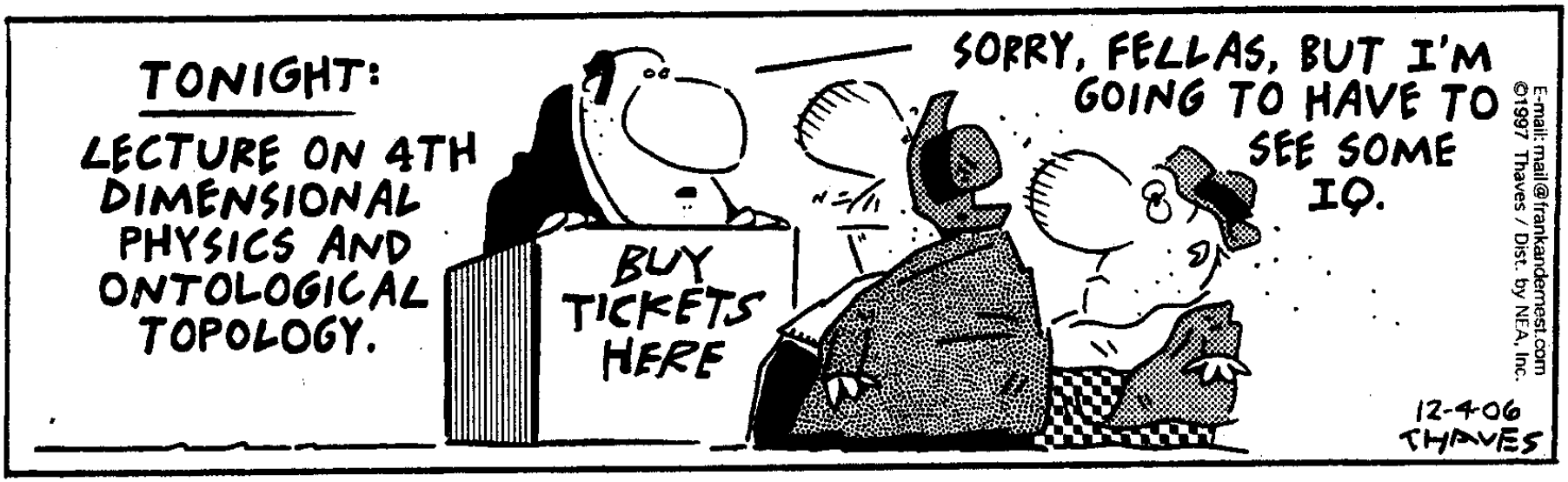
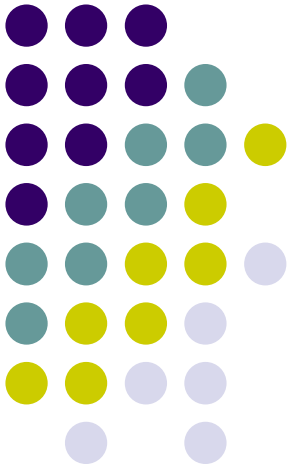
FRANK & ERNEST by Bob Thaves



The Other IQ:

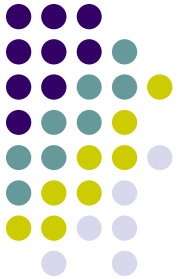
Historiometric Assessments of Intelligence



Overview

- Historiometric Measurement
- Two Major Measurement Traditions
  - Intelligence Scored from Personality Profiles
  - Intelligence Scored from Developmental Histories
- Two Minor Measurement Traditions
  - “Intelligence” Scored from Content Analyses
  - “Intelligence” Scored from Expert Surveys
- Integrative Illustration: US Presidents
- Conclusions

Historiometric Measurement



- Adolphe Quetelet (1796-1874)
- Francis Galton (1822-1911)
- James McKeen Cattell (1860-1944)
- Frederick A. Woods (1873-1939)

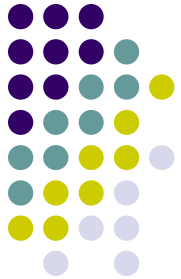
Adolphe Quetelet (1796-1874)

