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Faculty Advisor: TBD  
Meeting Time: Tue/Thurs  
FALL TERM: 11 Weeks + Final Exam

# Crafting Data

## **COURSE DESCRIPTION**

Big Data is increasingly used as a tool for describing and improving the world. From the quantified self to standardized testing, big data is often portrayed as a universal value-neutral approach where almost infinite information is stored in disembodied databases and findings are efficiently expressed through digital visualization tools. We've seen important successes from Big Data and also the spawning of new problems, from algorithmic bias to the commodification of individuals. What alternatives do we have in this era of data?

Crafting data explores a contrasting approach to information. It pursues the possibilities of data that is inefficient, process oriented, and contextual. This course will consider alternative approaches to data and question present day manifestation of data in society. We will create physical instantiations of data instead of digital visualization; artistic instead of analytic models; indexical data instead of quantified data; and contextual instead of universal data. We will also step back to the original motivations and promises of data. Why are we collecting data? What can and can't we measure? How does the process of data collection influence societies? What other paths towards problem solving are available to us? Our explorations will be underwritten by a desire to understand and address the important issues we face as a society.

Course requirements include participation in class discussion, project critiques, in-class activities, and weekly readings and assignments. Assignments will build towards a final project that demonstrates comprehensive understanding of the course. Students with a background in the arts, crafting, fabrication, data visualization, electronics, and social critique are encouraged to enroll. Graduate course; committed undergrads welcome with permission of instructor.

## **GRADING**

Grading will be based on attendance, thoughtful participation in class discussion and activities, and how successfully projects incorporate concepts addressed in readings (30%). Participation includes being attentive and engaged, contributing to critiques, and engagement in in-class exercises. Weekly course assignments will be required (30%). The final project will be worth 40% (including documentation). The final project is expected to build on a previous class exercise or earlier prototypes. Each unexcused absence will result in losing one letter grade. Each failure to do the assigned readings or activity will result in a 5% loss of total points.

## **WEEKS: 11 total plus one exam week**

### **WEEK ONE**

Syllabus & class introduction

Where are we now: looking closely & critically at data now: how does it reflect our values? How do we use it? How does it act on us?

The era of data: there's a lot of it, we used it for everything, it has "value"

The invisible action of data: metrics, algorithms & their impact

Alternative models: data storytelling, visceralizing data, data experiences, feminist data...

### Readings:

*Criticism of data and how it acts in the world*

Jeremijenko, N. "Delusions of Immateriality." *Doors of Perception: Lightness*. Amsterdam: 2000. <http://museum.doorsofperception.com/doors6/doors6/transcripts/jeremijenko.html>

*Criticism of data and how it acts in the world*

Jeremijenko, N. "Database politics and social simulations." *Technology in the 1990s*. Museum of Modern Art. 1997. [http://tech90s.walkerart.org/nj/transcript/nj\\_01.html](http://tech90s.walkerart.org/nj/transcript/nj_01.html)

*Quantified self; data processes, interactions, and products*

Levitt, A. "Making art out of the data of everyday life." Arts & Culture Chicago Reader. 2014.

<http://www.chicagoreader.com/chicago/quantified-self-data-lifeloggers-elmhurst-art-museum/Content?oid=13904575>

Dourish, P. 2014. NoSQL: The Shifting Materialities of Database Technology. Computational Culture, 4.

<http://computationalculture.net/article/no-sql-the-shifting-materialities-of-database-technology>

### Class Activity:

In groups of two, find five everyday "ranking" metrics (e.g. GDP) and the data that they're based on. What do they measure? How does their measurement reflect community or individual values? What other metrics might a society with different values use? Discuss these questions with your partner and be prepared to present two of your metrics to the class.

### Assignment:

Pick two big problems that interest you that you may want to do your final project on (no commitment yet). For each problem, write ~250 words describing what relevant data is out there, what relevant data isn't out there, what data pitfalls are common, and how you might design for action to solve this problem.

### **WEEK TWO**

Data and big (social) problems: case studies and pitfalls

Environmental: EPA data, climate change data (trapped data, more data, uncertainty)

Education: no child left behind & standardized testing data (impact of measuring)

Nutrition: sugar scandal (corrupted/selected data, community belonging overriding data)  
How do we avoid data pitfalls? What is the relationship between data & problem solving?

