**History 1714**
**Can Machines Think? Artificial Intelligence in Historical Perspective**
Prof. Evan Hepler-Smith
Spring 2019
MWF // 4-4:50pm // Stokes 105S
heplers@bc.edu // Office Hours: W 10am-12pm + by appointment, Stokes 274

Robots, drones, self-driving cars, algorithms, automation, apps: these twenty-first century technologies may seem unprecedented, but they are part of a centuries-long history of machines that seem to think for themselves. This course explores attempts to envision and build such machines, the questions they raised about the nature of human thought, and the relationship between specific technologies and specific models of human reasoning. Past efforts to mechanize thought celebrated certain people as thinkers and demanded labor from others, often based on gender, race, class, or ability/disability. This course will help you ask whether today's AI technologies do the same.



Film poster for *Metropolis* (Fritz Lang, 1927) & album cover for *The Archandroid* (Janelle Monáe, 2010)

Our course will follow a chronological history of how different people in different places have thought about thinking machines, from the early 18th century through the present day. Throughout, we will address enduring questions of present-day relevance in the context of our historical discussions, such as:

- *Are thinking machines instruments of domination or resistance?*

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- *Is thinking (machine and human) abstract, or is it embodied? That is, is thinking a matter of ideas and mathematical algorithms, or does thinking involve neurons, bodies, and electronic circuitry?*
- *Is thinking individual and autonomous or social and constrained by systems?*
- *Are thinking machines—and how we think about machines—shaped by gender, race, and other categories of human identity? If so, how?*

**Course requirements:**
- *Reading, discussing, reflecting*: Attendance, participation, response emails          40%
- *Analyzing, arguing, writing:* Two five-page essays on historical sources          15% each
- *Investigating:* Examine and/or interview a machine          15%
- *Planning, researching, Collaborating*: Final presentation          15%

**Participation:** Careful reading and thoughtful discussion are at the heart of this course. To do your part in making for a productive class (and to receive full credit for participation):
a) **read** each of the texts assigned for each session;
b) **submit** response emails, as described below;
c) **attend** class, arriving on time, and
d) engage in our discussions as both **speaker** and **listener**.

**Reading:** Our readings for this course include **primary sources** (produced in historical contexts by historical actors) and **secondary sources** (analyses by historians and other scholars), including images, film, and music as well as written texts. Except for the required book, all readings will be available via Canvas. *In order to participate effectively in our class meetings, please read each session's assigned text(s) beforehand.*

**Written assignments:** We will have two essay assignments of five pages each: **(1) Evolution, Industrialization, and Thinking Machines** (primary source analysis in historical context) and **(2) Cold War Thinking Machines** (comparative analysis of two primary sources).  Both essays address sources from our syllabus. You will also **(3) examine and/or interview a thinking machine** about its history. In an interview report, you will document your interview/examination (e.g. with photographs, screenshots, and/or audiorecordings), recount the history that you gleaned from the interview, and assess the reliability of this history in light of our readings and discussions.

I will be happy to meet during office hours or by appointment to read and comment on work in progress (up to the class before the due date). I will accept rewrites of Assignments 1 & 2 submitted within one week after I return graded assignments. (No rewrites on Assignment 3.) The final grade will be the average of the initial and rewrite grades.

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**Responses:** Over the term, you'll write 8 informal short responses. Approximately 150-200 words is plenty, though you are welcome to write more if you wish. I encourage you to be informal and exploratory in these responses – they should be about asking questions, not demonstrating that you've got the answers. Please submit all responses by email. Good responses count toward course participation; late or missing ones count against it.

*A) Reading response*: During your response group's assigned weeks (*R1*, *R2*, or *R3*), respond to one or more of our readings. Ask questions, identify areas of confusion, or point out connections among readings and class discussions. Good reading responses typically quote specific passage from the reading(s) you discuss. *Please submit your Reading Response by 9am BEFORE the class session during which we will be discussing a reading you focus on*.

