Annual Fellows Seminar 2016-2017

Impact of Big Data on Society: The Good, the Bad, and the Ugly

Co-organizers: Monnie McGee (Statistics) and Daniel Engels (Computer Science/Lyle)

Participants:
- Jeff Kahn, Dedman School of Law
- Justin Fisher, Department of Philosophy
- Jennifer Dworak, Electrical Engineering
- Dave Matula, CSE
- Mark McCoy, Anthropology
- Eli Olinick, EMIS

Description

The seminar will explore the changes in society that have been brought about by the easy availability and constant gathering of data on humans via various media and digital interactions, including smartphones, the Internet, and other mechanisms. Furthermore, data sets that were never meant to be used together can now be linked via computational methods to reveal significant personal information that cannot be obtained from a single source alone. Such linking of data sets often violates current notions of privacy and security. This seminar will explore the societal implications of data availability.

I. Research Collaboration

We are experiencing a seismic shift in institutional structures due to the availability of data – equivalent to, if not more impactful than, the shift experienced during the Industrial Revolution. Through our daily online and off-line activities, we are producing, and companies are collecting, enormous amounts of data with little attention paid to how the data will be used or analyzed. Several studies have already been performed analyzing the impact of the data on our society. For example, a recent study explored the impact a Google search on the development of public opinion (Davison, 2013). Google is the main way that approximately two-thirds of Internet users access the roughly 56 billion indexable documents on the Internet. The study determined that there was bias in the articles that appeared on the first page of a Google search, yet many people think that Google searches lead to objective, unbiased, results.

In addition to influencing our opinions, companies are using the enormous volumes of data that they are able to collect on consumers to improve their marketing campaigns to change our buying behaviors. Availability of data has led to the use of data in ways for which the holding databases were never intended. Another study showed that, with only

four data points taken from credit card metadata, 90% of individuals in the database could be uniquely identified (de Montjoye, et. al., 2015). Such examples raise questions about privacy and security as a result of the availability of Big Data.

The Internet of Things promises to make the inanimate items around us smarter and more helpful. The Internet of Things also promises to create Big Data corresponding to our daily activities and interactions. The unauthorized capture or otherwise obtaining data from the Internet of Things will provide an even greater level of privacy invasion by the persons and corporations that can analyze or otherwise mine this very granular data.

Cryptography can help prevent unauthorized capture of Internet of Things data and the unauthorized use of a database. Cryptographers spend a great deal of time and energy developing encryption algorithms and protocols that are increasingly more difficult to break. Most of the algorithms and protocols are broken within a relatively short period of time. However, the more dangerous issues arise when an insecure algorithm or protocol is thought to be secure and obtains widespread use. To this end, it is important to utilize well studied algorithms and protocols to secure our data capturing devices (such as those devices in the Internet of Things) and our data storage systems (such as our databases). And, it is important to thoroughly study new algorithms shortly after they are proposed.

The long term consequences of these perceived (or real) breaches of privacy are just beginning to be explored. Our intention in this seminar is to focus research on the influence of Big Data availability on the areas of cryptography and privacy.

Key Questions:

1. How does our notion of privacy need to change as a result of the Digital Age?
2. How is Big Data being used for good?
3. How can we teach students to examine the implications of the availability of Big Data?
4. How does our awareness of data collection and the use of the resulting Big Data impact our behavior?
5. How does the Internet of Things and the resulting knowledge that our behavior is monitored impact our individual and group interactions?
6. How can we use statistical analysis to demonstrate the strengths and weaknesses of cryptographic codes?
7. What are the ethical implications of tying databases together to determine multiple levels of human behavior?

II. Course on the Impact of Big Data on Society

As we examine various readings and conduct our own research, we also want to keep in mind that students (and society at large) need to develop a "bias detector" and learn how to apply it to the information they read on the Internet. As part of this seminar we plan to

develop a course that explains how data are kept private, how data can be linked together, and the implications of such linking.

Finally, we want to explore what other countries are doing to protect consumers from unauthorized use of their personal data, in the hopes of developing policies for use in the United States. Furthermore, we want to balance examples of ethically questionable uses of data with ethically sound and even beneficial uses.

III. Format of the Fellows Seminar

We expect to have five or six participants from the social science departments in Dedman College, the statistics department, and Computer Science and Engineering department at SMU. We will meet 8-10 times each semester. During the fall semester, our meetings will focus on the first part of our proposal—promoting research collaboration among scholars from statistics, computer science, and social scientists at SMU. During the spring semester, we will focus on the second half of our proposal—creating a course on the impact of big data on society.

