The Organization of Knowledge

History of Information i218
Geoff Nunberg
Feb. 18, 2015
Midterm exam

80 minute, in-class exam March 19. It will include three essay questions, two chosen from a list of questions provided in advance. There will also be short-answer sections asking you to identify quotations, people, dates, images, and other aspects of the course. Some of these will be chosen from a set given in advance, others will not be on the study guide. Exam questions will be based on material covered in readings (including Thurs readings!), slides, lectures and class discussion. We will provide a study guide around March 12.

Don't Forget!
Midterm Essay (by request)

Students can ask to submit a paper instead of a midterm exam. This paper will be a 2000 word essay in response to one of a list of essay questions. There will be a list of topics on the bcourses by Feb 27 and, if you wish to write an essay, you must let us know in writing which one you propose to write by March 5, providing a brief outline including sources. We will let you know if you may proceed by March 9. The paper is due at 9 a.m. on the morning of the midterm (March 19). If you do not submit by that time, you should take the midterm exam, which starts at 9:30. **No late papers will be accepted.**

Guidelines on form, etc. posted on bcourses
Midterm paper (optional)

2000-wd paper in response to one of a list of essay questions. Details on bcourses.

Essay prompts posted by March 1.

Paper outline w/ sources due March 9; our reply returned by March. Not all outlines will be accepted.

Paper due by March 19 at 9:30 AM BEFORE beginning of exam. **No late papers accepted**; if you haven’t finished by then, take the exam.

Guidelines on form, etc. posted on bcourses
Defining "knowledge"
The shifting frame of knowledge; from Renaissance to Enlightenment
Early reactions to "information overload"
New conceptualizations of knowledge
The material representations of knowledge: encyclopedias, libraries, museums, dictionaries
The Emergence of the Modern "Informational System"

Many, if not most, of the cultural phenomena of the modern world derive from [the 18th century] -- the periodical, the newspaper, the novel, the journalist, the critic, the public library, the concert, the public museum [not to mention advertising, intellectual property, propaganda, the scientific society (and science itself), the modern dictionary and encyclopedia, the decimal system etc.–GN]. Perhaps most important of all, it was then that 'public opinion' came to be recognized as the ultimate arbiter in matters of taste and politics.

--Tim Blanning, The Culture of Power
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Defining "knowledge"
Defining "knowledge"

Individual senses

*Oxford English Dictionary:*

- Acquaintance with a branch of learning, a language, or the like

  *His knowledge of French is excellent.*

- The fact or state of having a correct idea or understanding of something.

  *He has a considerable knowledge of alarm systems.*

Collective sense

**The sum of what is known.** *All knowledge may be commodiously distributed into science and erudition.*
Collective knowledge: the missing roles

Collective sense: knowledge as a three-place relation

The sum of what is known [about X] [by Y]
What makes for "knowledge"?

What qualifies something as (collective) knowledge?

P is collectively significant

Nunberg's out of paper towels.

Kimberly-Clark closed at $108 yesterday.

Paper towel consumption is 50% higher in America than in Europe.

Arthur Scott introduced the first paper towel in 1931.
Features of Systems of knowledge

Boundaries

Conceptual organization/classification system

Social organization
Features of Systems of knowledge

Boundaries

Conceptual organization/classification system

Social organization
Features of Systems of knowledge

Boundaries

Conceptual organization/classification system

Social organization: who does the knowing?
Shifting Conceptions of Knowledge, 1500-1800
The archaeology of knowledge

How do we characterize conceptions of "knowledge" historically?

- Explicit descriptions & theories
- Models/images of knowledge in
  - Forms of institutions & practices (curriculum)
  - Material embodiments (library, museum)
  - Textual embodiments – encyclopedia, dictionary, compendium, bibliography
- Metaphors & visualizations: field, tree, discipline, trésor, etc.
The 15th-Century Curriculum

System of knowledge is "closed"; built around classical sources and religious texts

Organization of knowledge is fixed and "natural"

The enkyklios paideia ("circle of 'learning'"):
- Trivium: grammar, logic, rhetoric
- Quadrivium: arithmetic, astronomy, geometry, music
- The three philosophies: ethics, metaphysics, "natural philosophy"
- Higher faculties: theology, medicine, law

General/specialized
- The "universal man" (polymathia, pansophia)
  "A man is able to learn many things and make himself universal in many excellent arts." Matteo Palmieri, 1528
The 15th-Century Curriculum

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Changing Frames of Knowledge

Within 200 years, something like the mod, system emerges.