*B) Arts of noticing:* Be on the lookout for easy-to-overlook machines with which human lives are entangled, on campus or elsewhere. In what ways do these machines seem to think (or not-think)? How do people use these machines to help them think? How does this example of machine thinking emerge from, resemble, or differ from the historical developments discussed in class and our readings? *Please submit one Arts of Noticing response during each of our four Units.*

**Final project:** As the historical component of your final project (see SOC 1712 syllabus), each group will present on your chosen machine's historical development in society, applying methods and concepts from our readings and class discussions. You may develop a historical comparison to a past machine in its own social context, engage with the historical reasoning of claims about what is or isn't new/transformative about your machine, and/or deliver a speculative account of your machine's future consequences in the style of one or our primary sources (along with a historically-informed critique of these predictions).

**Collaboration and academic integrity:** You are warmly encouraged to consult with one another and with others outside of class on your research, writing, presentations. With the exception of your group project, all work that you submit for evaluation should reflect your own research, thinking, and writing about the topic. This course is subject to the university's [Academic Integrity policy](#)—make sure that you're familiar with it. If you have questions on collaboration, please ask!

**Attendance:** You are responsible for all material covered during all of our class meetings. You are permitted three "personal day" absences, no questions asked. Additional absences will be excused provided you a) submit a note from a physician or documentation of <u>required</u> university activities and b) complete a make-up assignment.

**Classroom collegiality**: We will grapple with some challenging and disturbing ideas, events, writings, and images. I will do my best to make sure you know what's coming; if you have concerns, please let me know. Please also maintain civil respect for your colleagues and the perspectives, experiences, and identities that they bring to this class, including through frank questions and sincere arguments.  Personal attacks are out of bounds.

**Electronics:** You are welcome to use laptops and tablets in class for accessing readings and taking notes. *Only course-related uses of electronics are permitted during class time*, and all mobile devices must be silenced and put away. Repeated digital distractions will negatively impact your participation grade.

**Deadlines:** A *half letter grade per day* (A to A-, A- to B+, etc.) will be deducted from assignments submitted after the deadline listed on the syllabus, except with prior consultation and written consent of the instructor. Questions? Ask!

**Unforeseen conflicts***:* If you anticipate trouble, speak with me as soon as possible. If you can inform me of serious adverse circumstances in advance, we can make accommodations that are fair to you and your fellow students. It is more difficult to do so after the fact.

**Disability and inclusion**: If you have a documented disability, please notify me within the first two weeks of the semester and provide me with a letter from the [Disability Services Office](#) or [The Connors Family Learning Center](#) regarding accommodations that will help you succeed in this course. If you have other concerns about classroom inclusiveness, please talk with the Connors Center and with me. I will work with you!

**Required book (available at BC bookstore and online):**
- Safiya Umoja Noble, *Algorithms of Oppression: How Search Engines Reinforce Racism* (New York: NYU Press, 2018).

## Week 1: Our robots, ourselves

*Mon, Jan 14        Introduction*

*Weds, Jan 16        What are we asking when we ask "can machines think"?*
- John R. Searle, "Is the Brain's Mind a Computer Program?," *Scientific American* 262, no. 1 (1990): 25–31.
- Paul M. Churchland and Patricia Smith Churchland, "Could a Machine Think?," *Scientific American* 262, no. 1 (1990): 32–39.

*Fri, Jan 18        Are machines political?*
- Langdon Winner, "Do Artifacts Have Politics?," *Daedalus* 109, no. 1 (1980): 121–36.

# UNIT 1: BEFORE THE COMPUTER

## Week 2: Enlightened Machines                                                    *R1*

*Mon, Jan 21      NO CLASS—MARTIN LUTHER KING JR. DAY*

*Weds, Jan 23*
- Gottfried Wilhelm von Leibniz, *Monadology*, trans. Nicholas Rescher (Pittsburgh: University of Pittsburgh Press, 1991 [1714]).
- Julien Offray de La Mettrie, *L'homme Machine*, trans. Gertrude C. Bussey (Chicago: Open Court, 1912 [1748]), 85-87, 138-149.

*Fri, Jan 25      Are machines social?*
- Trevor J. Pinch and Wiebe E. Bijker, "The Social Construction of Facts and Artifacts," in *The Social Construction of Technological Systems*, ed. Bijker, Hughes, and Pinch (Cambridge, MA: MIT Press, 1987), 15–18, 21–40.
- Adelheid Voskuhl, *Androids in the Enlightenment: Mechanics, Artisans, and Cultures of the Self* (Chicago: University of Chicago Press, 2013), 1-9, 15-19.

