



Can 15-year-old Wikipedia remain the planet's font of all knowledge?

As Wikipedia marks its birthday, Andrew Lee looks back at how the website conquered the internet and the challenges it faces in maintaining its position as the 'font of all knowledge'.



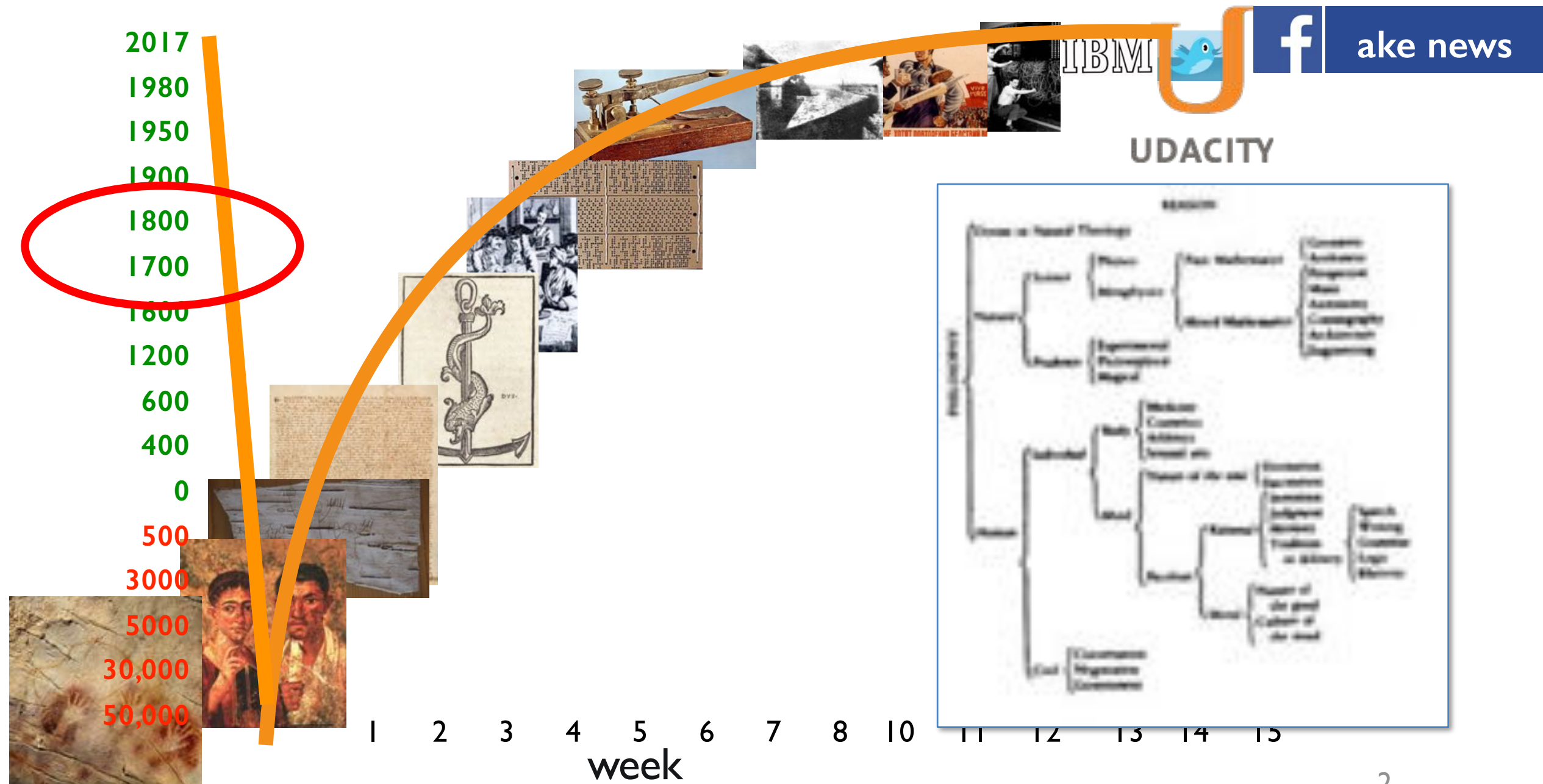
# The Organization of Knowledge

History of Information i103  
Geoff Nunberg

Feb. 21, 2017

# History of Information

## Organizing Knowledge



# Itinerary, 2/2 I

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Defining "knowledge"

The shifting frame of knowledge; from Renaissance to Enlightenment

Early reactions to "information overload"

Knowledge in the Age of Reason: the *Encyclopédie*

Assignment

Emily S., Sidney A., Grace N., Isadora T., Spandana S.

Material representations of knowledge

From cabinet to museum

# 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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# On "knowledge"

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# Defining "knowledge"

## Individual senses

*Oxford English Dictionary:*

- Acquaintance with a branch of learning, a language, or the like. *His knowledge of French is excellent.*
- having a correct idea or understanding of something. *He has a considerable knowledge of alarm systems.*

## Collective sense



**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.*

*Scott Paper closed at \$108 yesterday.*

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

*Arthur Scott introduced the first paper towel in 1931.*

*Paper was invented by the Chinese.*



# Features of Systems of knowledge

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Fields/domains of knowledge

Conceptual organization/classification system

Social organization: who does the knowing?





# 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)

Physical embodiments (library, museum)

Textual embodiments (encyclopedia, dictionary, compendium, catalogue/bibliography)

Metaphors & visualizations: *field*, *tree*, *discipline*, *trésor*, etc.



# Shifting Conceptions of Knowledge, 1500-1800

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# The 15<sup>th</sup>-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"



1. Tree of Knowledge, woodcut of R. Loh, Basel School  
1511-16, 1515; copy in Cambridge University Library (P.2.15).





# Changing Frames of Knowledge

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

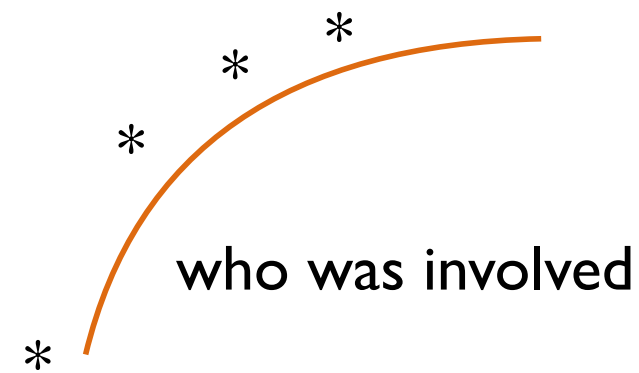
Responses to influences that are:

- Pragmatic/material

- Philosophical/academic

- Symbolic/political

- (Not independent...)



# from looking back to looking around

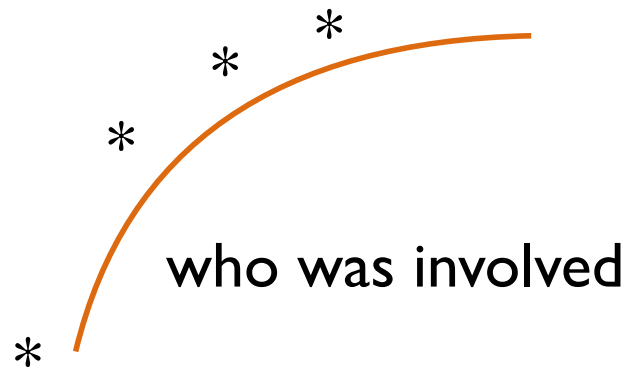
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"though I do not deny that moderns can make  
some discoveries ... do not think one will arise  
who can give us a body of philosophy more  
complete than [Aristotle]"

—Erasmus

"Why do we not, I say, turn over the living  
book of the world instead of dead papers."

