



# how much information?

---

**what kind of question is that?**

**what are its implications?**

**Concepts of Information**

**February 3, 2009**



# production values?

---

## **print and beyond**

"How much new information is created each year ... Newly created information is stored in four *physical media*—print, film, magnetic and optical—and seen or heard in four *information flows through electronic channels*—telephone, radio and TV, and the Internet."

--HMI



# info inferiority

---

"The United States produces about 40% of the world's new stored information, including 33% of the world's new printed information, 30% of the world's new film titles, 40% of the world's information stored on optical media, and about 50% of the information stored on magnetic media."

-HMI



# information in books

---

"If digitized with full formatting, the seventeen million books in the Library of Congress contain about 136 terabytes of information; five exabytes of information is equivalent in size to the information contained in 37,000 new libraries the size of the Library of Congress."

*—HMI*



# outline

---

**what kind of a question?**

**when did we start asking?**

**how much is too much?**

**too much for whom?**



# what kind of question?

---

**"how much information?"**

Google™

2006: 1,430,000

2007 Results 1 - 10 of about 940,000 for "how [much information](#)".

2009 Results 1 - 10 of about 644,000 for "how [much information](#)".



# antecedents & info-anxieties

---



"Ars longa, vita brevis,  
occasio praeceps,  
experimentum periculosum,  
iudicium difficile"

Hippocrates, 460 bc

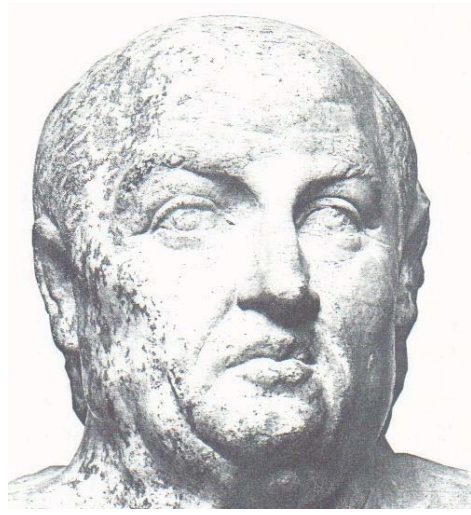


## old fears?

---

"Even for studies, where expenditure is most honorable, [developing libraries] is justifiable only so long as it is kept within bounds. What is the use of having countless books, and libraries whose mere titles their owners can scarcely read through in a whole life time? The mass of them does not instruct but rather burdens the student; and it is much better to surrender yourself to a few authors than to wander through many. Forty thousand books were burned at Alexandria; let someone else praise this library ... as did Titus Livius, who says that it was the most distinguished achievement of the good taste and solicitude of kings. There was no "good taste" or "solicitude" about it, but only learned luxury—no, not even learned, since they had collected the books, not for the sake of learning, but to make a show, just as many who lack even a child's knowledge of letters use books, not as the tools of learning, but as decoration for the dining room."





## old fears?

---

"Even for studies, where expenditure is most honorable, [developing libraries] is justifiable only so long as it is kept within bounds. What is the use of having countless books, and libraries whose mere titles their owners can scarcely read through in a whole life time? The mass of them does not instruct but rather burdens the student; and it is much better to surrender yourself to a few authors than to wander through many. Forty thousand books were burned at Alexandria; let someone else praise this library ... as did Titus Livius, who says that it was the most distinguished achievement of the good taste and solicitude of kings. There was no "good taste" or "solicitude" about it, but only learned luxury—no, not even learned, since they had collected the books, not for the sake of learning, but to make a show, just as many who lack even a child's knowledge of letters use books, not as the tools of learning, but as decoration for the dining room."



