linguistics, economics, political science and information theory. In short, the word stands (along with its sister “data”) for a welter of social, technological and intellectual connections that seem to define a large swath of modern life.

In this class, we will not be trying to define “information” or “data” (though we’ll look at some attempts to do so). Rather we want to take the word as a point of entry to explore the connections and ideologies that it evokes. Why do people assume, for example, that the bits and bytes sitting on their hard drives are the same as the stuff that creates social revolutions and whose free exchange is necessary to the health of democratic society? (Would we make those connections if we didn’t use the word “information” to describe them?) How are the notions of information deployed by management science or artificial intelligence connected to the information theory developed by Shannon?

We’ll be taking on these questions by discussing readings both from historical periods and from a range of disciplines, focusing on the some of notions (such as “information,” “data,” “platform,” “technology,” “knowledge”) that seem to connect them.

*Requirements:* Students will be expected to attend class and to complete various exercises attached to class topics over the course of the semester. They will also be asked to volunteer to take responsibility for one class and its readings. A final paper of 25 to 30 pages is required to pass. For this paper, students will be asked to focus on the way concepts that we have explored play out in their own work or the field or discipline in which they feel most at home and, drawing on and supplementing literature discussed in class, to examine the theoretical and symbolic work that the concepts are accomplishing in such literature.

## Concepts of Information

### Syllabus

#### 1. Introduction (Jan 19)

This class will introduce the questions that we will focus on over the semester and go over the syllabus and the course requirements.

#### 2. Methods (Jan 21)

In this class we will discuss how we might analyze "information," what tools and methods we will draw on. We will look briefly at attempts to do similar conceptual analysis in related fields.

Marx, Leo. 2010. "Technology: The Emergence of a Hazardous Concept." *Technology & Culture* 51(3): 561-577.

Williams, Raymond. 1976. "Communication" in *Keywords: A Vocabulary of Culture and Society*. New York: Oxford University Press.

##### *Background Reading*

Merton, Robert. 1984. "The Fallacy of the Last Word: The Case of Pietism and Science," *American Journal of Sociology*, 89(5): 1091-1121.

#### 3. Historical Developments (Jan 26)

This class will explore how the meaning of information has developed over time and in what ways current struggles with the concept reflect a break from the past or a reemergence in modern form of old battles. In parallel, we will look at the development of the concept of "data" and begin an exploration of the relationship of these two notions.

Duguid, Paul. 2015. "The Ageing of Information." *Journal of the History of Ideas* 76(3): 347-368.

Nunberg, Geoffrey, 1996. "Farewell to the Information Age" in G. Nunberg, ed., *The Future of the Book*, Berkeley: University of California Press. Read pp. 1-23.

#### 4. & 5. Theories of Information (Jan 28 & Feb 2)

In these classes, we will first look at Claude Shannon's foundational essay, "The Mathematical Theory of Communication," which created the field of information theory and established "information" as a modern keyword, not to mention making such terms as "bits" and "binary" part of the language. We'll then look at attempts to make "information" a first-class citizen in the philosophy of knowledge.

Shannon, C. E. 1948. "A Mathematical Theory of Communication," *Bell Systems Technical Journal*, July & October (Reprinted in *ACM SIGMOBILE* 5(1) 2001: 3-55

Shannon, C. E. 1956. "The Bandwagon," *IRE Transactions on Information Theory* 2 (March): 3.

Dretske, Fred I. 1983. "The Epistemology of Belief." *Synthese* 55 (1):3 - 19.

## 6. Counting Information (Feb. 4)

Shannon's mathematical theory provided a way to count information. This class will explore the rationales for quantifying information, and ask about the reliability and usefulness of such counts, contrasting Shannon's method with the assumptions that go into most claims of "information overload."

Lyman, Peter, & Hal Varian,. 2003. "How Much Information?: Executive Summary

Bohn, Roger E. & James E. Short. 2009. How Much Information? 2009: Report on American Consumers.

## 7. Information and Data (Feb. 9)

People often reduce the relation of information and data to a facile statement, "information is processed data." But it has become clear that the relation is more complex than that, particularly as data analysis becomes the focus of modern research. In this class we'll look at the historical rise of the concept of data and the central role it has come to play in recent years.