—John Comenius  
(1592-1670)



# from dead to living

from **Ptolemy** (c. 100-170)

to

**Copernicus, Galileo, Tycho, Kepler, Newton**

from **Hippocrates** (460-375 bce), **Galen** (c. 129-216)

*Ayurveda; Yellow Emperor's Inner Canon*

to

**Paracelsus** (1493-1541) (?taught by Trithemius)

**Harvey** (1578-1657)



# 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



# 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 Discorides, ignoring differences, with residual *herbae nuda* ("naked plants")



I am sending you the seed of the plant that I now take to be the true 'crocodilian,' but I would be more confident of being right if I had tried drinking an infusion of its root and found that it did indeed induce a nosebleed. Luca Ghini, ca. 1550





# Opening the world of knowledge



Valerius Cordus, *Historia plantarum* 1561 (1544), published posthumously by Conrad Gesner.

Records numerous plants not described by the ancients; emphasizes differences among similar plants.



Resemblance & the doctrine of "signatures"



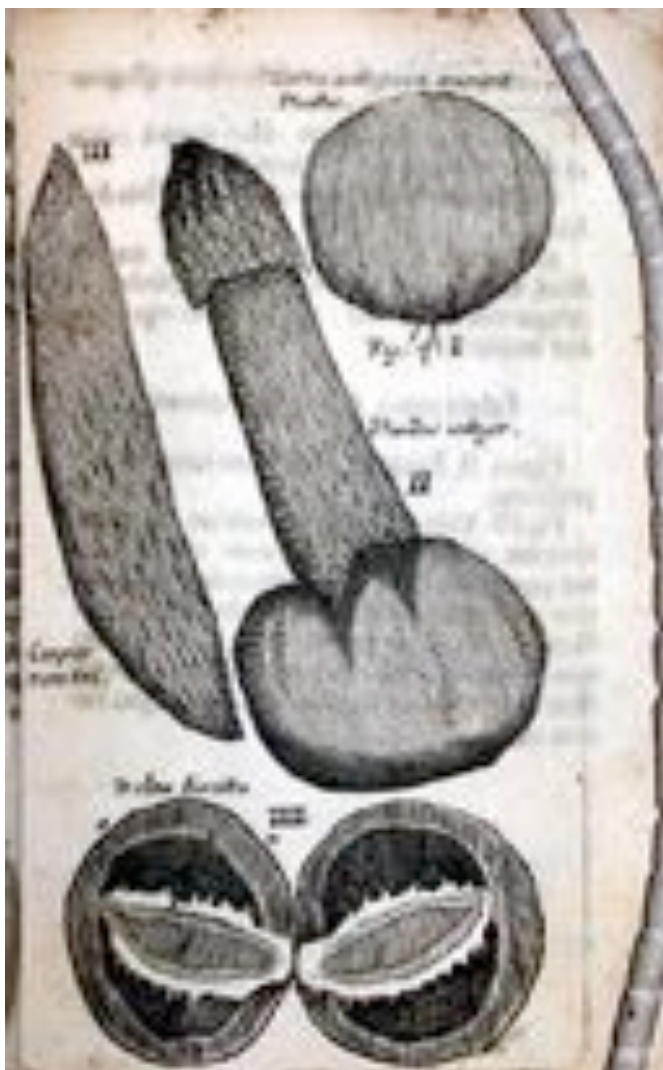


# The birth of "modern" classification

John Ray, *Historia generalis plantarum*, 1686-

"... no surer criterion for determining species has occurred to me **than the distinguishing features that perpetuate themselves in propagation from seed**. Thus, no matter what variations occur in the individuals or the species, if they spring from the seed of one and the same plant, they are accidental variations and not such as to distinguish a species...

"I reckon all Dogs to be of one Species, they mingling together in Generation, and the Breed of such Mixtures being prolifick"

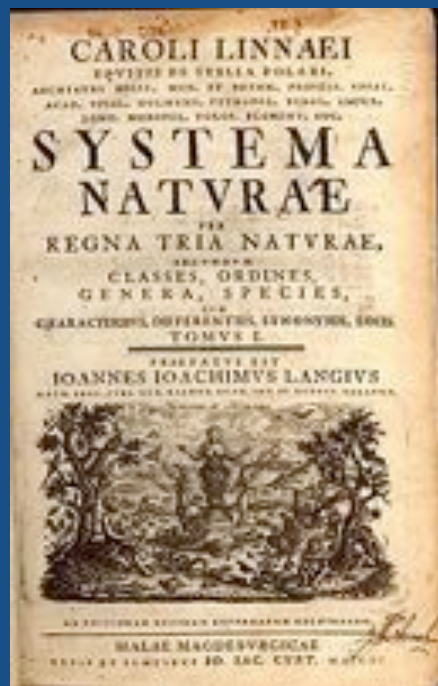








# The birth of "modern" classification



# Systema naturae 1735

[illegible]

"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



Frontispiece to  
Linnaeus, *Hortus  
Cliffortianus* 1737



“the gross prurience” of the book  
“shocks female modesty”—Bishop  
of Carlyle

# Organizing Knowledge Responses to Early Modern "Information Overload"

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Linnaeus, index card, ca 1760



# Pragmatic Forces: Perceptions of "Information Overload"

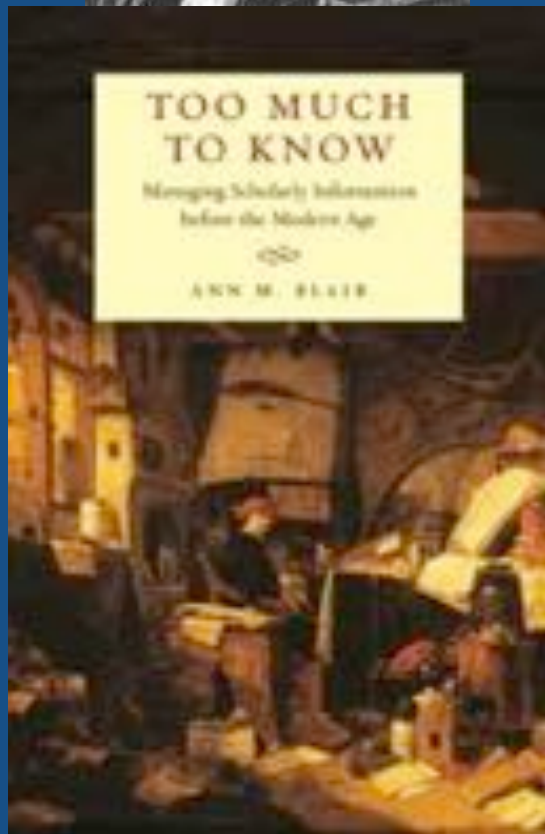
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Antonfrancesco Doni, 1550: there are “so many books that we do not have time to read even the titles.”

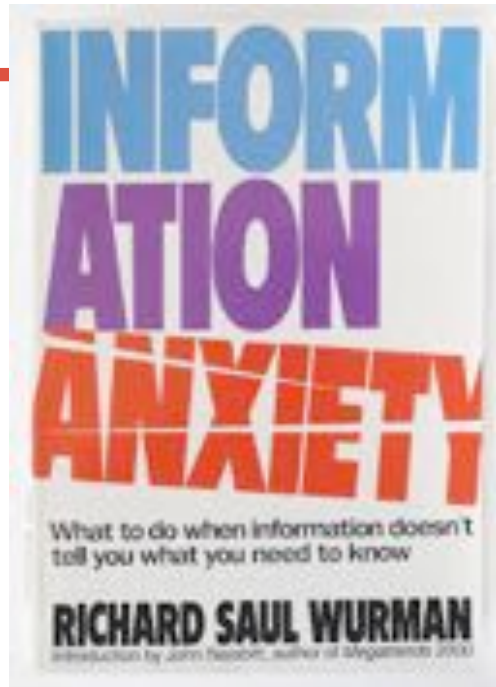
“That horrible mass of books... keeps on growing, [until] the disorder will become nearly insurmountable.”