Seneca, 4 bc - 65 ad

## old fears?

---

### *De Tranquillitate Animi*

"Even for studies, where expenditure is most honorable, [developing libraries] is justifiable only so long as it is kept within bounds. What is the use of having countless books, and libraries whose mere titles their owners can scarcely read through in a whole life time? The mass of them does not instruct but rather burdens the student; and it is much better to surrender yourself to a few authors than to wander through many. Forty thousand books were burned at Alexandria; let someone else praise this library ... as did Titus Livius, who says that it was the most distinguished achievement of the good taste and solicitude of kings. There was no "good taste" or "solicitude" about it, but only learned luxury—no, not even learned, since they had collected the books, not for the sake of learning, but to make a show, just as many who lack even a child's knowledge of letters use books, not as the tools of learning, but as decoration for the dining room."



# who counts?

---

[The Royal Statistical Society, 1917] predicted  
"an avalanche of statistics ... snowed under  
by ... an infinity of undigested details ... there  
should be a very skilled and very capable  
Department of Government to control the issue ..."

—John Agar, *The Government Machine*

"All claims of this sort have their historical  
specificity, and one must always ask: who has to  
gain from assertions that information is chaotic,  
overwhelming, and out of control? The answer is  
usually found in the expert groups who offered  
solutions."



# who counts?

---

"This year [2006], electronics manufacturers will produce more transistors ... than the world's farmers grow grains of rice ... four years from now, the world's information base will be doubling in size every 11 hours. ... kilobytes .. megabytes ... gigabytes ... terabyte .. petabyte .. exabyte ... zettabyte .. yottabyte"

"... when terabytes turn toxic ... no amount of disks will be enough to soak up the deluge"

"... taming the data beast ... data detox"



# who counts?

---

"This year [2006], electronics manufacturers will produce more transistors ... than the world's farmers grow grains of rice ... four years from now, the world's information base will be doubling in size every 11 hours. ... kilobytes .. megabytes ... gigabytes ... terabyte .. petabyte .. exabyte ... zettabyte .. yottabyte"

"... when terabytes turn toxic ... no amount of disks will be enough to soak up the deluge"

"... taming the data beast ... data detox"



recount?

---

**SUN, Cisco, IBM ...**



# what counts?



## **Alvin Toffler**

"The Quantity of Culture,"

*Fortune*, 1960

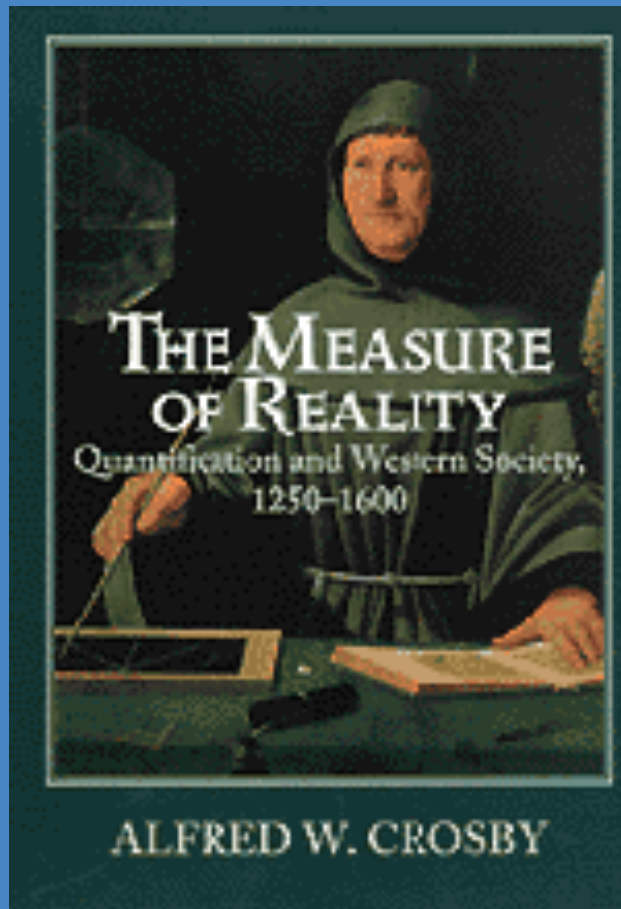
"The United States suffers from an inferiority complex about its culture consumption ... I shall attempt to give a rough idea of the amount of culture consumption in this country."