Tuomi, Ilkka. 1999. "Data is More Than Knowledge: Implications of the Reversed Knowledge Hierarchy for Knowledge Management and Organizational Memory." *Journal of Management Information Systems* 16(3): 103-117.

Porter, Theodore M. 1996. "How Social Numbers are Made Valid," Ch. 2 (pp. 33-48) of *Trust in Numbers : The Pursuit of Objectivity in Science and Public Life*. Princeton: Princeton U Press. Available at ebrary.

## 8: Information and Cybernetics (Feb. 11)

The field of cybernetics developed in tandem with Shannon's communication theory and ultimately give rise to Gibson's notion of "cyberspace," which remains with us today. This class will look at these developments, trying to understand its assumptions and contributions.

Hayles, N. Katherine. 1999. "Contesting the Body of Information: The Macy Conferences on Cybernetics," chapter 3 in *How We Became Posthuman: Virtual Bodies in Cybernetics, Literature, and Informatics*. Chicago: University of Chicago Press.

Kline, Ronald, R. 2006. "Cybernetics, Management Science, and Technology Policy, The Emergence of 'Information Technology' as a Keyword, 1948-1985." *Technology & Culture* 47(3): 513-535.

Weaver, Warren. 1998 (1949). "Some Recent Contributions to The Mathematical Theory of Communication," introduction to *The Mathematical Theory of Communication*. University of Illinois Press.

Wiener, Norbert. 1949. "Introduction," pp. 7-39 in *Cybernetics; or, Control and Communication in the Animal and the Machine*. Cambridge MA: Technology Press.

## 9. Information and Communications (Feb. 16)

This class will look at the rise of the academic field(s) of information and contrast them with accounts of the field of communication, exploring ways in which that field was subordinated by information studies. It will also look at the way both information and communication are used in fields represented in CHI.

from Williams, Raymond. 1962. *Communications*. London: Penguin.

from Carey, James W. 1989. *Communication as Culture: Essays on Media and Society*. Boston: Unwin Hyman.

Reddy, Michael. 1979. 'The Conduit Metaphor ' in A. Ortony, ed., *Metaphor and Thought*. New York, NY: Cambridge University Press, pp.: 284-324.

### **10 & 11. Information and the Organization of Knowledge** (Feb. 18 & 23)

“Knowledge is information made meaningful” is another of the facile generalizations that doesn’t withstand careful scrutiny. Is it knowledge or information that’s growing apace or that characterizes the new economy? What if anything is the difference? In this class and the following we’ll look at the roots of institutions that shaped the modern conception of knowledge, such as curricula, reference works and collections, whose features still shape the way we think about knowledge and information today. Then we’ll ask what happens to this global conception of the structure of knowledge in the age of Wikipedia and similar effort. Can we still speak of “knowledge” as a coherent body of content, or is it essentially pluralist and fragmentary?

Burke, Peter. "Classifying Knowledge" pp. 81-115 in *A Social History of Knowledge*. Cambridge: Polity.

*The following classes will focus on how information is used in different fields, particularly those that have adopted ideas of "information" widely used in economics, cognitive science and political science.*

### **12. Information and Economics** (Feb 25)

Information has become a key concept in Economics. This class will examine how the concept has been used in the field and explore to what extent this reflects a specialized use—is the economist’s “information” the same as its common use? As its use in information theory?

Akerlof, George A. 1970. "The Market for 'Lemons': Quality Uncertainty and the Market Mechanism." *Quarterly Journal of Economics* 84(3): 488-500.

Stiglitz, Joseph E. 2002. "Information and the Change in the Paradigm in Economics." *The American Economic Review* 92(3): 460-501.

Stigler, George J. 1961. "The Economics of Information." *Journal of Political Economy* 69(3): 213-225.

### **13. Information, Development, and Development Studies** (March 3)

Economistic notions of information have been applied widely in the field of development studies. In this class we will look at how it has been both naturalized and problematized within that field.