Gottfried Leibniz, 1680





# The endless anxiety...



DECEMBER 20, 2007, 5:52 PM

## Is Information Overload a \$650 Billion Drag on the Economy?



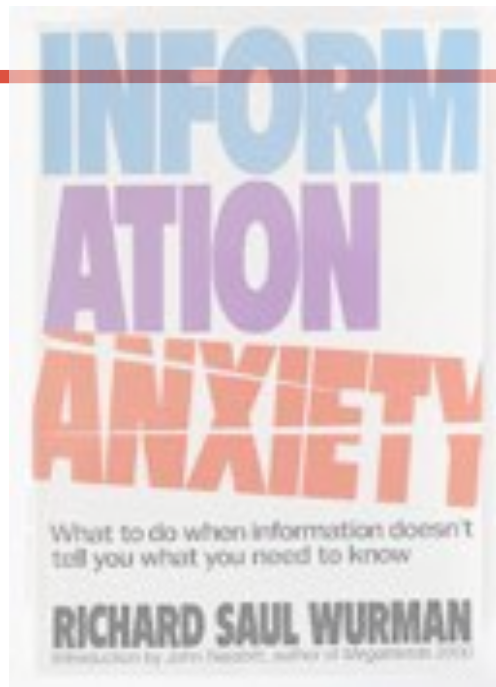
World of Psychology

## Overcoming Information Overload

By MARGARITA TARTAKOVSKY, M.S.  
Associate Editor

• Blog Index

# The endless anxiety...



a \$650 Billion Drag on the

An exponential curve looks just as scary wherever you get on



World of Psychology

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« Blog Index



# The Reorganization of Libraries



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

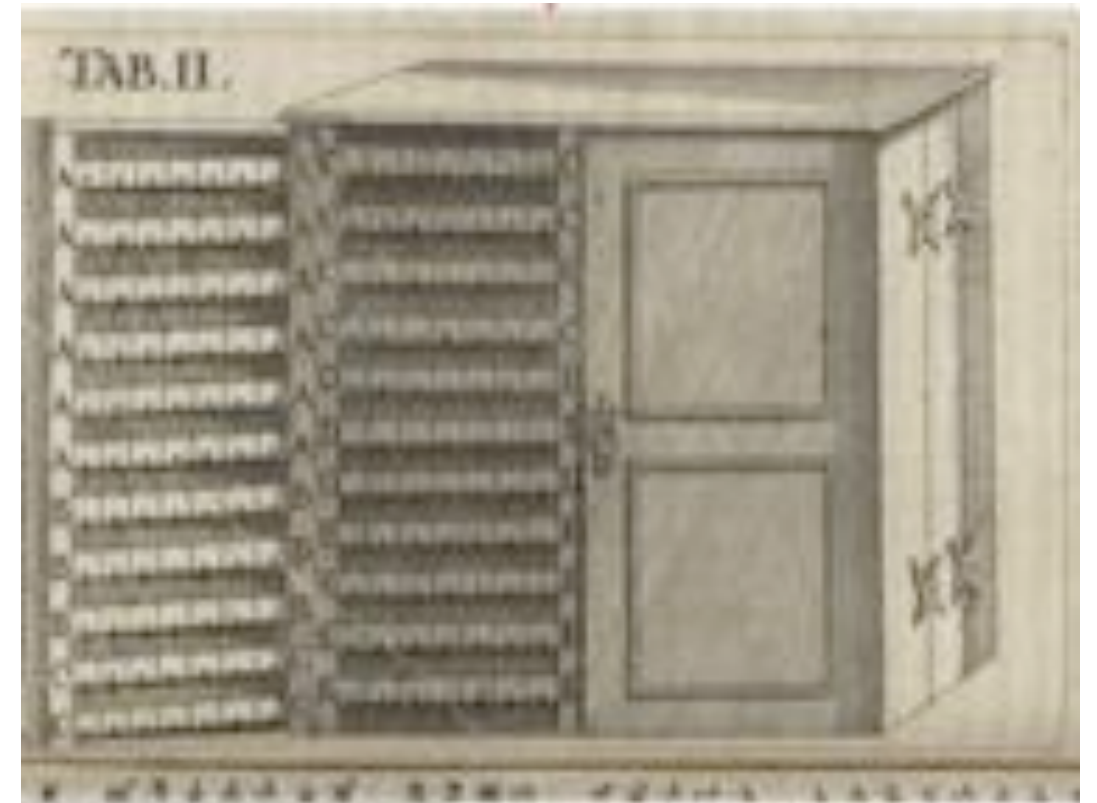
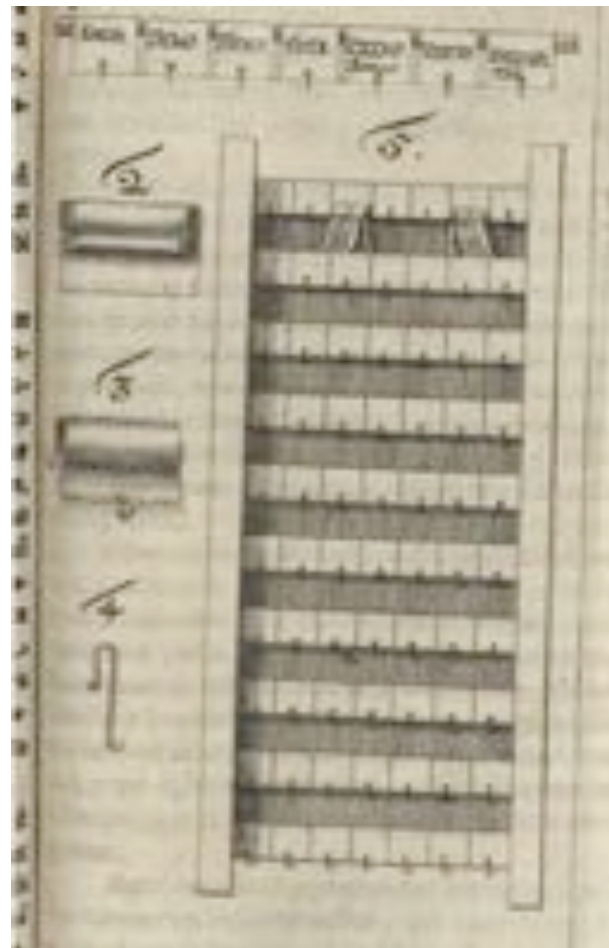
“Universal libraries”: Dresden, Vienna,



Bibliothèque Mazarine  
(1643)



# Note-taking system described by Vincent Placcius, from *De arte excerpendi*, 1689





# 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





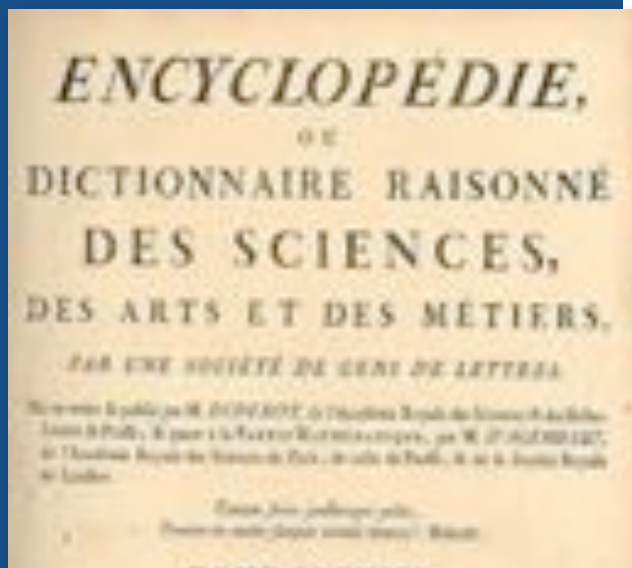


# Strategies for dealing with information overload

## 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

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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

# Knowledge in the Age of Reason

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“The Encyclopédie was more than a book—it was a faction, and all Europe took it up.” Jules Michelet

# The Enlightenment Project

The priority of reason:

“The conviction that human understanding is capable by its own power of comprehending the system of the world.” Ernst Cassirer, 1932

God as a clock-maker

The Republic of Letters.