## Week 3: Romantic Machines                                                       *R2*

*Mon, Jan 28*
- John Tresch, "Introduction" in *The Romantic Machine: Utopian Science and Technology after Napoleon* (Chicago: University of Chicago Press, 2012), 1-16.
- Charles Dickens, *Hard Times* (New York: Harper, 1854), 32–37.
- "Cellarius" [Samuel Butler], "Darwin Among the Machines (To the Editor of the Press, Christchurch, New Zealand, 13 June, 1863)," *The Press*, June 13, 1863, http://nzetc.victoria.ac.nz/tm/scholarly/tei-ButFir-t1-g1-t1-g1-t4-body.html.

*Weds, Jan 30      Do machines make history?*
- Merritt Roe Smith, "Technological Determinism in American Culture," in *Does Technology Drive History: The Dilemma of Technological Determinism*, ed. Merritt Roe Smith and Leo Marx (Cambridge, MA: MIT Press, 1994): 1–36.

*Thurs, Jan 31      Reflection Session: Machine Stories I – 6-8pm, Stokes 105S*

*Fri, Feb 1      Workshop: Making and refining historical arguments*

## Week 4: Business Machines                                                       *R3*

*Mon, Feb 4*
- James Cortada, *Before the Computer* (Princeton: Princeton University Press, 1993), 79-143 (chapters 5-9).

*Weds, Feb 6      No class meeting; work on Assignment 1*

*Fri, Feb 8      Guest Speaker: Jon Hay, Senior Manager of Business Analytics, Boston Red Sox*
- Michael Lewis, *Moneyball: The Art of Winning an Unfair Game* (New York: Norton, 2004), selections.

**Syllabus subject to change at instructor's discretion.**                          **5**

## UNIT 2: WAR MACHINES

### Week 5: Bombs and logistics                                                              *R1*

*Mon, Feb 11*                    **A1: Evolution, Industrialization, and Thinking Machines due**
- Jennifer S. Light, "When Computers Were Women," *Technology and Culture* 40, no. 3 (1999): 455–83.
- [Primary source TBD]

*Weds, Feb 13*    *Can machines kill?*
- David Mindell, "War," in *Our Robots, Ourselves: Robotics and the Myths of Autonomy* (New York: Viking, 2015): 113-148.

*Fri, Feb 15*        *Debate: Have thinking machines made the world more violent or less violent?*

### Week 6: Cybernetics and systems                                                          *R2*

*Mon, Feb 18*
- Norbert Weiner, *Cybernetics: Or Control and Communication in the Animal and the Machine* 2nd ed. (Cambridge, MA: MIT Press, 1961), selections.

*Weds, Feb 20*    *Can we trust machines?*
- Theodore M. Porter, *Trust in Numbers: The Pursuit of Objectivity in Science and Public Life* (Princeton, NJ: Princeton University Press, 1995), 3–8.

*Thurs, Feb 21*    *Reflection Session: Machine Stories II – 6-8pm, Stokes 105S*

*Fri, Feb 22*        *Guest speaker: Gili Vidan, Harvard University*
- Kai Stinchcombe, "Blockchain Is Not Only Crappy Technology but a Bad Vision for the Future," *Medium* (blog), April 5, 2018, [https://medium.com/@kaistinchcombe/decentralized-and-trustless-crypto-paradise-is-actually-a-medieval-hellhole-c1ca122efdec](https://medium.com/@kaistinchcombe/decentralized-and-trustless-crypto-paradise-is-actually-a-medieval-hellhole-c1ca122efdec).

### Week 7: Imitation games and neural nets                                                   *R3*

*Mon, Feb 25*
- A. M. Turing, "Computing Machinery and Intelligence," *Mind* 59, no. 236 (1950): 433–460.

*Weds, Feb 27*    *Are machines brains?*
- Berkeley, *Giant Brains, or Machines That Think* (1949), vii-xi, 1-41.

*Friday, Mar 1*    *Historical futures of AI*
- Berkeley, *Giant Brains, or Machines That Think* (1949), 180-208.
- Nathan Ensmenger, "[From Mechanical Brains to Philosophical Zombies](#)," (unpublished ms.)