– *The Culture Consumers*, 1961





# the cult of numbers



Pieter Bruegel the Elder  
*Temperance*, 1560







# start counting

---



**0**

[127,000 books, 1473-1700]



**0**

[1680-1800]



**4**

[150,000 books, 1700-1800]

**1788, 1789, 1795, 1796**

1. **Providence Gazette**, page [2], vol. XI, iss. 2045  
 Publication Date: March 12, 1803  
 Published as: The Providence Gazette  
 Location: Providence, Rhode Island  
 Headline: For the Providence Gazette  
 Article Type: News/Opinion  
[View Article](#) [View Full Page](#)  Add to My Collection

... it appears that a right to the town library  
 may now be obtained at the low price of eight  
 dollars, paid either in silver or gold, or  
 money. I can scarcely conceive how any  
 parent can omit such an opportunity of en-  
 lightening the minds of their children, to lay  
 notice of the substance of...

2. **Hampshire Federalist**, page [1], vol. 8, iss. 117  
 Publication Date: March 31, 1808  
 Published as: Hampshire Federalist  
 Location: Springfield, Massachusetts  
 Headline: [No Headline]  
 Article Type: Legislative  
[View Article](#) [View Full Page](#)  Add to My Collection

of his Constituents, merits the attention of ev-  
 ery friend to his country. If it does not  
 disclose all the information which an anx-  
 ious, and hitherto patient people, could de-

3. **Evening Post**, page [2], iss. 1881  
 Publication Date: April 11, 1808  
 Published as: The New-York Evening Post  
 Location: New York, New York  
 Headline: [No Headline]  
 Article Type: Legislative  
[View Article](#) [View Full Page](#)  Add to My Collection

... and, probably not intended for publica-  
 tion. But in the present agitated state of the  
 public mind, when an ardent desire prevails,  
 of getting information on the subject of our  
 public concerns, from the most various, that  
 friend ventures to lay it before the public,

4. **Portsmouth Journal of Literature and Politics**, page [2], vol. XXXV, iss. 31  
 Publication Date: July 30, 1825  
 Published as: The Portsmouth Journal of Literature & Politics  
 Location: Portsmouth, New Hampshire  
 Headline: Communications: a Map of Busy Life  
 Article Type: News/Opinion  
[View Article](#) [View Full Page](#)  Add to My Collection

to a slight history of my paper after it is left at  
 my door. It is surely a very pleasant thing  
 to see with what avidity a newspaper is  
 sought after, and how much information is  
 imparted to a whole neighborhood by a sin-  
 gle sheet.

5. **Connecticut Courant**, page [1], vol. LXV, iss. 3158  
 Publication Date: August 8, 1825  
 Published as: Connecticut Courant  
 Location: Hartford, Connecticut  
 Headline: From the Portsmouth (N. H.) Journal: "a Map of Busy Life"  
 Article Type: News/Opinion  
[View Article](#) [View Full Page](#)  Add to My Collection

... a slight history of my paper after it is left at my  
 door. It is surely a very pleasant thing to see  
 with what avidity a newspaper is sought after,  
 and how much information is imparted to a whole  
 neighborhood by a single sheet.  
 One of my good neighbors, who is highly re-

6. **Vermont Gazette**, page [2], vol. XVI, iss. 37  
 Publication Date: August 14, 1825  
 Published as: The Vermont Gazette  
 Location: Wrentham, Vermont  
 Headline: From the Portsmouth (N. H.) Journal: "a Map of Busy Life"  
 Article Type: News/Opinion  
[View Article](#) [View Full Page](#)  Add to My Collection

... have a slight history of my paper after  
 it is left at my door. It is surely a  
 very pleasant thing to see how much  
 information is imparted to a whole

7. **Haverhill Gazette**, page [2], vol. VI, iss. 7  
 Publication Date: February 11, 1826  
 Published as: Haverhill Gazette & Essex Patriot  
 Location: Haverhill, Massachusetts  
 Headline: Gazette & Patriot, Haverhill, Feb. 11, 1826  
 Article Type: News/Opinion  
[View Article](#) [View Full Page](#)  Add to My Collection

... with my answer of the 7th November,  
 by order of the Honorable Senate, you  
 will learn, how much information was  
 communicated to me, of the personal  
 merits, services, and benevolence of...