Jensen, Robert. 2010. "The Perceived Returns to Education and the Demand for Schooling." *Quarterly Journal of Economics*. 125(2): 515-548.

Nguyen, Trang. 2008. "Information, Role Models and Perceived Returns to Education: Experimental Evidence From Madagascar." MIT Working Paper.

Srinivasan, Janaki, & Jenna Burrell. 2013. "Revisiting the Fishers of Kerala, India." Working Paper

Burrell, Jenna, and Elisa Oreglia. 2015. "The Myth of Market Price Information: Mobile Phones and the Application of Economic Knowledge in ICTD" *Economy and Society* 44(2): 271-292.

#### **14. Information and IP (March 10)**

Economistic notions of information are also used in seminal texts on intellectual property. This class will explore and question how they have been used and consider what alternatives there are for understanding IP.

Boyle, James. 2009. "Preface," pp. i-xvi in *Shamans, Software, and Spleens: Law and the Construction of the Information Society*. Cambridge, MA: Harvard University Press.

Duguid, Paul. 2014. "Information in the Mark and the Marketplace: A Multivocal Account," *Enterprise and Society*, 15(1): 1-30.

Landes, William, & Richard Posner. 1987. "Trademark Law: An Economic Perspective." *Journal of Law & Economics* 30(2):265-309.

#### **15. Information, Organization, and Institutions (March 15)**

This class will explore theories that suggest that modern organizations and institutions can be best explained in terms of their ability to manage and control the production and circulation of information. In particular, we will look at claims that the development of the "information society" is giving rise to new forms of organization and development.

Coase, R.H. 1937. "The Nature of the Firm," *Economica*, NS 4(16): 386-405.

Richardson, G.B.. 1972. "The Organisation of Industry," *The Economic Journal*, 82(327): 883-896.

Kenney, Martin & Urs von Burg. 2000. 'Institutions and Economies: Creating Silicon Valley ' in M. Kenney, ed., *Anatomy of an Innovative Region: Understanding Silicon Valley*. Palo Alto, CA: Stanford University Press.

#### **16. Information and Quality (March 17)**

Along with quantifying information, ideas of quality (some objective and some subjective) are explicitly or implicitly raised in discussions of information. In this class we will look at such discussions, in particular but not limited to those which have arisen around "open source" and "peer production," trying to discern the conditions assumed to justify claims of quality and the role of different types of certification in accounting for such claims.

Benkler, Yochai. 2003. "Coase's Penguin, or Linux and the Nature of the Firm." *Yale Law Review* 112(3): 369-446.

Duguid, Paul. 2006. "Limits of Self-Organization: Peer Production and the 'Laws of Quality.'" *First Monday* 11(10).

Nunberg, Geoffrey. 2009. "Google's Book Search: A Disaster for Scholars." *Chronicle of Higher Education*. August 31.

Nunberg, Geoffrey. 2015. "Don't You Dare Use 'Comprised of' on Wikipedia: One Editor Will Take It Out." *Fresh Air*, March 12

## Spring Break

### 17. Presentations of Final Paper Outlines (March 29)

In this class students will outline their final papers for class discussion.

### 19 & 20. Information & Politics (March 31 & April 5)

What role does information play in the political process? Can citizens be sufficiently informed to make rational choices? We'll look at the ways political scientists have borrowed concepts of information from economics and cognitive science to address these questions. We'll also discuss the vexed notion of "objectivity," which is closely related to the role of information in public life. Is information necessarily objective? What sense of objectivity is at work here?

Lippmann, Walter. 1922. *Public Opinion*. New York: Harcourt Brace. ch. 6-7, 13-14.

Popkin, Samuel L. 1994. *The Reasoning Voter*. Chicago: Chicago University Press. Chch. 1-3, 5.

### 21. Information and the State (April 7)

Arguments similar to those presented in organizational and institutional theory are used to explain the modern state. This class will look at arguments around the role of the state in creating many of our contemporary notions of information. We will also look at notions that, as with formal organization, information technology will diminish or even dismiss the role of the state.