*\*\*\* W E E K  8 :  S P R I N G  V A C A T I O N \*\*\**

## UNIT 3: ARTIFICIAL EXPERTS

## Week 9: Retrieving information                                                          *R1*

*Mon, Mar 11*
- Vannevar Bush, "As We May Think," *The Atlantic*, July 1945.
- Film: *Desk Set* (Spencer Tracy, Katharine Hepburn), 1957, 103 min.

*Weds, Mar 13    Can machines teach?*
- Eric Westervelt, "Meet The Mind-Reading Robo Tutor In The Sky," *Morning Edition*, October 13, 2015. (Radio segment.)
- Beth McMurtrie, "How Artificial Intelligence Is Changing Teaching," *The Chronicle of Higher Education*, August 12, 2018.

*Fri, Mar 15        Discussion: Classroom AI?        **A2: Cold War Thinking Machines due***
Guest presenter: remote presence robot

## Week 10: Doing science                                                                   *R2*

*Mon, Mar 18*
- Stephanie Dick, "Of Models and Machines: Implementing Bounded Rationality," *Isis* 106, no. 3 (2015): 623–34.

*Weds, Mar 20    Can machines make people more creative?*
- Evan Hepler-Smith, "'A Way of Thinking Backwards': Computing and Method in Synthetic Organic Chemistry," *Historical Studies in the Natural Sciences* 48, no. 3 (2018): 300–337.

*Fri, Mar 22        Biographies of data*
- Joanna Radin, "'Digital Natives': How Medical and Indigenous Histories Matter for Big Data," *Osiris* 32 (2017): 43–64.

## Week 11: Playing games                                                                   *R3*

*Mon, Mar 25*
- Film: *WarGames* (Matthew Broderick, Ally Sheedy), 1983, 114 min.
- Jennifer Light, "Taking Games Seriously," *Technology and Culture* 49, no. 2 (2008): 347–75.

*Weds, Mar 27    Can machines love?*
- Marie Hicks, "Computer Love: Replicating Social Order Through Early Computer Dating Systems," *Ada New Media*, October 31, 2016.
- Janelle Monáe, "The Ten Droid Commandments."
- Album: Janelle Monáe, *The Archandroid* (2010), selections.

*Thurs, Mar 28    Reflection Session:* Her *(film) – 6-8pm, Stokes 105S*

*Fri, Mar 29        Guest Discussant: Erik Baker, Harvard University*

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# UNIT 4: CYBERCULTURE AND BLACK BOX SOCIETY

## Week 12: Cyborgs                                                                             *R1*

*Mon, Apr 1*
- Donna Haraway, "A Cyborg Manifesto: Science, Technology, and Socialist-Feminism in the Late Twentieth Century," in *Simians, Cyborgs, and Women: The Reinvention of Nature* (New York: Routledge, 1991), 149–181.

*Weds, Apr 3*
- Peter Galison, "The Ontology of the Enemy: Norbert Wiener and the Cybernetic Vision," *Critical Inquiry* 21, no. 1 (October 1, 1994): 228–66.

*Fri, Apr 5          No class meeting – read Noble!*

## Week 13: Gender, Race, Ability                                                              *R2*

*Mon, Apr 8*
- Safiya Umoja Noble, *Algorithms of Oppression: How Search Engines Reinforce Racism* (New York: NYU Press, 2018), first half.

*Weds, Apr 10     Are machines fair, part I?*
- Meryl Alper and Gerard Goggin, "Digital Technology and Rights in the Lives of Children with Disabilities," *New Media & Society* 19, no. 5 (2017): 726–740.
- Ellen K. Pao, *Reset: My Fight for Inclusion and Lasting Change* (New York: Spiegel & Grau, 2017), selections (or magazine article version).

