the "age of information"

& the “information revolution”

history of information

January 22, 2015
administrative matters

wait list
  sign up
  check with departments
  wait/drop

class website
  https://ucberkeley.instructure.com/courses/1281320

Bancroft tour
  sign up on syllabus

class reader
  Copy Central, 2576 Bancroft Way

class recording
  ets.berkeley.edu
Pick one of the following and write a (very) brief story or anecdote in which it serves as an "information technology," perhaps in conjunction with other things. Try to make your stories ingenious without being completely implausible. Bring your answer to class for discussion (but no need to hand them in).

- a necktie
- a blanket
- a rubber duckie
- a can of beans
- a lemon

"Extra credit" if you manage to use two of these in your story.
where are we?
where are we?

all over the place?
overview

why history matters

intergenerational revolution

revolution

getting from one age to another

what’s in an age?

when was that?

the “age of information”
overview

why history matters

intergenerational revolution

revolution

getting from one age to another

what’s in an age?

when was that?

the “age of information”
it’s the ....?
it’s the ....?
it’s the ....?
overview

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revolution

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the “age of information”
overview

- why history matters
- intergenerational revolution
- revolution
- getting from one age to another
- what’s in an age?
- when was that?
- the “age of information”
when was that?

Fortune July 1977

Information: there's growing agreement it's the name of the age we live in.

Human history has long been described in terms of Ages whose names reflect the stages of development through which mankind has passed: the Stone Age, the Bronze Age, the Iron Age and so on—down to the Industrial Age, which established the foundations of our modern society.

Today, there is growing agreement that we have entered a new era—a post-industrial stage of development in which the ability to put information to use has become critical, not only to the essential production of goods, but to efforts to provide a better life for the individual, as well.

This new era is being referred to with increasing frequency as the Information Age.

Information in the Information Age

Changes in our perception of information itself—its nature as well as its scope—have accompanied this profound shift of emphasis in our society.

Much has been written about the so-called "information explosion." It has been pointed out, for example, that the number of technical journals published throughout the world today exceeds 100,000, and that the total body of technical information is now doubling every ten years.

At the same time as the volume of information has been increasing dramatically, our understanding of the meaning of the term information itself has also broadened—to encompass a wide variety of timely data relating to "how things really are" across the whole spectrum of human activity.

A heartbeat, for example, can be extremely meaningful information when recorded and analyzed on sophisticated electrocardiogram equipment. So can electrical impulses reflecting the load level in a power network, or numeric digits representing the availability of a seat for you on an airplane—when processed by a modern computer.

These and a wide range of similar types of data are clearly recognized today as information, the kind of information on which we increasingly depend for the growth and health of our economy, the smooth functioning of our institutions—and, even more important, for the quality of our individual lives.

Information—an inexhaustible resource

Information is one of the few resources not in danger of exhaustion on this shrinking planet. It is unique because the supply is limitless, because it actually becomes more valuable with use and because—when properly managed and applied—it can greatly enhance our use of all our other resources, natural, human and economic.

One reason, of course, that information has proved to be such a dynamic resource is the fact that there exists today a remarkable technological capacity for dealing with it rapidly and effectively.

Through a vast array of electronic tools and techniques, mankind is able to accumulate, organize, store, interpret, retrieve and transmit information on a worldwide scale, in a volume, at a speed, and with an accuracy that would have been impossible barely two decades ago.

It is also a technology that continues to grow and that has proved to be amazingly efficient in economic terms. As advance has followed advance, the cost of processing information has steadily declined. Since the 1950s, the cost of performing 100,000 calculations on an IBM computer has fallen from $1.26 to less than one cent—and the downward trend continues.

Putting information to work for people

IBM makes many different products—from computers to copiers—but clearly, the essence of our business is information.

As a company, we are committed to exploring the limits of technology to find better, more imaginative and more productive ways to help put the benefits of this uniquely valuable resource to work for people.
50 years and counting

“[New media] does not centralize but decentralize ... In the new ...
Age of Information.”