8. **Eastern Argus**, page [1], vol. VI, iss. 630  
 Publication Date: December 17, 1838  
 Published as: Eastern Argus, Semi-Weekly  
 Location: Portland, Maine  
 Headline: From the London Court Journal: Knock at the Door  
 Article Type: News/Opinion  
[View Article](#) [View Full Page](#)  Add to My Collection

... or those who are...  
 torn Laws, to which the  
 or during the hammering-  
 of a delivery, inasmuch  
 as he shall receive  
 ... a prayer...  
 to yawn in compla-  
 cence. The knock-  
 dispenser of morni-

# US news

how much information:

readex  
 8 before 1850  
 0 after 1800

nyt  
 7 1850-1900



# "how much information?"



Books 1 - 10 of 36 on "How much information" date:1450-1800.

Books 11 - 17 of 17 on "How much information" date:1450-1800.



## White Collar Report - Page 258

by Bureau of National Affairs (Washington, D.C.) - [Collective labor agreements](#) - 1789

Out of that \$400 billion that's going to be spent this year, **how much information** do we really have as to where those dollars are going? ...

Snippet view - [About this book](#) - [Add to my shared library](#) - [More editions](#)



## Chemical Abstracts - Page 601

by American Chemical Society, American Chemical Society Chemical Abstracts Service - [Science](#) - 1620

It is shown **how much information** about the spatial-temporal energy flux distribution in a laser beam is necessary in order to calc. multiphoton transition ...

Snippet view - [About this book](#) - [Add to my shared library](#) - [More editions](#)



## Agent Mediated Electronic Commerce II: Towards Next-generation Agent-based ... - Page 43

by Alexandros Moukas, Carles Sierra, Fredrik Ygge, International Joint Conference on Artificial Intelligence 1999

[Computers](#) - 1788 - 238 pages

The customer can control **how much information** about themselves they wish to share with the retailers' agents. Information from any of the shopping ...

Limited preview - [About this book](#) - [Add to my shared library](#)

## INIS Atomindex: INIS Atomindeks

by International Atomic Energy Agency - [Nuclear physics](#) - 1762

Page 3893

Time and effort is being spent on exploring the various compliance options and in determining **how much information** is needed for compliance and what form it ...

No preview available - [About this book](#) - [Add to my shared library](#) - [More editions](#)



## Working Memory and Exploration in Training the Knowledge and Skills Required ..

by Jean L. Dyer, Robin S. Salter, ARMY RESEARCH INST FOR THE BEHAVIORAL AND SOCIAL

U.S. Army Research Institute for the Behavioral and Social Sciences - [Education](#) - 1783 - 132 pag

formula, for instructional designers working with computer-based training



## to the question ...

---

"How many mental pleasures, and how much information should we be deprived of if there was no night?"

*S Sturm, Reflections, Edinburgh, 1788.*

"... how much information he derived from this excellent writer;"

*Jones, Memoirs of...George Horne, London, 1795*

"How much ingenuity might be displayed and how much information communicated by a professor."

*Clarke, Letters to a Student, Boston, 1796*



# "how much information?"

---

"How much information, how much  
consolation, and how much fortitude do you  
afford me at the close of my life."  
Voltaire to Frederick of Prussia, London,  
1789



# "how much information?"

---

"How much information, how much consolation, and how much fortitude do you afford me at the close of my life."  
Voltaire to Frederick of Prussia, London,  
1789

## DE M. DE VOLTAIRE

A Ferney, 6 janvier 1778.