Responses to influences that are:
  - Pragmatic/material
  - Philosophical/academic
  - Symbolic/political

  (Not independent…)
Breaking with the past

It would disgrace us, now that the wide spaces of the material globe, the lands and seas, have been broached and explored, if the limits of the intellectual globe should be set by the narrow discoveries of the ancients. Francis Bacon, *The Advancement of Learning*, 1605
Breaking with the past

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Opening the World of Knowledge: Botany

*Herbarum vivae eicones* ("Living Pictures of Herbs") by Otto Brunfels, 1532. Matched Swiss & German plants to those known to Pliny and Dioscorides, ignoring differences, with residual *herbae nuda* ("naked plants")
The birth of "modern" classification

"I know no greater man on earth." Jean-Jacques Rousseau
The birth of "modern" classification

Plants classified into 24 classes according to length and number of stamens; further classified into orders etc.
Established binary system of naming
Organizing Knowledge Responses to Early Modern "Information Overload"

Linneaus, index card, ca 1760
Antonfrancesco Doni, 1550: there are “so many books that we do not have time to read even the titles.”

“That horrible mass of books... keeps on growing, [until] the disorder will become nearly insurmountable." Gottfried Leibniz, 1680
The endless anxiety…
An exponential curve looks just as scary wherever you get on board.
Confronting the Explosion
The Reorganization of Libraries

Gabriel Naudé proposes library organization scheme to “find books without labor, without trouble, and without confusion.” (1627)
Creation of "reference" works

Compendia and reference books (répertoires or trésors)

Dictionaries (& onomasticons); Florilegia (collections of sayings, etc.); commonplace books; miscellanies…

"I esteem these Collections extreamly profitable and necessary, considering, the brevity of our life, and the multitude of things which we are now obliged to know, e’re one can be reckoned amongst the number of learned men, do not permit us to do all of ourselves." Gabriel Naudé, 1661

The Cyclopaedia will "answer all the Purposes of a Library, except Parade and Incumbrance." Ephraim Chambers, 1728
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Men of good will have extracted the substance of a thousand volumes and passed it in its entirety into a single small duodecimo, a bit like skillful chemists who press out the essence of flowers to concentrate it in a phial while throwing the dregs away."

Louis-Sebastian Mercier, *L'An 2440*, 1771
Strategies for dealing with information overload

The most accomplished way of using books at present is twofold. Either, first, to serve them as men do Lords, learn their titles exactly and then brag of their acquaintance:—or, secondly, ..., to get a thorough insight into the Index, by which the whole book is governed and turned, like fishes, by the tail... Thus men catch knowledge by throwing their wit on the posteriors of a book, as boys do sparrows by flinging salt upon the tail."

Jonathan Swift, "Tale of a Tub," 1704
Compendia and reference books (*répertoires* or *trésors*)

As long as the centuries continue to unfold, the number of books will grow continually, and one can predict that a time will come when it will be almost as difficult to learn anything from books as from the direct study of the whole universe. It will be almost as convenient to search for some bit of truth concealed in nature as it will be to find it hidden away in an immense multitude of bound volumes.

—Denis Diderot, *Encyclopédie*, 1755
Strategies for Dealing with Information Overload

Note-taking system described by Vincent Placcius, from *De arte excerpendi*, 1689
Reconceptualizations of Knowledge
The Classificatory Urge: Thematic Organization

Vincent de Beauvais, Speculum triplex, 1244, in 3 divisions:
  Speculum naturale: God, angels & devils, man, the creation, and natural history
  Speculum doctrinale: Grammar, logic, ethics, medicine, crafts…
  Speculum historiale: History of the world…
New Schemes of Organization: Philosophical Influences

Francis Bacon's scheme puts man at the center:

Nature (astronomy, meteorology, etc.).

Man (anatomy, powers, actions),

Man acting on nature (medicine, visual arts, arithmetic),
The Encyclopédie

ENCYCLOPÉDIE,
OU
DICTIONNAIRE RAISONNÉ
DES SCIENCES,
DES ARTS ET DES MÉTIERS.
PAR UNE SOCIÉTÉ DE GENS DE LETTRES.

Tome Premier.

DENIS DIDEROT

Denis Diderot
The tree of human knowledge could be formed in several ways, either by relating different knowledge to the diverse faculties of our mind or by relating it to the things that it has as its object. ...But how could there not be arbitrariness? Nature presents us only with particular things, infinite in number and without firmly established divisions. Everything shades off into everything else by imperceptible nuances.