# New Schemes of Organization: Philosophical Influences

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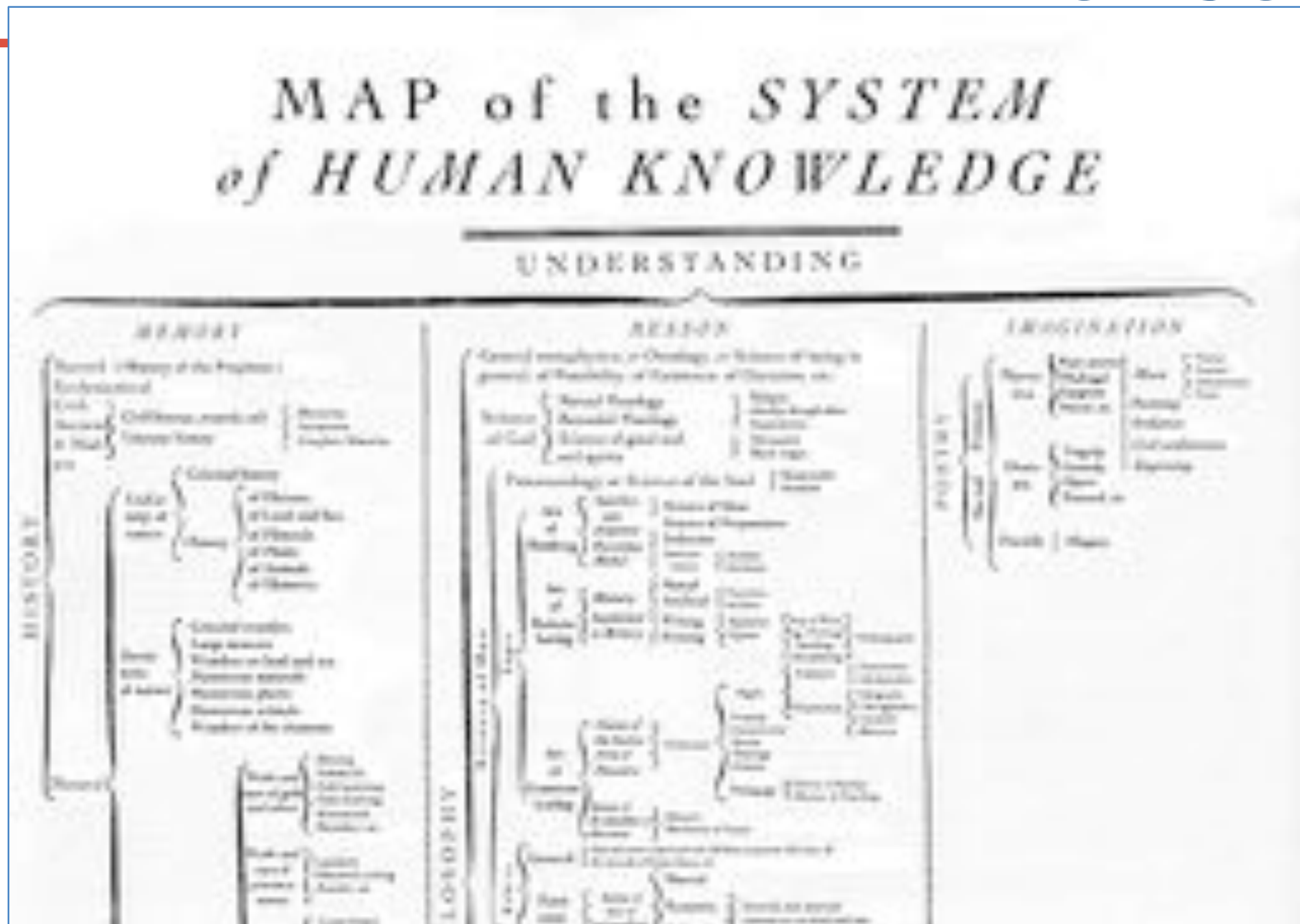
Francis Bacon's scheme puts man at the center:

Nature (astronomy, meteorology, etc.).