Sire, grand homme, que vous m'instruisez, que vous me consolez, que vous me fortifiez dans toutes mes idées au bout de ma carrière! Votre Majesté, ou plutôt votre humanité a bien raison; le fatras métaphysique, théologique, fanatique, est sans doute ce que nous avons de plus méprisable, et cependant on écrira sur ces chi-



# American examples

---

"How much information may be derived and  
imparted by living long in the world"  
*Palmer, Sermon ... death of Col. McIntosh,*  
1813

"When I consider how much information and  
wisdom I might have acquired, had I  
faithfully improved my advantages, I am  
confounded. O that it may be my great  
endeavor to cultivate and improve my mind,  
and do good to all."  
*Fanny Woodbury, Writings ...*, 1819



# changing the subject?

---

## **trials**

House of Lords, 1788: You have said Mr. Hastings could not have obtained full and complete Information upon the subject?

## **books**

Pinto, 1774: The best book is not that, perhaps, which contains the greatest quantity of information.

James, 1790–98: Whatever difference may be found between the parts of this work of mine already published .. as to the quantity of information ...

Knox, 1790:[Salamasius's works] furnish a great variety and quantity of information.





# another source

---

## reports

[parliament] : the French Treaty was a subject of vast importance that too much information could not be obtained, nor too much deliberation employed ... Very luckily he had looked into the papers ... our exports to Portugal .. one million annually, and our imports thence to five hundred thousand ...

*Times, 1787*

[leader on the blue books] More discretion might undoubtedly be evinced in moving for ... sessional papers, and more judgment and economy in printing them; but ... our most practical check upon existing abuses; and small is the error of giving too much information, in comparison of the guilt of withholding any.

*Times, 1828*



# American angle - similar sources

---

Our legislators have a wonderful propensity for disposing of troublesome questions .. by referring them to a commission ... to investigate and report. It matters not how many times or how thoroughly a subject may have been investigated before, or how much information ... may be already at hand.

*New York Times, 1880, Feb 5, Canal Question*

"Mr. Dudley might be subpoenaed and asked if he was a member of the league," said the Referee, probably not thinking of how much interesting information could be had from Mr. Dudley if he could be brought here ...

*New York Times, 1890, Jan 12, Dudley's Fall from Grace*

The decision to abandon an action against [Admiral Meade] has not been reached, because the inquiry instituted yesterday to ascertain how much information could be obtained for presentation to a court has not been completed.

*New York Times, 1895, May 17, May Escape Disgrace of Trial*



# changing the question

---

## **books: "quantity of information"**

Bond, 1795: By presenting [the reader] with a  
quantity of information

Longworth, *Almanac*, 1799: The Register will  
be found to contain double the quantity of  
information ever before inserted in it.

*Historical Magazine*, 1799:

Johnson's *Journey to the Western Islands* ..  
does not admit of abridgement, because every  
sentence compresses such a quantity of  
information.



# the press

---

## quantifying information

***Times*** (London)

1784 -1900: **43**

7 ads (dictionaries, grammars, atlases);

25 books (reviews), newspapers, reports;

7 education;

1 telegraph;

1 trade statistics,



# NEW PUBLICATIONS.

READY THIS DAY.

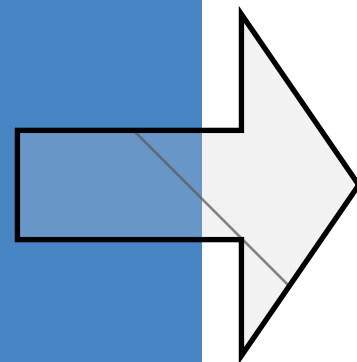
**GREELEY'S TRAVELS IN EUROPE.—GLANCE AT GREAT EUROPE:** In a series of Letters from GREAT BRITAIN, FRANCE, ITALY, &c. By HORACE GREELEY. Octavo, cloth; price, one dollar. This volume comprises the observations made during Mr. Greeley's recent European tour, on Society, Manners and Customs, Art, Literature, Agriculture, Foreign Politics, and a great variety of other attractive and exciting topics.

It has copious notices of the Great Exhibition or World's Fair in London; complete descriptions of the Cultivation of the Soil in different countries; brilliant Criticisms of the Works of Art in the great European Capitals; and graphic sketches of Public and Domestic Life in London, Paris, Rome, &c., written in the frank, straightforward, piquant style for which Mr. Greeley is widely celebrated.