*Fri, Apr 12          No class meeting                                    **A3: Machine Interview due***

## Week 14: Spring holidays & final projects

*No class meetings; work on projects, ask questions, read Noble*

## Week 15: Black boxes and big data                                                           *R3*

*Mon, Apr 22     NO CLASS – Easter Monday*

*Weds, Apr 24*
- Safiya Umoja Noble, *Algorithms of Oppression: How Search Engines Reinforce Racism* (New York: NYU Press, 2018), second half.
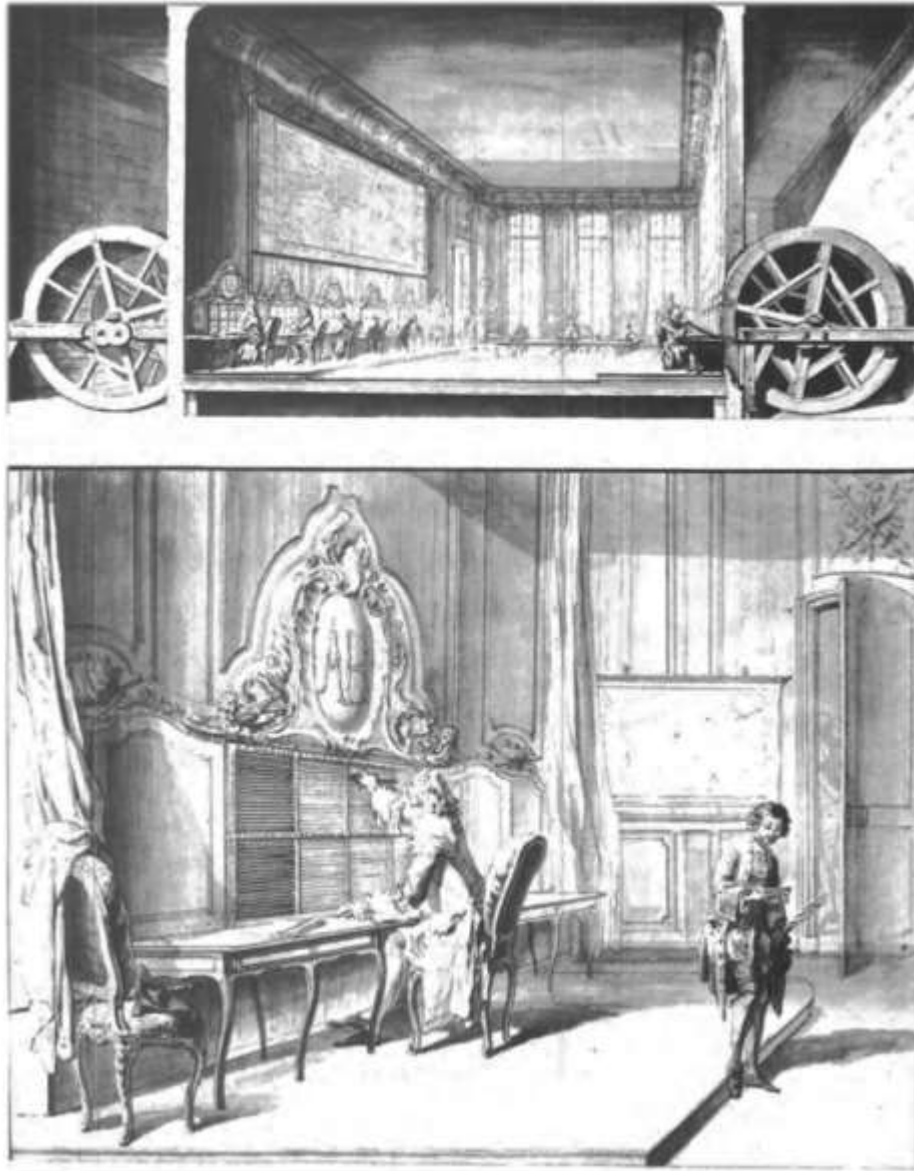
*Fri, Apr 26     Are machines fair, part II?*
- Video: Hilke Schellmann and Jason Bellini, "Artificial Intelligence: The Robots Are Now Hiring," *Wall Street Journal*, September 20, 2018, sec. Tech.

## Week 16: Presentations and Final Thoughts

*Mon, Apr 28     Groups 1 & 2 present*

**Syllabus subject to change at instructor's discretion.**                                      **8**

*Weds, Apr 30     Groups 3 & 4 present*



"The Paperholder," Gabriel de Saint-Aubin, in Guillauté, *Memoire on the Reformation of the Police* (1749)