- Belgian mathematician and physicist
- The landmark 1835 *Treatise on Man*
  - Founded “social statistics”
    - The “normal curve” of individual differences
    - The concept of the “average person” (*l'homme moyen*)
  - Conducted first application of statistical analysis to historical data to examine a psychological question
    - age and output in eminent playwrights
    - The first bona fide historiometric study

Francis Galton (1822-1911)

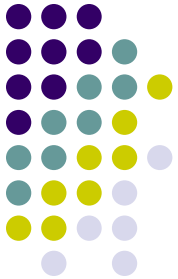
- English scientist, inventor, and explorer
- His 1869 *Hereditary Genius*
  - General intelligence ("natural ability") is
    - distributed according to the normal curve,
    - biologically inherited (nature, not nurture), and
    - manifested in eminence (genius as reputation)
  - Historiometric analysis (pedigree method)
- His anthropometric laboratory: The "first intelligence tests"

James McKeen Cattell (1860-1944)



- Psychologist, Publisher, and Editor
- Student and admirer of Francis Galton
- Three relevant contributions:
  - 1890: Concept of “mental tests”
  - 1901: (In)validation of Galton’s measures (Wissler)
  - 1903: Historiometric assessment of eminence
- Editorship of *Science* (1894-1944)
  - Eventually to become official AAAS journal (1900)
  - Early vehicle for publication of historiometric research
    - Especially papers and notes by Cattell and Frederick Woods

Frederick A. Woods (1873-?)



- MIT geneticist and embryologist
- Two *Science* articles defining the method
  - "A new name for a new science" (1909)
    - Historiometry: "the facts of history of a personal nature have been subjected to statistical analysis by some more or less objective method"
    - Provides extensive bibliography of examples (including Galton, Candolle, and Cattell)
  - "Historiometry as an exact science" (1911): specific problem of eminence assessment

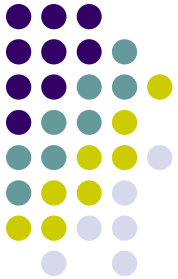
Frederick A. Woods

- Plus two books:
  - *Mental and Moral Heredity in Royalty: A Statistical Study in History and Psychology* (1906) – the first historiometric assessment of intelligence ("intellect")
  - *The Influence of Monarchs: Steps in a New Science of History* (1913) – the first historiometric analysis of correlation between a psychological variable ("leadership") and overt achievement (across 12 nations, *r*'s= .60-.70)

Frederick A. Woods

- The 1906 study extends Galton (1869):
  - Pedigree method applied to European royal families rather than those who “achieved eminence”
  - Psychological characteristics directly assessed from biographical data instead of inferred (from eminence)
    - The mental trait “intellect”
    - The moral trait “virtue” or “morality”
  - Assessed on a normally distributed 10-point scale
  - Estimated correlation between the two traits (r = .40)
  - Hence, launched the first major historiometric assessment tradition …

Intelligence Scored from Personality Profiles



- Edward L. Thorndike (1874-1949)
  - Many well-known psychometric contributions, including intelligence assessment (e.g., *The Measurement of Intelligence,* 1927)
  - Two little-known historiometric contributions:
    - "The relation between intellect and morality in rulers" (*American Journal of Sociology*, 1936)
    - "Traits of personality and their intercorrelations as shown in biographies" (*Journal of Educational Psychology*, 1950)

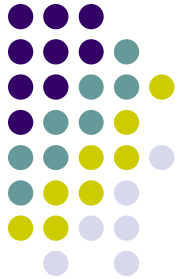
Edward L. Thorndike

- The early 1936 *AJS* study:
  - Replication of Woods (1906) for 305 male members of European royal families
  - Again used 10-point scale and biographical data, but introduced independent raters (including Maslow!)
  - He obtained a correlation of .60 between intellect and morality, and argued that
  - “the removal of errors of general inaccuracy and inadequacy would raise this, but the removal of ‘halo’ errors would lower it” (top intellects Frederick the Great, William the Silent, and Gustavus Adolphus)