### Readings:

*Data doesn't create action the way we hope*

Pierce, J., Fan, C., Lomas, D., Marcu, G., Paulos, E. "Some Considerations on the (in)effectiveness of Residential Energy Feedback Systems for Interaction Design and HCI Energy." *ACM DIS*, Aarhus, Denmark, August 2010.

*Rules for responsible data practices*

Mimi Onuoha, "The Point of Collection," 2016.

[https://points.datasociety.net/the-point-of-collection-8ee44ad7c2fa#.5wc6mrjb\\_4](https://points.datasociety.net/the-point-of-collection-8ee44ad7c2fa#.5wc6mrjb_4)

*Corrupted data, politics of data*

Naomi Oreskes & Erik M. Conway. Defeating the merchants of doubt. *Nature*, 465, 686–687. June 2010. <http://www.nature.com/nature/journal/v465/n7299/full/465686a.html>

### Class Activity:

Guest lecture; assignment presentations

### Assignment:

List 10 data sources or data usages that you encounter over the course of a day and 10 "data" sources that aren't collected or observed. What motivates the collected data? What values does this data reflect? Who might be interested in these uncollected datasets? Why aren't they collected? How does this reflect on society? Write ~250 words describing your findings. Prepare up to 3 slides to present your findings to the class.

## **WEEK THREE**

What counts as data? What doesn't count as data? What data do we collect?

Types of data: quantitative data, qualitative data, indexical data, artisanal data...

Data quality: the limits of hard numbers (e.g. sensor data, air quality)

Data collection often reflects what we see and who we are: Detroit Geo

### Readings:

*What else can "data" look like?*

Kuznetsov, S., Hudson, S., Paulos, E. "A Low-Tech Sensing System for Particulate Pollution." *ACM Tangible and Embedded and Embodied Interaction (TEI)*, Munich, Germany, February 2014.

*Data visualization as art*

Viegas, F., Wattenberg, M. "Artistic Data Visualizations: Beyond visual analytics." *HCI*, 2007.

*Data visualization and the artist eye; mapping variables, project examples*

Manovich, L. "The Anti-Sublime Ideal in Data Art."  
[http://virus.meetopia.net/pdf-ps\\_db/LManovich\\_data\\_art.pdf](http://virus.meetopia.net/pdf-ps_db/LManovich_data_art.pdf). Berlin, 2002.

*Who collects data matters; indexical data*

Catherine D'Ignazio. "The Detroit Geographic Expedition and Institute: A Case Study in Civic Mapping." blog

Class Activity:

In your group, find 10 data visualizations from your day to day life. Where are they? What do they look like? Who are they for? Who are they by? What do they want you to do or think? What would they look like if something else made them? Discuss this. After your conversation, each group member should select one of the visualizations and write a short (~250 words) overall reflection on what you found.

Assignment:

List five types of quantified data and imagine how similar information could be collected as indexical data. Collect one such set of indexical data and make something out of it (display it nicely).

**WEEK FOUR**

How do we produce data? Who produces data? Who owns data?

Participatory action research (& data): co-researchers, co-designers

Citizen science (& friends)

Privacy & action (& access! Open data issues here)

Readings:

*Public participation in scientific research*

Shirk, J.L., Ballard, H.L., Wilderman, C.C., Phillips, T., Wiggins, A., Jordan, R., McCallie, E., Minarchek, M., Lewenstein, B. V., Krasny, M.E., Bonney, R. "Public participation in scientific research: a framework for deliberate design." *Ecology and Society* 17(2): 29. 2012.

<http://dx.doi.org/10.5751/ES-04705-170229>

*Community based data displays*

Koeman, L., Kalnikaite, V., Rogers, Y. "'Everyone Is Talking about It!': A Distributed Approach to Urban Voting Technology and Visualisations." *Proceedings of the ACM Conference on Human Factors in Computing Systems (CHI '15)*, 2015.

Rahul Bhargava & collaborators. Data Murals.

<https://civic.mit.edu/blog/rahulb/first-data-mural-pilot> (2012)

<https://civic.mit.edu/blog/rahulb/mural-ing-our-way-to-data-literacy> (2013)

*Paths to engagement and creation*

Jeremijenko, N. "Tower Power: Truss, Trust and Reengineering Participation." *Core*.  
[http://www.core77.com/reactor/opinion\\_07.03.asp](http://www.core77.com/reactor/opinion_07.03.asp)

Class Activity:

Guest lecture (Rahul? Catherine?); reading presentations?