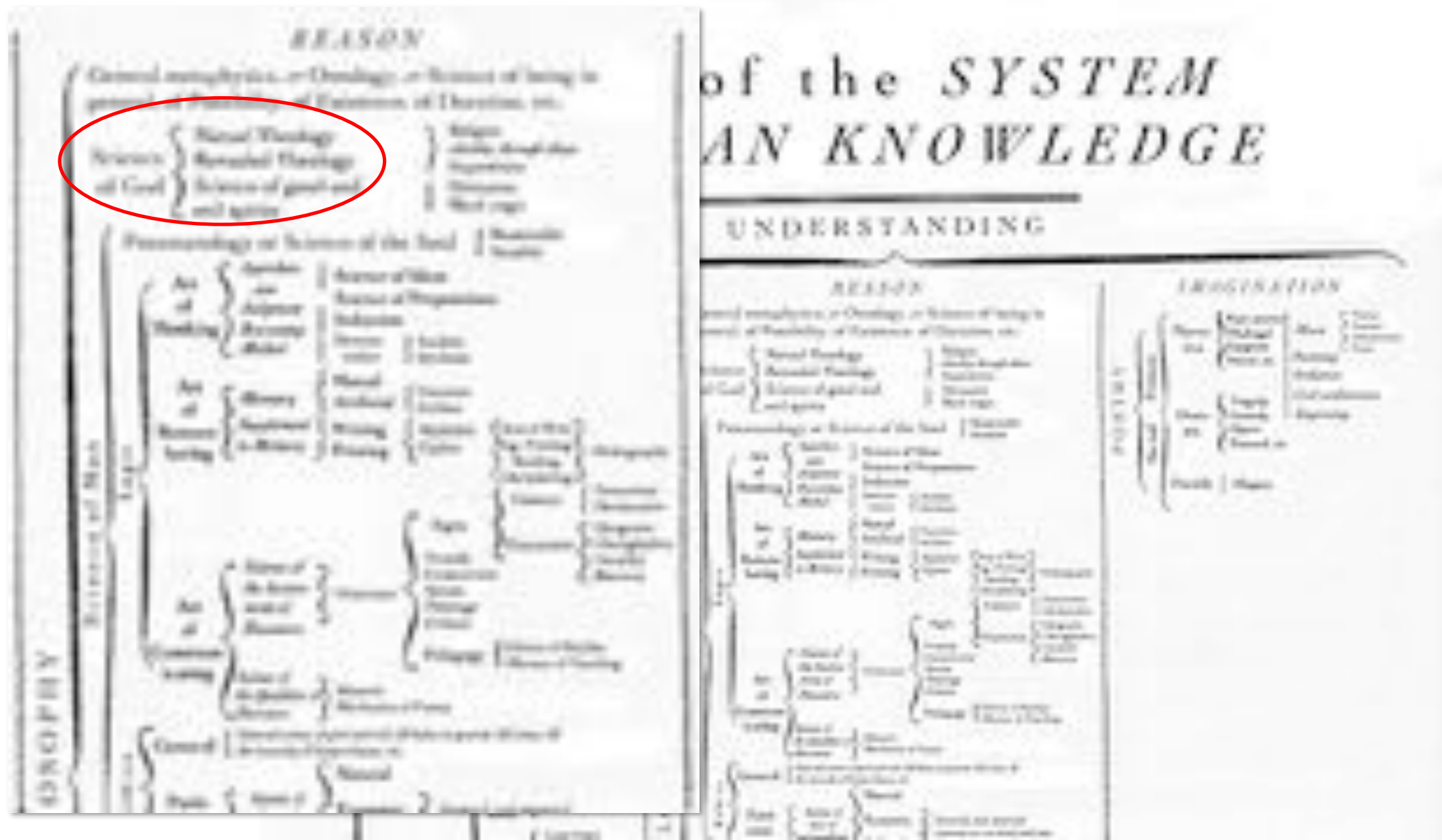
Man (anatomy, powers, actions),

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

# The Tree of Diderot & D'Alembert



# The Tree of Diderot & D'Alembert





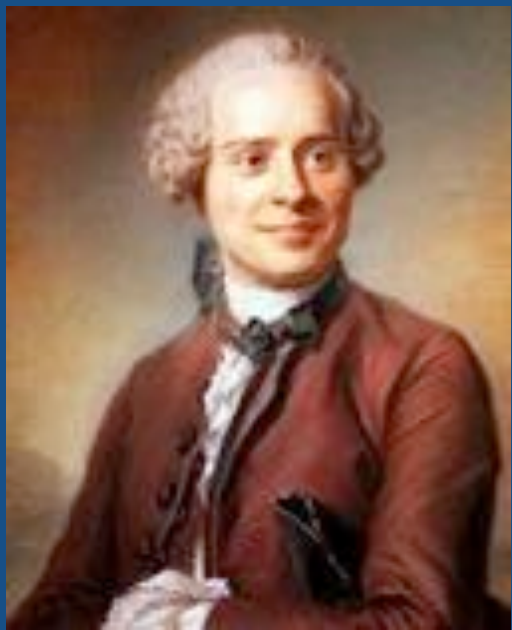
# The infinity of orders

... 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

# The modern condition: An infinity of orders

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Jean d'Alembert

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*

# Visualizing knowledge



Jean d'Alembert

[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...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.

# The Tree of Diderot & D'Alembert

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

Art of Remembering.

Natural.

Artificial.

Prenotion.

Emblem.

Supplement to Memory.

Writing.

Printing.

Alphabet.

Cipher.

Arts of Writing, Printing, Reading  
(process) | Reading, Deciphering.

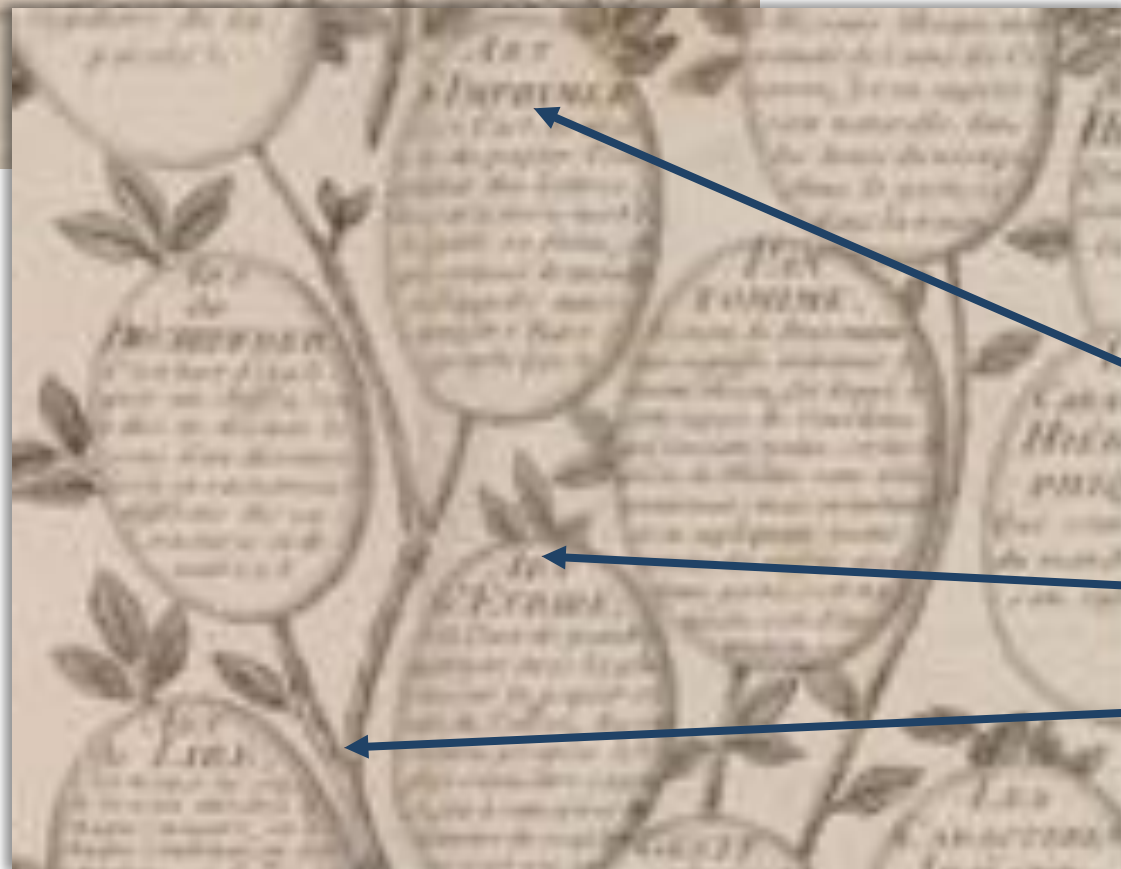
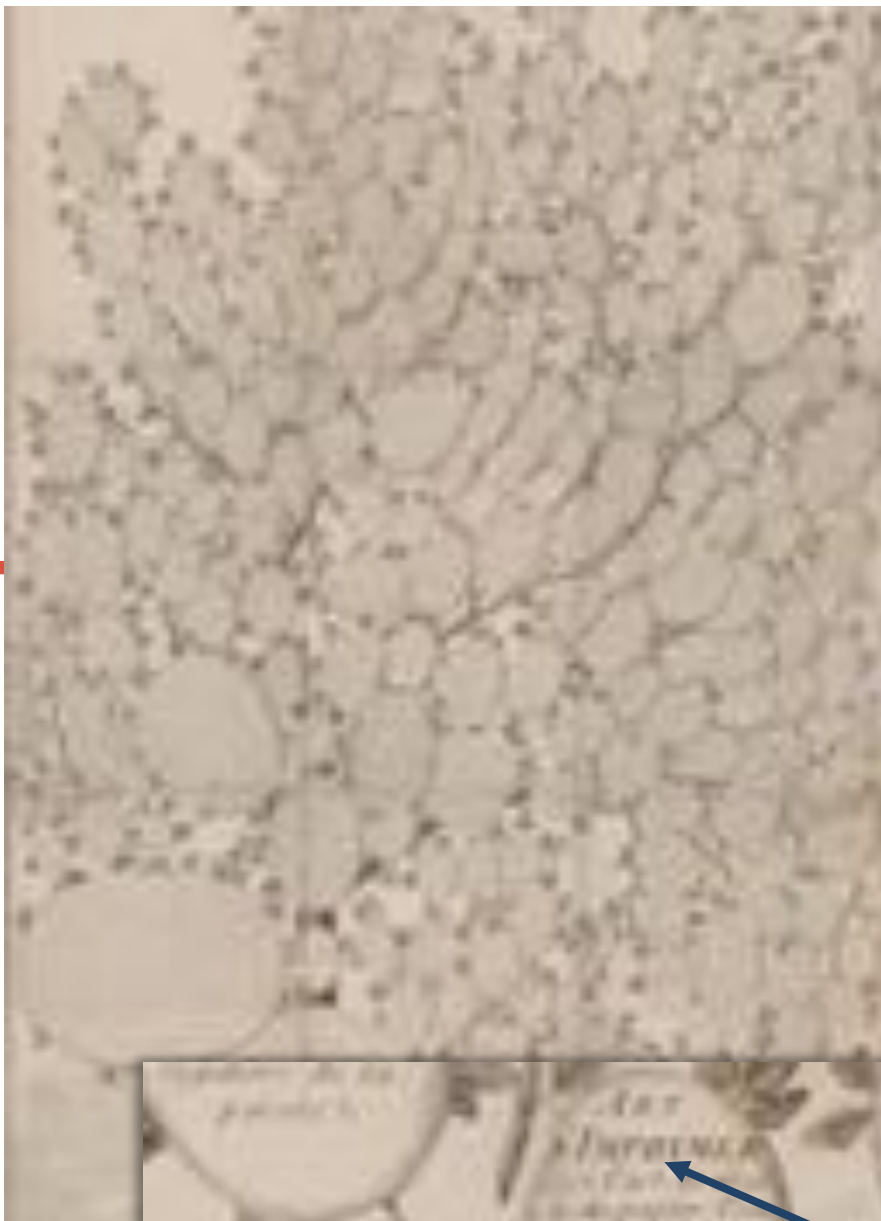
Orthography.