Marshall McLuhan,
*Understanding Media*, 1964
50 years and counting

“[New media] does not centralize but decentralize ... In the new ... Age of Information.”


27 Jan: Technological Determinism

*Required Reading*

*Read:* "Preface to Third Printing* (pp. v-x), and "Introduction" & "The Medium is the Message" (pp. 3-21).
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when was that?

local change

Mario Savio, shown here at a victory rally in UC Berkeley's Sproul Plaza on Dec. 9, 1964, was the face of the free speech movement. (AP)

In 1964, students at the University of California, Berkeley, formed a protest movement to repeal a campus rule banning students from engaging in political activities.
local change

Mario Savio, shown here at a victory rally in UC Berkeley's Sproul Plaza on Dec. 9, 1964, was a leader of the free speech movement. (AP)

In 1964, students at the University of California, Berkeley, formed a protest movement to repeal a campus rule banning students from engaging in political activities.
Information: there's growing agreement it's the name of the age we live in.

growing agreement?

when was that?
when was that?

never a-changin’?
there's growing awareness that ...

self-conscious age of information

"In the long run, history is the story of information becoming aware of itself."

-- James Gleick, 
The Information, 2011
1. when did people become aware that they lived in an “age of information”?

2. what were the most important innovations of the time and how did they affect this awareness?
"He shall from time to time give to the Congress Information of the State of the Union" - Art 2 Sect 3
ahead of his time?

when was that?

Vicesimus Knox
1752–1821
ahead of his time?

"But though books are easily procured, yet, even in this age of information, there are thousands in the lower classes that cannot read. Besides, it is a well-known truth, that the same precepts inculcated by a living instructor, adorned by a proper oratory, enforced by a serious and authoritative manner, produce a powerful effect, not to be experienced in solitary retirement."

--Vicesimus Knox,
*Essays Moral and Literary*, 1778
2. what were the most important innovations of the time and how did they affect this awareness?

“Wassup, bro?”

“N’ much”

everything’s now on the internet …
what was going on?

the emergence of the public sphere

newspapers, public opinion [coming up, Feb 17]

organization of knowledge

Chambers, Diderot, Smellie [coming up, Feb 26]

advertising, IP

Donaldson v. Beckett [coming up, March 5, 10]
what was going on?

the emergence of the public sphere

newspapers, public opinion [coming up, Feb 17]

organization of knowledge

Chambers, Diderot, Smellie [coming up, Feb 26]

advertising, IP

Donaldson v. Beckett [coming up, March 5, 10]

revolution [coming up, today]
overview

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the "age of information"
"Human history has long been described in terms of ages ... The Stone Age, the Bronze Age, the Iron Age, and so on"

IBM ad, *Fortune* 1977
"Human history has long been described in terms of ages ... The Stone Age, the Bronze Age, the Iron Age, and so on"

IBM ad, *Fortune* 1977

**ages past**
- stone
- bronze
- iron
- steel
  - *plastic*
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IBM ad, *Fortune* 1977

**ages past**
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what’s in an age?

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- stone
- bronze
- iron
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  - plastic
"Human history has long been described in terms of ages ... The Stone Age, the Bronze Age, the Iron Age, and so on"

IBM ad, Fortune 1977

what's in an age

ages past
stone
bronze
iron
steel
plastic

sail
steam
jet
nuclear/atomic
space
what’s in an age?

ages past

Adam Smith
1723–1790

Thomas Carlyle
1795–1881
what's in an age?

ages past

- hunter-gatherer
- husbandry
- manufacturing
- commerce

A. Smith,

*Wealth of Nations*, 1776
what's in an age

ages past

- hunter-gatherer
- husbandry
- manufacturing
- commerce

A. Smith,

*Wealth of Nations, 1776*

"Not an Heroical, Devotional, Philosophical, or Moral Age, but above all others the Mechanical Age. It is the Age of Machinery."