D’Alembert, Preliminary Discourse to the *Encyclopédie*
The infinity of orders

… a certain Chinese encyclopaedia entitled 'Celestial Empire of benevolent Knowledge'. In its remote pages it is written that the animals are divided into: (a) belonging to the emperor, (b) embalmed, (c) tame, (d) sucking pigs, (e) sirens, (f) fabulous, (g) stray dogs, (h) included in the present classification, (i) frenzied, (j) innumerable, (k) drawn with a very fine camelhair brush, (l) et cetera, (m) having just broken the water pitcher, (n) that from a long way off look like flies. There is no classification of the Universe not being arbitrary and full of conjectures. —Jorge Luis Borges

In the wonderment of this taxonomy, the thing we apprehend in one great leap, the thing that… is demonstrated as the exotic charm of another system of thought, is the limitation of our own, the stark impossibility of thinking that. —Michel Foucault
"Sciences, Arts Libéraux, Arts Méchaniques"

Formier

Economie Rustique (silk-making)
"Sciences, Arts Libéraux, Arts Mécaniques"

…the advantage that the *liberal* arts have over the *mechanical* arts, because of their demands upon the intellect... is sufficiently counter-balanced by the quite *superior* usefulness which the latter for the most part have for us....while justly respecting great geniuses for their enlightenment, society ought not to degrade the hands by which it is served”

d'Alembert, Preliminary Discourse to the *Encyclopédie*

Economie Rustique (silk-making)
The age of specialization

**scientist, n.**

1. A person who conducts scientific research or investigation; an expert in or student of science, esp. one or more of the natural or physical sciences.

   *computer, earth, mad, natural, rocket scientist*, etc.: see the first element.

   It is possible that the ‘ingenious gentleman’ referred to in quot. 1834 is Whewell himself.

1834 W. Whewell in *Q. Rev.* 51 59 Science...loses all traces of unity. A curious illustration of this result may be observed in the want of any name by which we can designate the students of the knowledge of the material world collectively. We are informed that this difficulty was felt very oppressively by the members of the British Association for the Advancement of Science, at their meetings...in the last three summers...
specialist, n

2.a. In general use, one who specially or exclusively studies one subject or one particular branch of a subject.

1867 H. Spencer First Princ. (ed. 2) ii. i. §36 130
Even the most limited specialist would not describe as philosophical, an essay which [etc.].
Schemes of Organization
New Schemes of Organization: Didactic Objectives

Comenius (Amos Komensky), Orbis sensualium pictus, 1658

1. Elements, firmament, fire, meteors
2. Waters, earths, stones, metals,
3. Trees, fruits, herbs, shrubs
4. Animals
5. Man and his body…
20. Providence, God and the angels„„
Contextual organizations
Roget’s System

Peter Marc Roget: 1779-1869
Visualizing Knowledge
[T]he encyclopedic arrangement of our knowledge ... consists of collecting knowledge into the smallest area possible and of placing the philosopher at a vantage point, so to speak, high above this vast labyrinth, whence he can perceive the principle sciences and the arts simultaneously. From there he can... discern the general branches of human knowledge, ...and sometimes he can even glimpse the secrets that relate them to one another. It is a kind of world map which is to show the principal countries, their position and their mutual dependence, the road that leads directly from one to the other.
Cyclopædia: or, an Universal Dictionary of Arts and Sciences.

Containing an Explanation of the Terms, and an Account of the Several Subjects, in the Liberal and Mechanical Arts, and the Sciences, Human and Divine.

In four volumes.

By 2. Chambers, Esq.

With the Supplement, and Modern Improvements, incorporated in one Alphabet.

By Abraham Rees, D.D.
Picturing knowledge
The Tree of Bacon
The Tree of Bacon

The Two Trees of Bacon

HUMAN LEARNING

MEMORY
- Natural
  - Of reason
  - Of nature
  - Of arts
- Civil
  - Of memorials
  - Of antiquities
  - Of the Church
- Ecumenical
  - Of prophecy
  - Of providence

IMAGINATION
- Poetic
  - Narrative
  - Representative
  - Allegorical

REASON
- Divine or Natural Theology
  - Of science
    - Pure Mathematics
    - Mixed Mathematics
  - Of experimental
    - Of natural
    - Of philosophical
    - Of magical
- Of medicine
  - Of the body
    - Of health
    - Of the mind
  - Of the soul
    - Of the good
    - Of the evil
- Of law
  - Of rational
    - Of tradition
    - Of delivery
  - Of social
    - Of the state
    - Of the mind
  - Of civil
    - Of negotiation
    - Of government

DIVINE LEARNING

THE NATURE OF RELIGION
- Law of nature
  - Law of reason
  - Law of faith
- The nature of God
  - Attributes of God
  - Works of God

THE NATURE OF RELIGION
- Belief
  - Law of nature
  - Law of faith
- Manners
  - Of the body
  - Of the mind
- Law of the Church
  - Interpretation of Scripture
  - Interpretation of Scripture
  - Interpretation of Scripture

THE NATURE OF THE CHURCH
- Liturgy
  - Government of the Church
  - Government of the Church
  - Government of the Church
The Tree of Diderot & D'Alembert
The Tree of Diderot & D'Alembert

**REASON**

General metaphysics, or Ontology, or Science of being in general, of Possibility, of Existence, of Duration, etc.