Art of printing

Art of deciphering

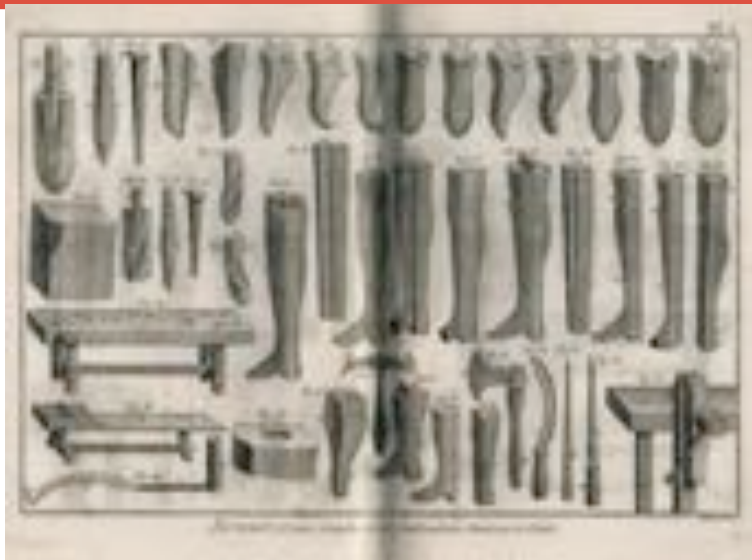
Art of writing

Art of reading





# "Sciences, Arts Libéraux, Arts Mécaniques"



Formier



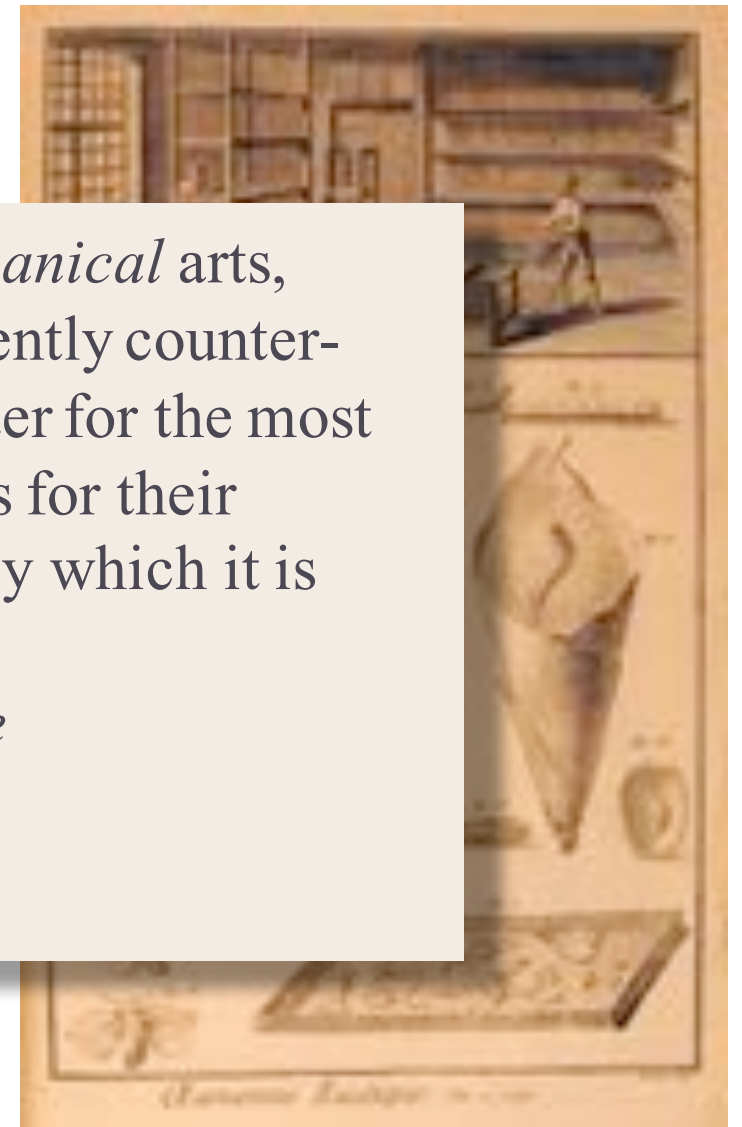
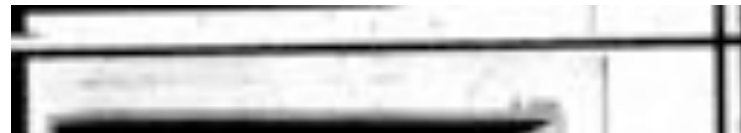
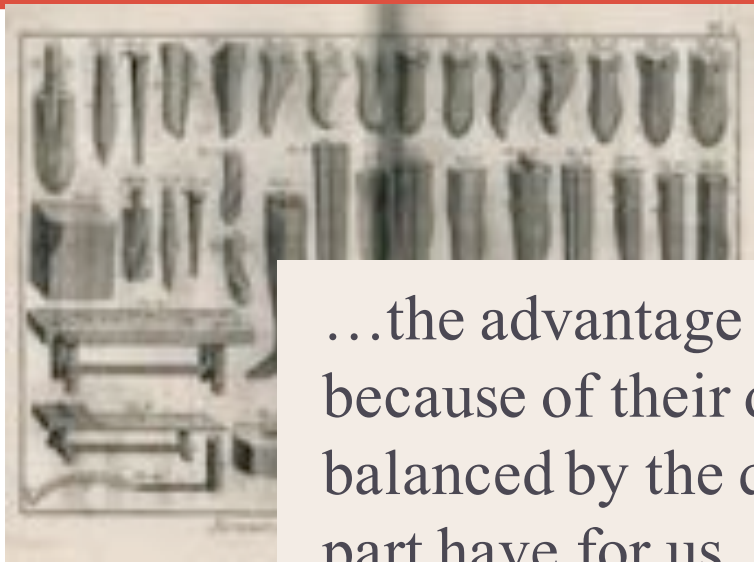
Economie Rustique (silk-making)