Assignment:

Using one of your potential final project topics, brainstorm and sketch five experiences that create data in real life in communities and leave that data in the communities. Pick your favorite and make an early prototype, showing the basic functionality and form of the interaction and describing the technology you would use to make it fully functional.

**WEEK FIVE**

How do we communicate data? To whom? Where?

Traditional data visualizations

Alternative data visualizations (artistic, experiential)

Individual vs collective experiences of data

Contextes of data: space & framework for action, provides scripts, particularity

Data-in-place: intervention as data collection

Readings:

*Making crafted objects using "data"*

Goodwin, V. *Art Quilt Maps: Capture a Sense of Place with Fiber Collage*. C&T Publishing: Lafayette, CA, 2013.

*Physical data benefits and challenges*

Jansen, Y., Dragicevic, P., Isenberg, P., Alexander, J., Karnik, A., et al. "Opportunities and Challenges for Data Physicalization." *CHI 2015 - Proceedings of the SIGCHI Conference on Human Factors in Computing Systems*, Apr 2015, Seoul, South Korea. 2015, .  
<10.1145/2702123.2702180>.

*Critique of the standard way; opposition to existing model; core purpose*

Jeremijenko, N. "A futureproofed power meter." *Whole Earth*, Summer, 2001.

*Experiencing data; focusing on the problem not the data; data in place*

Lane, G., Brueton, C., Dially, D., Airantzis, D., Jeremijenko, N., Papamarkos, G., Roussos, G., Martin, K. "Feral Robots: A Social Tapestries Experiment in Everyday Archaeology." *4th Uk Ubinet Workshop*, London 10-12 July 2006.

Class Activity:

In groups of two, select a popular recent "data visualization" from the public sphere (e.g. news, sports, election/polling results...). Brainstorm and sketch 10 on the same topic: 5 examples of a digital "opposite" of the visualization and 5 examples of a physical data experience. As a group,

write a couple sentence for each sketch indicating what you're taking the opposite of and what your imagined data experience is like.

Assignment:

Select your favorite physical data experience concept from the class activity. Create a prototype of it and write 250 words describing the concept, the data mapping, and linking to the original sketch.

**WEEK SIX**

How do we understand (data)? When can/can't data help us solve (social) problems? How does data relate to action?

Values & knowledge: rational knowledge isn't enough for knowing or action (Kahan)

Decision making isn't purely rational (Thaler & Sunstein)

Examples of data visualizations--what is their relationship with action?

Next week preview: What else can create action? Brainstorm examples.

Readings:

*Data isn't convincing to people*

Mooney, C. "The Science of Why We Don't Believe Science." *Mother Jones*, 2011.

<http://www.motherjones.com/politics/2011/03/denial-science-chris-mooney>

*Knowledge + values*

Kahan, D. What Is the "Science of Science Communication"?, 14 *J. Sci. Comm.* 1 (2015).

*New approaches to science and science communication; framing*

Groffman, P. Stylinski, C., Nisbet, M.C. et al. "Restarting the Conversation: Challenges at the Interface of Science and Society." *Frontiers in Ecology and the Environment*, 8, 284-291, 2010.

*Influence of framing on data perception and routes to action*

Nisbet, M.C., Maibach, E. & Leiserowitz, A. "Framing Peak Petroleum as a Public Health Problem: Audience Research and Public Engagement." *American Journal of Public Health*, 101: 1620-1626, 2011.

Class activity:

Assignment presentation and critique.

Assignment:

Using one of your potential final project topics, brainstorm and sketch 10 value based approaches to engaging audiences with this topic that respond to the readings. Write a few sentences for each, identifying the target audience and the manner in which your framing speaks to their values. These sketches should include data, but not feature data. Pick your favorite and turn it into 3 slides to present your idea to the class.

## WEEK SEVEN

Broadening “data”: what other tools can we use to communicate and solve problems?

Art: power of surprise to shift perception (London art, Andy Goldsworthy)

Art & social change: asks questions, new angle on difficult problems (Somner/Mockus)

Education/psychology: the power of in-depth questioning (Duckworth, Lertzman)

Psychology: survey theory (CITE)

### Readings:

*Using emotion instead of facts to create change*

Pierce, J., Paulos, E. “Designing Emotional Attachment to Energy.” *Design and Emotion*, Chicago, USA, October 2010.