A more authentic, instructive, and amusing Book of Travels has probably never been issued from the American press. The vast amount of information which it contains is presented in such a lively and off-hand manner that the perusal of the volume becomes as interesting as a novel.

Whoever would obtain a fresh, Daguerreotype view of the present state of England, should not fail to make himself acquainted with its contents. Even the discussion of the driest topics, which it sometimes takes up, is enlivened with such frequent flashes of humor, and pervaded with such genial and sparkling vivacity, that no one who commences the volume can lay it down without finishing its perusal.

We confidently anticipate a very extensive circulation for this work throughout the United States. The name of





# Times (1851)

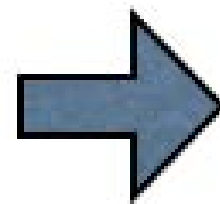
---

## NOTICES OF NEW PUBLICATIONS.

---

The Overland Expedition in Search of Sir JOHN FRANKLIN is, perhaps, as deeply interesting as any marine effort. Sir JOHN RICHARDSON set out from Quebec early in the Summer of 1848, and traversing all that wild region stretching between the Lakes and the Arctic Sea, explored the shores of those gelid waters in pursuit of the long lost voyager. While he was unsuccessful in his main object, yet the journey was exceedingly profitable in other ways; and those who read Sir JOHN'S "ARCTIC SEARCHING EXPEDITION," as issued by the HARRERS, will be grateful for the immense amount of information respecting the nations, languages, climate and other peculiarities of those elevated latitudes. The appendix might serve separately for a geography of the British Possessions, so complete and methodical are the matter and arrangement.

---

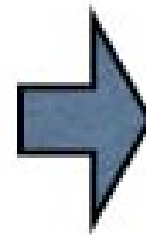




## more useful

**THE TIMES RECIPES.** Information for the Household. Reprinted by Authorization and Carefully Revised and Indexed from THE NEW-YORK TIMES. New-York: THE AMERICAN NEWS COMPANY. 1876.

The great popularity of the " Household " column of the Sunday edition of THE TIMES,



found useful in all. The recipes have come from all directions, some from the inmost recesses of our large cities, some from remote spots in the country, whence they could never have been hunted out for the benefit of the public at large, except through the medium of THE TIMES. It proves, in fact, how much useful information lies hidden away in isolated places, but ready to be spread abroad directly the opportunity for utilizing it arises. And while the Household Column of our paper testifies further to the same fact by its continuous wealth of useful hints upon a wide variety of topics, we are assured that this reissue must prove a very acceptable aid to families, in many of which it will be not less appreciated in because offered to them at a moderate price.





REPORTERS NOT SPIES.—The *Liverpool Times*, in an article upon the subject of the employment of newspaper reporters in the late Government prosecutions in Ireland, has the following remarks, which, in justice to a gentleman whose great services have not always been so handsomely acknowledged by a portion of the press, we have much pleasure in extracting:—"All parties have joined in bearing witness to the skill, impartiality, and great public usefulness of the reporter of the *London Times* during the recent disturbances in South Wales. He went everywhere, reported everything, and discharged his duties with so much fairness, that nothing was concealed from him, so that the Government obtained infinitely more useful information by his letters than from the inquiries of its own Commission. We should like to know how much information he would have been able to obtain, if it had been even suspected that he had received a 50*l.* note from Sir James Graham before leaving London, or that he was collecting evidence with the intention of going into the witness-box to prove the guilt of those with whom he was living on friendly terms? Can there be a doubt that

"how much" again

THE  TIMES

1844

Mr. VILLIERS said, that if any doubt existed as to the importance of a little care and caution in legislating upon matters of this kind, an argument would be afforded by the speech of the hon. gentleman who had just said that his mind was made up, and that the mind of the country was made up, and therefore he was quite prepared to legislate for this purpose; and the hon. gentleman followed that up by saying,—“You gentlemen attach too much importance to this foreign trade. You don't know how many persons are employed in it; 400,000 only, taking your silk, flax, cotton, and all the rest of the branches together.” (Hear.) That statement showed how much information upon this subject was possessed by certainly not one of the youngest members of that house.