-- Thomas Carlyle,

"Sign of the Times" 1829

Adam Smith
1723–1790

Thomas Carlyle
1795–1881
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the "age of information"
how change happens

first wave

second wave

third wave

what's in an age?
how change happens

first wave
   agrarian revolution

second wave

third wave
how change happens

first wave
   agrarian revolution

second wave
   industrial revolution

third wave
how change happens

first wave
   agrarian revolution

second wave
   industrial revolution

third wave
   information revolution
how change happens

first wave
agrarian revolution

second wave
industrial revolution

third wave
information revolution

Alvin Toffler,
— The Third Wave, 1980

what’s in an age?
how change happens

first wave
agrarian revolution

second wave
industrial revolution

third wave
information revolution

fourth revolution?

Alvin Toffler,
— The Third Wave, 1980
how change happens

first wave
   agrarian revolution

second wave
   industrial revolution

third wave
   information revolution

Alvin Toffler,
   — The Third Wave, 1980
how change happens

first wave
agrarian revolution

second wave
industrial revolution

third wave
information revolution

Alvin Toffler,
— The Third Wave, 1980

Luciano Floridi
— The Fourth Revolution, 2014

what’s in an age?
how change happens

first wave
agrarian revolution

second wave
industrial revolution

third wave
information revolution

fourth revolution?
Copernicus

Alvin Toffler,
— The Third Wave, 1980

Luciano Floridi
— The Fourth Revolution, 2014
how change happens

first wave
   agrarian revolution
second wave
   industrial revolution
third wave
   information revolution

fourth revolution?
   Copernicus
   Darwin

Alvin Toffler,
   — The Third Wave, 1980
Luciano Floridi
   — The Fourth Revolution, 2014
what’s in an age?

how change happens

first wave
agrarian revolution

second wave
industrial revolution

third wave
information revolution

fourth revolution?
Copernicus
Darwin
Freud

Alvin Toffler,
— The Third Wave, 1980

Luciano Floridi
— The Fourth Revolution, 2014
how change happens

first wave
agrarian revolution

second wave
industrial revolution

third wave
information revolution

Alvin Toffler,
— The Third Wave, 1980

fourth revolution?
Copernicus
Darwin
Freud
Turing

Luciano Floridi
— The Fourth Revolution, 2014
transformation

"The day the universe changed"

James Burke, *Printing Transforms Knowledge*
BBC 1986 [UC Media Center]
"[I]n order to satisfy the new needs for information and education, more books, ...and soon newspapers were required."

Lucien Febvre & Henri-Jean Martin

*The Coming of the Book*, 1984
"[I]n order to satisfy the new needs for information and education, more books, ...and soon newspapers were required."

Lucien Febvre & Henri-Jean Martin

*The Coming of the Book, 1984*
evolutionary needs?

"The need for readily available information, which had been steadily rising, was accelerated by the advent of Christianity ..."

"The need to find information more rapidly than is possible in a papyrus-roll-form book initiated the development of the Greco-Roman codex in the second century ..."

-- Frederick Kilgour, 
The Evolution of the Book, 1998
evolutionary response?

"Printed books evolved into better-designed packages of information."

-- Paul Grendel, *Cambridge History of Renaissance Philosophy* 1988
cause or effect?

"glittering proof that a new information age was dawning in Europe, fuelled by the power of the printed word."

--Stephen Fry, 
*The Machine That Made Us. BBC 2008*

[veoh.com]
[youtube]
[library]
overview

does technology drive history?

why history matters

intergenerational revolution

revolution

going from one age to another

what's in an age?

when was that?

the "age of information"
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revolution

what does it look like?
what does it looke like?

**an English perspective:**
- going round in circles: 1640-1660

**gaining direction?** "Glorious Revolution" (1688)
"The Popists in offices lay down their Commisions and flie: it lookes like a Revolution."