*Forming activities & experiences for change*

Duckworth, E. The Having of Wonderful Ideas and Other Essays on Teaching and Learning. Teacher’s College, Columbia University, New York, 1987.

*Art as a methodology for action*

Sommer, D. The Work of Art in the World: Civic Agency and Public Humanities. Durham: Duke University Press Books, 2014.

*Activity as a route to understanding; local data creation*

Williams, S., Deahl, E., Rubel, L., Lim, V. “City Digits: Local Lotto: Developing Youth Data Literacy by Investigating the Lottery.” *Journal of Digital and Media Literacy*. 2014.

<http://www.jodml.org/2014/12/15/city-digits-local-lotto-developing-youth-data-literacy-by-investigating-the-lottery/>

### Class Activity:

Presentation and critique of project proposals.

### Assignment:

Prepare a final project proposal. Submit a ~250 word statement describing the problem you’re engaging with, the “dataset”, the context, and the design of your output/experience. Also include sketches or early prototypes that demonstrate your intended product. Prepare ~3 slides to support your presentation to the class.

## WEEK EIGHT

The project process: planning, prototyping, producing

Brainstorm: "Nothing is more dangerous than an idea, when it's the only one we have."

Emile-Auguste Chartier Alain

What is the concept? Why is it important? What scope communicates the core idea?

What is the minimal viable product? Make it.

Tools for fabrication & coding

Readings:

*Local versus global systems for solving problems*

Paulos, E., Pierce, J. "Citizen Energy: Towards Populist Interactive Micro-Energy Production." Hawaii International Conference on System Science (HICSS). Kauai, USA, 2011.

Class Activity:

Final project debugging and in-class work period.

Assignment:

Revise your project concept based on feedback from the critique. Procur data and materials needed for final project. Start making something that you can discuss with instructors during the in-class work period.

**WEEK NINE**

How do we collect data on data experiences? (How) do we measure the impact of interventions?

Overview: how do different fields measure success? To what ends?

Aim: did the intervention succeed? What influence did it have? How could it improve?

Secondary aim: how do we justify the work to funders and motivate more of it?

The problem of measurement (can you integrate it? Can you make it art? Cat in the box)

What can/can't we measure? On what scale? How does that correlate with "success"?

Readings:

*Measuring in the art world*

The Guardian. "How do you measure theater success?" 2010.

[https://www.theguardian.com/stage/theatreblog/2010/apr/09/theatre-industry-s\\_uccess](https://www.theguardian.com/stage/theatreblog/2010/apr/09/theatre-industry-success)

*Measuring in the art world*

Gressel, Katherine. "Public Art and the Challenge of Evaluation." 2012.

<http://createquity.com/2012/01/public-art-and-the-challenge-of-evaluation/>

*Measuring in the social sciences*

JC Greene, L Benjamin, L Goodyear. The merits of mixing methods in evaluation. Evaluation, 2001. <http://journals.sagepub.com/doi/abs/10.1177/13563890122209504>

*Turning measuring into problem solving*

Brother Nut. "Air Pollution Bricks in China." 2015.

<http://nyti.ms/1jwZjvJ> and <http://news.qq.com/a/20151130/045666.htm#p=1>

Class activity:

Small group final project feedback and debugging. What does success look like for your project?

Assignment:



Continue to work on your final project. Bring problems and questions to class for debugging with instructors and in small groups.

## **WEEK TEN**

Aesthetics & experience design: a designer talking about how to make usable and pretty things

Examples of good and bad aesthetics (digital and physical)

Simplicity, complexity

Tools & approaches for design

### Readings:

None

### Class Activity

Guest final project critique with designers.

### Assignment:

Prepare another iteration of your final project for in-class critique. Bring the project or slides including images of the project to class as appropriate. Submit a 250 words statement describing the feedback you received in the past critique and the changes you've made in response.

## **WEEK ELEVEN**

Working with communities:

Finding partners

Nurturing mutually beneficial partnerships

Best practices and rules of thumb to remember

### Readings:

None

### Class Activity:

Guest critique with community based researcher or sociologist.

### Assignment:

Prepare another iteration of your final project for critique. Submit a 250 words statement describing the feedback you received in the past critique and the changes you've made in response.

## **FINAL REVIEW**

Presentation and final projects critique

### Assignment:

Final project & final project documentation