# weighing information

---

[on newspaper tax]"*The Times* weighs generally more than four ounces ... this measure would [for taxing newspapers] would affect *The Times*, while the other morning papers would be allowed to go freer ... *The Times*, because it gave too much information to the country, ... would be obliged to pay more."

*Times*, 1855



# not too much

---

[leader, on the need for ]: calm investigation ...

For .. it is impossible to have too much information as to the social and economical relations of that agricultural population."

*Times*, 1880

"The public, however, cannot have too much information at a crisis like this .. useful to give some account of the further Egyptian papers just issued."

*Times*, 1882

"If the government had erred at all, it has been in giving too much information."

*Times*, 1885



# too much information

---

[re commerce and transatlantic cable]: "Every new ground of information, every earlier access to information .. is an addition to the trial and work of commercial life. Time was when a merchant in Liverpool or Glasgow received his business letters in a morning... then came the electric telegraph, which pursued him even into his evening circle ... evidence of **overtaxed** heads .. men have already more material of calculation than they can use .... A man may easily have too much information – more than he can manage—one part of it modifying and qualifying another, till he does not know where he stands. But though every fresh addition, every earlier access to data is a trial of feeble, it constitutes the triumph of strong heads. They exult in the largeness, the multiplicity, the intricacy of their field of intelligence."

*Times*, 1866



in sum

**courts**

**politics**

**books**

**newspapers**

**commerce**



## spreading anxiety

---

**Too Much Information.**

**From The New-York Weekly.**

**Jinks—How did you come to lose so much money on the races?**

**Winks—Got too many tips before I started.**



## Times (1852)

---

poses. So in other circles. FITZ-ROY CUNNINGHAM, Esquire, a shrewd and clear-headed merchant, who has acquired princely wealth without education, has made himself generally intelligent, and has acquired an immense amount of information regarding nearly everything in the world, has little respect for science or learning; unless, indeed, he may stand at the head of the Board of Trustees and contrive with his brethren to get out of the Faculty the maximum of work at the minimum of salary. [Laughter.] As a general



# education and information

---

[Aberdeen]: As has been pointed out lately by the President of a sister university, the essential purpose of the college course should not be so much to see how much information or learning can be stored into a young man's mind ... rather that these years should be fruitful in thought, culture, and mind-building.

*New York Times*, 1897,  
Birthday of Princeton ... Earl of Aberdeen Honored



# education and information

---

[London school board investigation into exams]: many answers show that the candidates do not understand the meaning of the phrases they use, and that too much information and too long words ... still choke children, or impair their mental digestion."

*Times*, 1886





## too much

---

[Balfour, On the pleasures of reading]: "'an impotent voracity for desultory information... incessant accumulation of fresh books' I am never tempted to regret that Gutenberg was born .... though the 'cataract of printed stuff' should flow and still flow. Has miscellaneous reading the dreadful consequences which Mr. Harrison depicts? ... the intellect being 'gorged and enfeebled" by the absorption of too much information expresses, no doubt with great vigour, an analogy, for which there is high authority, between the human mind and the human stomach ... analogy which may be pressed too far. I have often heard of the individual whose excellent natural gifts have been so overloaded with huge masses of undigested and indigestible learning ... no chance of healthy development. But though I have often heard ... I have never met him." – Times, 1887



## brahmin worries

---

"Intellectual culture consists, not chiefly, as many are apt to think, in accumulating information, though that is important, but in building up a force of thought which may be turned at will on any subjects, on which we are called to pass judgment."

--William Channing, 1838

"It may well be questioned whether the invention of printing, while it democratized information, has not so levelled the ancient aristocracy of thought"

--James Lowell, 1893



wrap

**enduring worries**

**enthusiasm / despair**

**creating problems / solving problems**

**what value 'a man of information'?**