Perruquier (wig-maker)

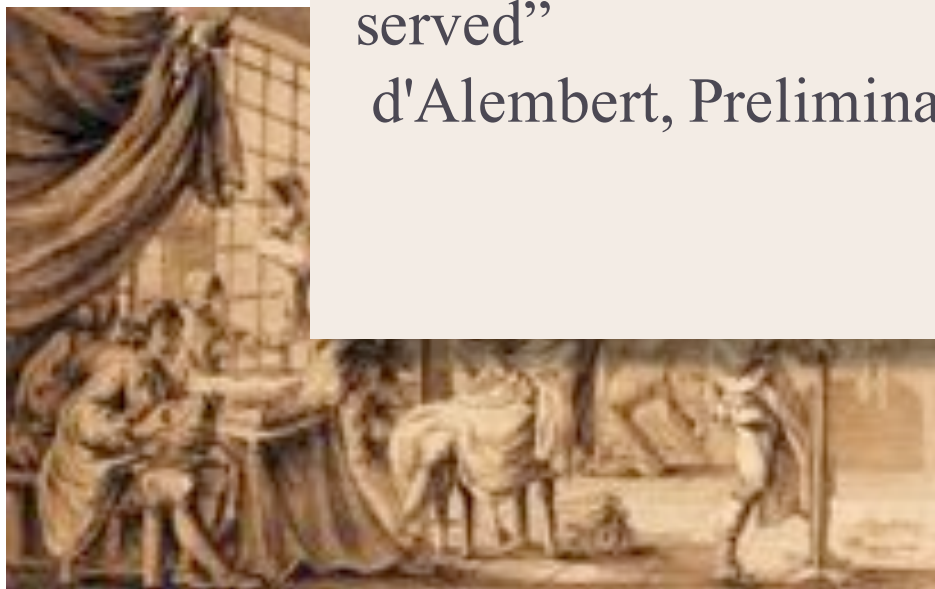


# "Sciences, Arts Libéraux, Arts Mécaniques"



...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*



Perruquier (wig-maker)

Economie Rustique (silk-making)

[adultery](#)  
[childhood](#)  
[doubt \(article written by Diderot\)](#)  
[elegance \(Voltaire\)](#)  
[man \(Diderot\) – \(see “human” in Wikipedia\)](#)  
[paternal authority \(see “father” in Wikipedia\)](#)

Note: If you have trouble reaching the University of Michigan site, I've put a pdf of archived versions of all the entries [here](#).

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# Assignment for Feb 21

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Pick one of the following definitions from the Encyclopédie edited by Diderot and d'Alembert and look at the definition of the equivalent term in Wikipedia. What differences strike you—in tone, in "objectivity" or "neutrality," in style, in coverage. What factors might explain the difference: the way the two sources were compiled (as recounted in McArthur, the article on the Encyclopedists, and the Darnton and Blom, which you may find useful); the difference in the cultural understanding of what makes for the "knowledge" that an encyclopedia should record (as reflected in Diderot's scheme and the Darnton), the notion of expertise (discussed by Paul in Thursday's class), or the cultural and political background. (You need to pick only one or two of these to develop.)

[adultery](#)

[childhood](#)

[doubt \(article written by Diderot\)](#)

[elegance \(Voltaire\)](#)

[man \(Diderot\) – \(see “human” in Wikipedia\)](#)

[paternal authority \(see “father” in Wikipedia\)](#)

## Emily S.

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"MAN": Diderot and d'Alembert...categorize facts as those that "concern either God, or man, or nature". Everything seems to be judged in the context of religion. That's why it surprised me upon reading the Darnton article to see that Diderot and d'Alembert were radical in their religious beliefs at the time.... It also provided an anthropocentric view of the world, defining man as "[he] who seems to be at the head of all other animals whom he dominates", elevating humanity to a god-like plane over the dominion of animals. The Wikipedia article by contrast is fairly objective in its treatment of humanity, describing humans as primarily an animal-species before delving in to the components of humanity.

# Sidney A.

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...While Wikipedia's entry and Diderot's Encyclopédie entry for the word doubt begin identically, the similarities between the two end there. Wikipedia summarizes the history and effects of doubt in psychology, philosophy, theology, and law. The entry is written in the third-person and maintains a rather objective tone... In contrast, Diderot's entry speaks to the political and social climate of the period in which it was written; essentially Diderot writes "from the standpoint of the "Enlightenment" ... Diderot focuses on the philosophical ideals of Descartes... which proved foundational to the progressive thinking of the Enlightenment era. Meanwhile, while Wikipedia only briefly mentions Descartes and skepticism. An open source encyclopedia like Wikipedia is compiled and edited by many different authors of different backgrounds; this forces most entries to be concise and objective in tone. In contrast, the Encyclopédie "featured articles by leading radical thinkers and reflected its chief editor's own revolutionary enthusiasms...



# Grace N.

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...the Encyclopédie's definition [of 'childhood'] is written in an authoritarian voice and less objective than Wikipedia's definition. Wikipedia brings in multiple perspectives and definitions of childhood, using open vernacular such as "Some consider..." and "It has been argued that...". The Encyclopédie's definition is written in a matter-of-fact style that only offers one perspective. This definition narrows in on the physical well-being of childhood and how to achieve it, while Wikipedia broadens the definition to the stages, history, and social roles of childhood.

What may account for these differences is the cultural understanding of what constitutes as "knowledge." Diderot's map divides human knowledge into 3 categories: memory, reason and imagination. The Encyclopédie's "childhood" zeroes in on the section of "Medicine", under Science of Nature > Particular Physics. The boundaries that this simple diagram sets on human knowledge contributed to the one-sided nature of the definition. However, Darnton explains that the Encyclopédie is meant to "limit the domain of the knowable and pin down a modest variety of truth" [195]. Therefore, the Encyclopédie's definition is purposefully subjective in order to cap the "infinite number of possible [knowledge] trees" [195].

# Isadora T.

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Voltaire describes the term “elegant” by referring to historical uses of the term. He includes accounts from Cicero, Aulu-Gelle, the Romans, and the French. Elegance is mostly in terms of the arts - literature, music, poetry, sculpture. These fall under the “Imagine” section of Diderot’s “Map of the System of Human Knowledge.” The Wikipedia article on “elegance,” however, applies the term to human creation, rather than a human form: elegant procedures, elegant writing, elegant constructions, elegant solutions. These descriptions would fall under “Science of Nature” in Diderot’s scheme. The difference here could be because in the 21st century, physical beauty is so subjective that to link the two would be moot in a medium such as Wikipedia that heralds exactness...Most notably, Voltaire writes extensively about what “elegance” isn’t. The Wikipedia article only explains what elegance is. ...the Wikipedia article is (likely) a product of hundreds of edits from hundreds of different contributors. With so many perspectives, objectivity becomes a standard to strive for. In explicating what “elegance” is not... V positions the term as a noun of ... elevation. This description is biased, for it comes from a single person’s account.

# Spandana S.

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Diderot's definition of adultery is laden with cultural references which influence his perception of the act, its impact and related consequences, or lack thereof ("adultery is, after homicide, the most punishable of all crimes") Diderot's rendition is therefore more subjective and far less neutral. Wikipedia on the other hand presents a more objective definition which considers the role, perceptions and consequences of adultery in multiple countries and cultures around the world and presents them in a neutral manner, citing culture as the key difference for the interpretation of adultery around the world.