-- John Evelyn, *Diary*, 1688

**coming round again:**
"a Pope/is summoned in, to crown an emperor ... the dog/Returning to his vomit ..."

-- William Wordsworth, *Prelude*, 1805
“Ibn Khaldun, the great fourteenth century north African sociologist developed a cyclical theory of Islam ... alternation between the city and the desert whereby warrior desert nomads sweep in on the decadent cities .... But they in turn become lax and decadent, and new conquest sweeps in from the desert.”

Michael Mann, Sources of Social Power vol 4, 2013
still circling?

new media "creates ... depth of involvement ... and human association that our preceding mechanical technology has destroyed. 

"... the causes of things begin to emerge to awareness again ... We return to the inclusive form ..."

McLuhan, *Understanding Media*, 1964
still?
still?
Report says richest 1% will control most wealth by 2016

Kim Hjelmgard, USA TODAY  5:23 p.m. EST January 19, 2015
Report says richest 1% will control most wealth by 2016

“not since the gilded age”
does it looke alike?
does it looke alike?

all much the same?

- English
- American
- French
- Haitian
- Russian
- Iranian
- Tunisian/Egyptian/Syrian ...
which does it look like?

“The global communication revolution can be the first revolution in history that has no losers.”

C. Michael Armstrong, CEO, AT&T
“The global communication revolution can be the first revolution in history that has no losers.”

C. Michael Armstrong, CEO, AT&T
which does it look like?

“The global communication revolution can be the first revolution in history that has no losers.”

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C. Michael Armstrong, CEO, AT&T
R évoltes, révolutions, émeutes, rébellions, émotions, guerres civiles, coups d'État, l'histoire entière en est tissée 1. La vie de l'homme en est faite. Non point accident mais constante, non

1. L'histoire en est tissée... Prenons quelques exemples : le xviieme siècle : 1601 à 1610, « le temps des troubles » série de révoltes en Russie; 1610, révolte des Sikhs; 1620-1630, révolte chinoise contre les Ming; 1631, soulèvement de Dijon et d'Aix-en-Provence; 1633, soulèvement de Bordeaux; 1636, révolte des Croquants; 1637, révolte d'Awa Kousa au Japon; 1639, révoltes des Nu-pieds; 1640 à 1644, révoltes contre les Ming, aboutissant à la chute de la dynastie; 1640, révolte de la Catalogne contre l'Espagne qui ne s'achève qu'en 1652; et la même année, 1640, débute aussi la révolution du Portugal, qui restera, latente ou explosive, permanente jusqu'en 1668, 1641, année de troubles très généralisés, révoltes paysannes en Irlande, Suisse, Allemagne. Russie; 1643, révolte du Rouergue; 1645, révolte de Montpellier; 1647, révolte de Massaniello à Naples, contre le vice-roi espagnol, pendant un an; 1648 est également une année forte pour les révolutions : révolution d'Angleterre commencée en 1649 mais qui se développe de 1648 à 1653 tout particulièrement, et dont on a dit qu'elle était peut-être « la première grande révolution bourgeoise des temps modernes »; la Fronde en France, de 1648 à 1652; l'insurrection d'Ukraine, de 1648 à 1654; les émeutes populaires en Russie, dans cette même année, à Moscou, Koslov, Tomsk, etc.; la révolte hindouiste des Mahtrattes contre les envahisseurs mongols, toujours en 1648; en 1649, la révolte de Moscou qui reprend; 1650, émeute de Novgorod et coup d'État de Guillaume de Hollande; 1653, guerre paysanne de Suisse; 1662, révolte du Boullonais, révolte de Moscou pour un problème monétaire; 1664-1670, la grande rébellion d'Audijos; 1670-1671, la grande révolte de Steanka Razin et le soulèvement paysan de Bohême; 1673 à 1681, le soulèvement considérable du nord-est de la Chine; 1673, nouvelle année d'abondance : révoltes dites du papier timbré en Bretagne et à Bordeaux, accroissement des rébellions sikhs et mahtrattes, et aussi à l'année précédente la révolution religieuse des Camisars; 1679, la révolution d'Islande.