Giddens, Anthony. 1981. "Surveillance and the Capitalist State" pp. 169-176 in A. Giddens, *A Contemporary Critique of Historical Materialism*, vol 1 *Power, Property, and the State*. Berkeley: University of California Press.

Scott, James C., John Tehranian, & Jeremy Mathias. 2002. "The Production of Legal Identities Proper to States: The Case of the Permanent Family Surname." *Comparative Studies in Society and History* 44(1): 4-44.

from Veeraraghavan, Rajesh. 2014. "Open Governance and Surveillance: A Study of the National Rural Employment Program in Andhra Pradesh, India." U.C. Berkeley Ph.D. Thesis.

### 22: Personal Information and Privacy (April 12)

Discussions of the state and information lead quickly to debates over the state as a challenge to our "personal information," and, alternatively, as the primary means to protect us from challenges to "personal information." In this class we will explore notions of "personal information," both historical and current and set contemporary debates about it in the context of the challenges raised by the proliferation of such information with the rise of self-tracking and movements like the "quantified self," and look at assumptions that "ownership" solves many related problems.

from Boyle, James. 1996. *Shamans, Software, & Spleens: Law and the Construction of the Information Society*. Cambridge, MA: Harvard University Press.

Fourcade, Marion and Kieran Healy. 2013. "Classification situations: Life-chances in the neoliberal era." *Accounting, Organizations and Society*, 38.

Crawford, Kate, et al. 2015. "Our Metrics, Ourselves: A Hundred Years of Self-Tracking from the Weight Scale to the Wrist Wearable Device." *European Journal of Cultural Studies* 18(4-5) 479-496.

Mulligan, Deirdre K. & Colin Koopman. "Theorizing Privacy's Contestability: A Multi-Dimensional Analytic of Privacy." WIP.

### **23 & 24. Information and Cognitive Science (April 14 & 19)**

The notion of information has been central in the emergence of cognitive approaches to psychology, anthropology, linguistics and AI. In these two classes we'll survey these approaches asking how the "cogsci" understanding of information is related to the information theory developed by Shannon and what role it plays in theories of mind and action.

Gardner, Howard. 1987. Introduction & Ch. 1, pp. 3-44. in Howard Gardner, *The Mind's New Science: A History of the Cognitive Revolution*. New York: Basic Books.

Miller, George A. 1956. "The Magical Number Seven, Plus or Minus Two: Some Limits on Our Capacity for Processing Information." *The Psychological Review* 63:

Suchman, Lucy. 1993. "Response to Vera and Simon's 'Situating Action: A Symbolic Interpretation.'" *Cognitive Science* 17(1): 71-75.

### **25. Information and Education (April 21)**

Education is often cast as a process of delivering information and, by extension, learning as the mirror image of teaching. This class will examine how "information" has been cast in debates about learning, particularly in the context of discussion of on-line education and such things as MOOCs.

Brown, John S. & Paul Duguid. 1996. "The University in the Digital Age." *The Times Higher Education Supplement* (May): 1-4.

Sims, Christo. Forthcoming (2016). "Introduction" and "Conclusion: Surviving Fixations," chch 1 & 7 in *Fixations*. Princeton University Press, Princeton, NJ.

Saxenian, Annalee. 2012. "Can Online Education Technology Improve Excellence and Access at Berkeley?"

### **26: Information Literacy (April 26)**

As the concepts and techniques surrounding information and data assume a central place in academic and public life, there have been numerous proposals for incorporating them into the secondary and university curriculum. These cover a range of topics, from teaching students how to search and how to engage in data-based reasoning to giving them a fundamental understanding of issues of privacy and IP. Can these all be treated as a coherent subject matter? What do students really need to know? Who should take responsibility for teaching this material?

"Information Literacy Competency Standards for Higher Education," American Council of Research Libraries

Report of the Commission on the Future of the UC Berkeley Library, 2013. Read section on "information literacy"

**27. Wrap** (Apr 28)

In this class we will look back over the semester to see what conclusions we might draw from the variety of approaches to the notion that we have surveyed in this course.

**Reading Week**

**May 5 Final Paper Presentations**

In this class students will present the argument of final papers for class discussion.

**May 13 Final Paper Due**