The variation in cultural understanding of what "knowledge" is can account for this difference. Diderot for example believes knowledge is based on subjective concepts such as memory, philosophy and religion, and thus his definitions highlight ideas that are contextually relevant at the time.

# Material Representations of Knowledge

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# Knowledge and the "Virtuosi"



"He Trafficks to all places, and has his Correspondents in every part of the World; yet his Merchandizes serve not to promote our Luxury, nor encrease our Trade, and neither enrich the Nation, nor himself. A Box or two of Pebbles or Shells, and a dozen of Wasps, Spiders and Caterpillars are his Cargoe. He values a Camelion, or Salamander's Egg, above all the Sugars and Spices of the West and East-Indies... Mary Astell, *"Character of a Virtuoso,"* 1696

"I content myself with the speculative part of swimming; I care not for the practical. I seldom bring anything to use.... Knowledge is my ultimate end."

Sir Nicholas Gimcrack, in *The Virtuoso*, by Thomas Shadwell, 1676

# Representations of Knowledge: The Kunstkammer

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



Museum Wormianum, 1655

# Representations of Knowledge: The Kunstkammer

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The Kunstkammer of Rudolph II was a carefully organized "museum" articulated through an understanding of the world... This organisation depended on the concept of resemblance, where the objects and their proximities suggested macrocosmic microcosmic links.

Eilean Hooper-Greenhill, *Museums and the Organisation of Knowledge*



# A world of resemblances

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“...all nature forms one great fabric in which beings resemble one another from one to the next, in which adjacent individuals are infinitely similar to each other; so that any dividing–line that indicates, not the minute difference of the individual, but broader categories, is always unreal.”

Michel Foucault, *The Order of Things*





# A world of resemblances

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Tasmanian Wolf



“...all nature forms one great fabric in which beings resemble one another from one to the next, in which adjacent individuals are infinitely similar to each other; so that any dividing–line that indicates, not the minute difference of the individual, but broader categories, is always unreal.”

Michel Foucault, *The Order of Things*

# Representations of Knowledge: The Studiolo



Studiolo of Francesco I  
Florence (1570)



Kunstammer, 1636



# From Cabinets to Museums

Montague House, home  
of original British  
Museum in Bloomsbury

Kunstkammers first made available for public viewing in mid-17<sup>th</sup>.  
C (Kunstmuseum Basel, 1661)

Public museums in 18<sup>th</sup> c:

British Museum, 1759, containing cabinet of curiosities  
assembled by Hans Sloane, 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



# 17th c. Galleries

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23 The Imperial Gallery in the Louvre, by Jacques-Louis Le Vau, 1708. The paintings are arranged according to the school and historical style.

Source:



# 17th c. Galleries

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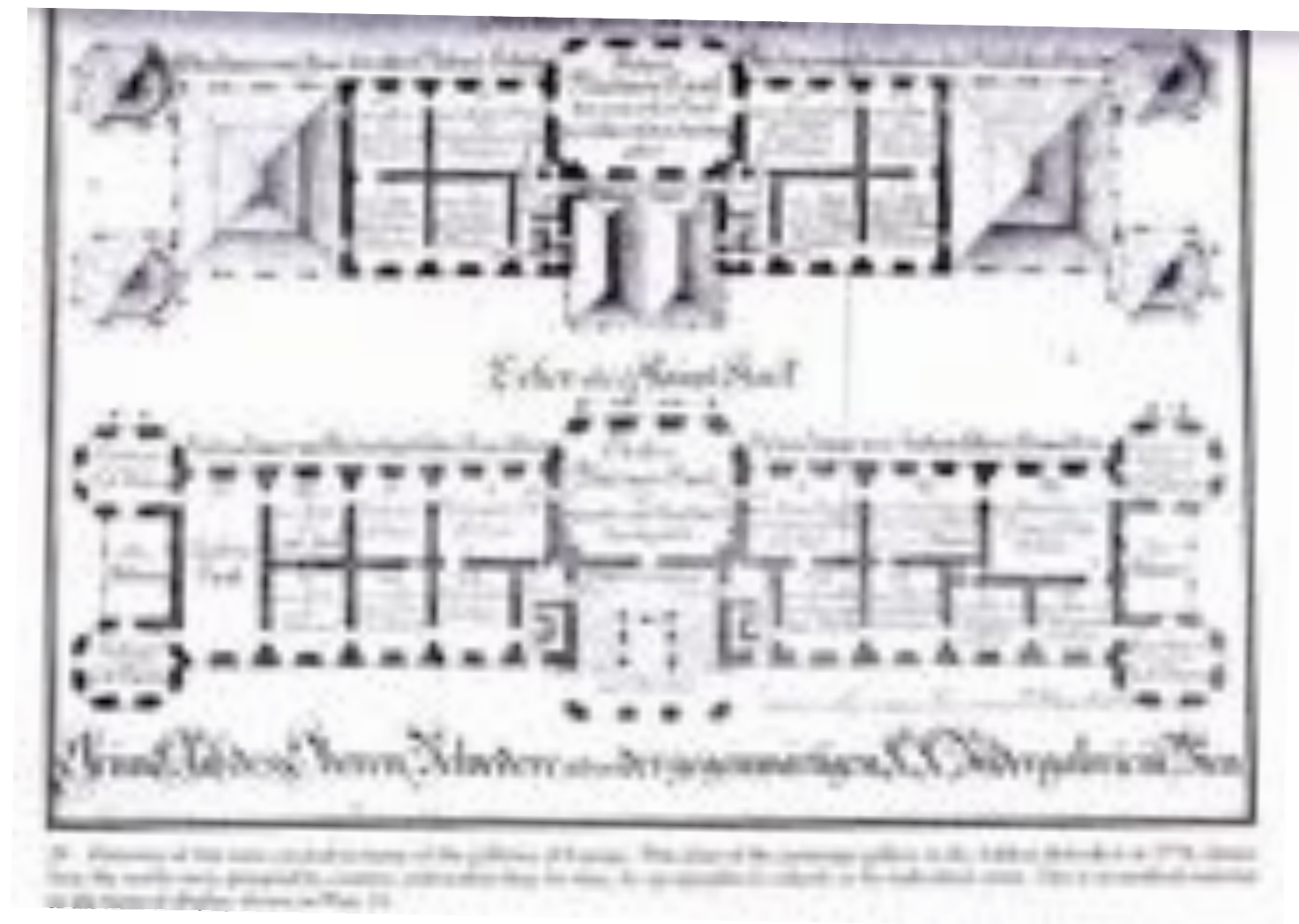
Gallery of Cornelis  
van der Geest, 1628





# 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





# Modern Wunderkammers

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# Readings for 2/23: Information as property

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Information, it has famously been claimed, "wants to be free." Nevertheless, people have long sought to control it. One way they have tried to do this is by making it into property--intellectual property. The reading for this class will introduce you to the laws that introduced fundamental types of IP to the English-speaking world. As you read them, consider the extent to which we are still subject to these particular laws.

## **Required Reading**

Statute of Anne [1710] *Source:* Copyrighthistory.com

U.S. Constitution, Article I, Section 8. [1789] *Source:* U.S. Archives

U.S Copyright Act [1790]. *Source:* Cambridge University

An Act to Amend the Several Acts for the Encouragement of Learning [54 Geo III 156] [1814] *Read:*Section IV *Source:* Cambridge University

An Act Concerning Trade Marks and Names. [1863] *Source:* bCourses

An Act to Revise, Consolidate, and Amend the Statutes Relating to Patents and Copyrights [1870] *sRead:* Sections 77-84 *Source:* bCourses