Prenons une autre période : de 1770 à 1850. Là encore nous constatons émeutes, révoltes, révolutions dans le monde entier. 1768, révolution américaine, à la suite de sa guerre contre la Grande-Bretagne; 1772, révolution royale en Suède; 1780 à 1783, révoltes multiples en Angleterre et en Irlande, grande révolte des Indiens du Pérou; 1781, insurrection de la Savoie-Génova, révolution à Fribourg, et de nouveau à Gènes en 1782; 1783 à 1787, révolution aux Provinces-Unies avec diverses orientations; 1787-1790, révolution des Pays-Bas autrichiens; 1788-1794, révolution de Gérye, révolution polonaise; 1790, début de la révolution française, démocratisation du régime en Suède; 1791, révolution polonaise; 1792, rétablissement de la révolution belge et révolution rhénane, révolte généralisée dans les Antilles; 1794, émeutes en Irlande; 1795, révolution en Hollande et à Gènes, émeutes à Londres, Birmingham, etc.; à Constantinople, à Smyrne; 1796, révolution dans les États Italiens; 1797, mutinerie des flottes anglaises; 1798, révolution en Suisse et en Irlande; 1799, révolte des Îles Ioniennes et de Malte; 1810, révolution des colonies espagnoles qui s'échelonna par la reconnaissance de leur indépendance en 1825; et de 1810 également à 1829, guerre pour l'indépendance des peuples balkaniques; 1820, révolution d'Italie, et d'Espagne; 1821, révolution grecque, et 1830, grande flambée révolutionnaire en France, en Belgique, en Pologne... en attendant 1848.
Rivoltes, révolutions, émeutes, rébellions, émotions, guerres civiles, coups d'État, l'histoire entière en est tissée. La vie de l'homme en est faite. Non point accident mais constante, non permanent revolution?

1. L'histoire en est tissée... Prenons quelques exemples : le XVIIe siècle : 1601 à 1610, « le temps des troubles » série de révoltes en Russie; 1610, révolte des Sikhs; 1620-1630, révolte chinoise contre les Mings; 1631, soulèvement de Dijon et d'Aix-en-Provence; 1633, soulèvement de Bordeaux; 1636, révolte des Croquants; 1637, révolte d'Awa Kousa au Japon; 1639, révolte des Nu-pieds; 1640 à 1644, révoltes contre les Mings, aboutissant à la chute de la dynastie; 1640, révolte de la Catalogne contre l'Espagne qui ne s'achève qu'en 1652; et la même année, 1640, débute aussi la révolution du Portugal, qui restera, latente ou explosive, perpétuelle jusqu'en 1668; 1641, année de troubles très généralisés, révoltes paysannes en Irlande, Suisse, Allemagne. Russie; 1643, révolte du Rouergue; 1645, révolte de Montpellier; 1647, révolte de Massaniello à Naples, contre le vice-roi espagnol, pendant un an; 1648 est également une année forte pour les révolutions : révolution d'Angleterre commencée en 1640 mais qui se développe de 1648 à 1653 tout particulièrement, et dont on a dit qu'elle était peut-être la première grande révolution bourgeoise des temps modernes ; la Fronde en France, de 1648 à 1652; l'insurrection d'Ukraine, de 1648 à 1654; les émeutes populaires en Russie, dans cette même année, à Moscou, Koslov, Tomsk, etc.; la révolte hindouiste des Mahattes contre les envahisseurs mongols, toujours en 1648; en 1649, la révolte de Moscou qui reprend; 1650, émeute de Novgorod et coup d'État de Guillaume de Hollande; 1653, guerre paysanne de Suisse; 1662, révolte du Boulonnais, révolte de Moscou pour un problème monétaire; 1664-1670, la grande rébellion d'Audijos; 1670-1671, la grande révolte de Stenka Razin et le soulèvement paysan de Bohême;
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when was that?

the "age of information"
digital natives

"Today's students think and process information fundamentally differently, and these differences...run much deeper than most educators would like to have it."