To be considered for participation in this seminar, please send a 1–2 page statement discussing your background, research, and interest in the topic of this seminar. Please discuss what you hope to achieve through participation in the seminar, and how you see the seminar fitting into your broader research and teaching goals for the year. The statement should be emailed to Monnie McGee (mmcgee@smu.edu) and Daniel Engels (dengels@smu.edu) by April 15, 2016.

Languages of Art and the Arts of the Conceptual
Co-Organizers: Michael Coriss (Art) and Philippe Chuard (Philosophy)

Participants**:**
- Lisa Pon (Art History, Meadows)
- Anna Lovatt (Art History, Meadows)
- Peter Kupfer (Music History, Meadows)
- Zach Wallmark (Music, Meadows)
- Jennifer Matey (Philosophy, Dedman)
- Brad Thompson (Philosophy, Dedman)

Description:
Nelson Goodman's 1976 *Languages of Art* has had a profound impact on how to think about pictures: forcing many to abandon or greatly refine the role resemblance is supposed to play in pictorial representation, and developing a set of new ideas regarding the function and expressive power of the structure of works of art, including, in the case of painting, their spatial and chromatic structures.

Goodman's ideas are meant to apply to many other sorts of pictures, including photographs, as well as pictures used in rather different contexts: graphs, diagrams, and charts, and their functions in scientific theories. They have been taken to shed light on psychological

representations too, including mental imagery and perception, by focusing on the structural features of these representations.

Goodman himself suggested that such structural concerns can be extended to more dynamic works of art, especially music, film, even dance: to do so, clearly, would require a shift of focus on the temporal structural features of musical and cinematographic works and our perception of them (evidently, much work has been done on such structures from a variety of perspectives).

But Goodman's ideas would appear to hit a wall when it comes to the more sophisticated and playful forms of art developed in the second part of the 20th century by conceptual artists such as Joseph Kosuth, Lawrence Weiner, Dan Graham, Sol LeWitt, Adrian Piper, and the conglomerate of artists involved with the journal *Art & Language*. Without any clear attempt to depict or represent anything, one might think, what's the point of focusing on the structural features of representations?

Perhaps this is too quick: going back to the early days of the 20th century, Ludwig Wittgenstein developed an account in his *Tractatus Logico-Philosophicus* of the logical structure of language and thought which he took to mirror or "picture" the logical structure of the world itself, in ways that are not too dissimilar from how Goodman views the role of structure in a broader class of representations. And focus on logic, especially the logical limits of expression and the representational features of logical paradoxes, is an important theme, connecting the interests of a variety of conceptual artists back to Wittgenstein.

One question this raises is whether the sort of structural approach developed by Goodman can help capture how systems of representations face various limitations (expressive limitations in particular) and whether such limitations can even be considered as an issue *within* the system of representation in question. Another question is to what extent art forms can exploit philosophical and logical theories, or other theoretical approaches from the sciences, for expressive purposes. Finally, there is the further question of whether these art forms can in fact make genuine contributions to some of the philosophical, logical, or scientific, concerns they borrow from (other than as mere popularizing tools) and to what extent.

The aim of the seminar is hence to focus on a host of related issues surrounding the nature and structure of representations, be they in some sense pictorial or altogether different (linguistic, musical, cinematographic, choreographic, etc.), through a variety of art forms and outside the arts, including the role of graphs and diagrams in scientific theories, as well as the use of modelling in scientific explanation and theory-building. Another related focus concerns the limitations such systems of representation face, and how such limitations can be considered and theoretically explained—and to what extent the arts can, perhaps, contribute to our understanding of such limitations. Finally, there's the question of how scientific and philosophical theories can be exploited for artistic projects, and to what extent the resulting art forms can thereby contribute in some way or other to the development or evaluation of such theories. Conversely, various scientific explanations may well be using philosophical or aesthetic assumptions or tools in their explanations: in this respect, how do such assumptions and tools contribute to the development of particular scientific projects if at all.

To be considered for participation in this Interdisciplinary Fellows Seminar, please send a 1-2 page statement of your own work and interests as they intersect with the theme of the seminar. Please discuss what you hope to achieve through participation in the Seminar, being fairly specific about the scholarly goals you would set for the year. The statement should be emailed to Michael Coriss (mcoriss@smu.edu) and Philippe Chuard (pchuard@smu.edu) by April 15, 2016.