- Natural Theology
- Revealed Theology
- Science of good and evil spirits

**KNOWLEDGE**

Pneumatology or Science of the Soul

- Reasonable
- Sensible

**LOGIC**

- Science of Ideas
- Science of Propositions

- Sense of Ideas
- Sense of Propositions

**ART OF THINKING**

- Natural
- Artificial

- Reasoning
- Induction

- Science of Reasoning
- Science of Induction

**ART OF MEMORY**

- Writing
- Printing

- Grammar
- Syntax

- Science of the Instrument of Discourse
- Rhetoric

**ART OF COMMUNICATING**

- Pedagogy
- Choice of Studies

- Science of the Qualities of Discourse
- Mechanics of Poetry

**NATURAL SCIENCES**

- General science of good and evil, Of Virtue in general, Of Virtue, Of the necessity of being virtuous, etc.

**SYSTEM UNDERSTANDING**

**IMAGINATION**
ESSAI D'UNE DISTRIBUTION GÉNÉALOGIQUE DES SCIENCES ET DES ARTS PRINCIPAUX.

Selon l'Explication détaillée du Système des Connaissances Humaines dans le Discours préliminaire des Editeurs de l'Encyclopédie publiée par M. Diderot et M. d'Alembert, Weimar, 1769

Art of Remembering.
Natural.
Artificial.
Prenotion.
Emblem.

Supplement to Memory.
Writing.
Printing.
Alphabet.
Cipher.

Arts of Writing, Printing, Reading (process) | Reading, Deciphering.
Orthography.
Art of printing
Art of deciphering
Art of writing
Art of reading
The Tree of Diderot & D'Alembert

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"Système Figuré Des Connaissances Humaines"
http://goo.gl/a8FMf
Material Representations of Knowledge
Knowledge and the role of the "trésor"

Libraries, anthologies, dictionaries, in a word "treasuries" [trésors], alongside of encyclopedic collections, delimit a vast territory on which are cast the signs required for knowledge, the expression of identities, and communication among the members of the group.

-Alain Rey, "Les trésors de la langue,"
1986
Material Representations of Knowledge

Curriculum mirrored in form of library (bibliographies)

Leiden University Library, 1610
Material Representations of Knowledge

Curriculum mirrored in form of library (bibliographies)
Representations of Knowledge: The Kunstkammer

Organization of knowledge mirrored in form of Kunstkammer, cabinets of curiosities, Wunderkammer, etc.

Museum Wormiamum, 1655
The Kunstkammer & Wunderkammer

Kunst- und Wunderkammer of Emperor Rudolf II, ca 1610

Natural History Kabinet, Naples, 1599
Representations of Knowledge: The Studiolo

Studiolo of Francesco I
Florence (1570)

Kunstkammer, 1636
Representations of Knowledge: The Studiolo

Studiolo of Federico da Montefeltro Urbino (ca. 1460) with wood intarsia (inlay)
Representations of Knowledge: The Kunstschrank

The Kunstschrank (art cabinet or art shrine)
Representations of Knowledge:
The Kunstschrank

French Reliquary, 1330

Presentation of the Pomeranian Kunstschrank, Anton Mozart 1615
From Cabinets to Museums

Kunstkammers first made available for public viewing in mid-17th C (Kunstmuseum Basel, 1661)

Public museums in 18th c:

British Museum, 1759, containing cabinet of curiosities assembled by Hans Sloan, ms collections, Royal Library.
Uffizi Gallery, Florence, 1765

Belvedere Palace, Vienna, 1781

Louvre Palace opened to public in 1793 with royal collections; augmented by Napoleon

Montague House, home of original British Museum in Bloomsbury
17th c. Galleries

23. *The Imperial Gallery in Prague*, by Johann Bretschneider, 1714. The paintings are arranged according to the visual and decorative effect.
17th c. Galleries

Gallery of Cornelis van der Geest, 1628
18th c. Galleries

Painting Galleries, Schloss Belvedere, Vienna, 1781

Rationalizing the organization of the trésor
Modern Salon Style

Daumier, Salon de 1867

Walker Museum, Minneapolis
Readings for 3/3

**Required Reading:**

Henry George, “The Western Union Telegraph Company and the California Press,” San Francisco, April 21 1869. Source: bCourses


**Additional Reading**

“Electro-Magnetic Telegraphs,” H. Rpt 753 (to Accompany Bill H.R. 713) 25th Congress, 2nd Session, April 6, 1838

Alexander Graham Bell, “To the Capitalists of the Bell Telephone Company,” Kensington (UK), March 25, 1878

Green and Hubbard argue over whether the government or private industry is better suited to protecting communication channels from abuse. Which one has the better argument and in what ways might it be applicable to today's communication challenges?