--Edith Ackermann, "Anthropology of Digital Natives" 2008
"I’ve begun to think that my daughter’s generation will also be utterly unlike those that preceded it. Researchers ... theorize that the ever-accelerating pace of technological change may be minting a series of mini-generation gaps. ...

'People two, three or four years apart are having completely different experiences with technology,' said Lee Rainie, director of the Pew Research Center’s Internet and American Life Project. 'College students scratch their heads at what their high school siblings are doing, and they scratch their heads at their younger siblings. It has sped up generational differences.'"
permanent revolution?

- children of the depression
- baby boomers
- generation x
- generation y
- generation m^1
- generation m^2
- ... generation m^n
"Only on looking back ... at his own figure in 1854, and pondering on the needs of the twentieth century, he wondered whether, on the whole, the boy of 1854 stood nearer to the thought of 1904, or to that of the year 1 ... in essentials, the American boy of 1854 stood nearer to the year 1 ... Before the boy was six years old he had seen four impossibilities made actual--the ocean-steamer, the railway, the electric telegraph, and the Daguerreotype."

--Henry Adams, *The Education of Henry Adams* [1905]
1854, or was it 1847?

“the age is remarkable for scientific research. ... The ancients saw nothing like it. The moderns have seen nothing like it till the present generation. We see the ocean navigated and the solid land traversed by steam power, and intelligence communicated by electricity. Truly this is a miraculous era.”

—Daniel Webster, “Dedication of the Northern Railroad,” 1847.
intergenerational revolution

who’s wrong?

and what’s odd?
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looking back to find ourselves

the same? different? better? worse? how would we know?

history matters

Rudyard Kipling
1865-1936
looking back to find ourselves

the same? different? better? worse?
how would we know?

"What should they know of England
Who only England know?"

-- Rudyard Kipling
"The English Flag," 1899
looking back to find ourselves

the same? different? better? worse?
how would we know?

"What should they know of England
Who only England know?"

-- Rudyard Kipling

"The English Flag," 1899

what should we know of our "age"
who . . .?
dangerous pastime?

"Mao urged the emulation of ... an emperor [Qin Shi Huang] who had advocated eliminating anyone who used history to criticise the present. .... [Huang] 'buried 460 scholars but we buried 46,000.'"

James C. Scott, "Tyranny of the Ladle,” 2012

hence

talk of revolution, transformation, rupture, coupure, 2.0
and a challenging pastime? like learning cricket?

"The past is a foreign country. They do things differently there."

--L.P. Hartley, The Go-Between, 1953
central themes

beyond presentism

"The real, central theme of history is not what happened, but what people felt about it when it was happening"

-- George M. Young,
*Victorian England: Portrait of an Age*, 1960
central themes

beyond presentism

"The real, central theme of history is not what happened, but what people felt about it when it was happening"

-- George M. Young,
*Victorian England: Portrait of an Age*, 1960
coming up: what’s the role of tech?

**tech change — 50 years on**

**WEEK 2**

**27 Jan: Technological Determinism**

*Required Reading*

*Read:* "Preface to Third Printing" (pp. v-x), and "Introduction" & "The Medium is the Message" (pp. 3-21).  
*Source: Course reader*

*Read:* Chapter 1, introduction and sections a & b, pp. 9-19; & chapter 5, section c, pp. 126-128.  
*Source: Course reader*
Why TV in 1960s and 70s? “Television has now been a ... service for a whole generation” — Williams

coming up: what’s the role of tech?

tech change — 50 years on

WEEK 2

27 Jan: Technological Determinism

Required Reading

Source: Course reader

McLuhan writes that "any technology gradually creates a totally new human environment" [vi] and "any child can list the effects" [vii] of new technologies, which are "irresistible and unavoidable." Williams argues that such a list would be "superficial" [1] or even "ludicrous" [121]. Choose any technology from a list a child might make today, discuss its assumed effects, and use it to argue either for McLuhan or for Williams.