Edward L. Thorndike

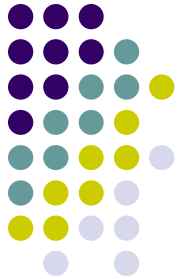
- The posthumous 1950 *JEP* study:
  - 91 eminent leaders and creators
  - Using biographical data rated on 48 traits using on -3 to +3 scale (with half points)
  - Traits included “intelligence,” “curiosity,” “liking for art, music, beauty,” etc.
  - Published the raw scores
  - Calculated correlation matrix and conducted preliminary analyses (e.g., military leaders vs. scientists)

Two Follow-ups to Thorndike's 1950 study



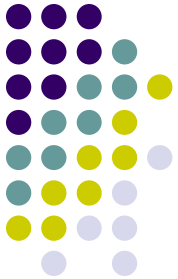
- Knapp (1962 *JSP*): 4 factors:
  - (a) sanguiness versus melancholic introversion,
  - (b) ordered industriousness versus emotionality,
  - (c) aggressiveness, and
  - (d) intellectual sensitivity

Two Follow-ups to Thorndike's 1950 study



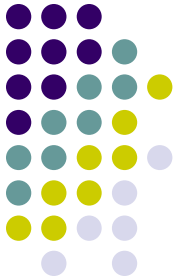
- Simonton (1991 *CRJ*):
  - Intelligence factor defined by following traits: sensitiveness (.72), intelligence (.67), liking for words (.57), liking for art, music, beauty (.51), liking for reading (.50), and liking for things (.43) (alpha reliability .70)
  - Intelligence factor correlated .35 with an 8-item eminence measure (alpha reliability .86)
  - Multiple regression: eminence predicted by intelligence (.27) and aggressiveness (.19)

Intelligence Scored from Personality Profiles



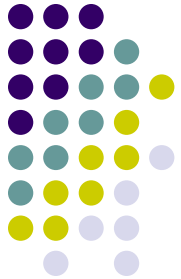
- Political leadership studies
  - European Absolute Monarchs
  - United States Presidents

European Absolute Monarchs



- Simonton (1983 *JPSP*): 342 monarchs
  - Eminence from 13-item composite (.90)
  - Leadership from Woods (1913)
  - Intelligence and morality from Woods (1906)
  - Missing intellect values estimated from independent ratings of able, intelligent, shrewd, and educated (R^2 = .57)
  - Intelligence correlated with morality (.23), leadership (.67), and eminence (.32)

United States Presidents

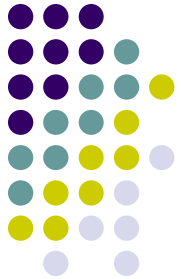


- Simonton (1986 *JPSP*): 36 presidents
  - Abstracted personality sketches (identity removed; random order)
  - Independent raters score presidents on 300 ACL items; 110 reliable items
  - Factor analysis yields 14 factors, including
  - Intellectual Brilliance: interests wide (.85), artistic (.84), inventive (.76), curious (.74), intelligent (.64), sophisticated (.62), complicated (.61), insightful (.54), wise (.46), idealistic (.43), but not dull (-.71) or commonplace (-.41)
  - Internal-consistency reliability is .90

United States Presidents

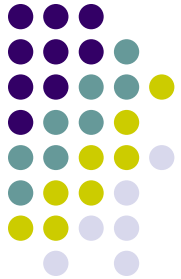
- Simonton (1986 *JPSP*):
  - Intellectual Brilliance correlates .59 with presidential greatness according to the results from a survey of 846 experts
  - Its standardized partial regression coefficient in a 6-variable equation (containing 5 situational predictors) is .26 (R^2 = .82)
  - Correlates .47 with a Creativity assessment based on Q-sort items applied to the same sketches by different judges (Simonton, 1988)

Intelligence Scored from Personality Profiles



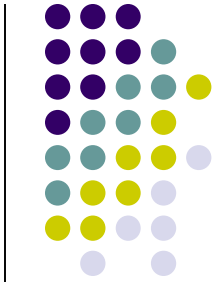
- Problem:
  - How can these intelligence scores be compared with the general population when most scores are defined in terms of a highly select population?
  - Certainly the least intelligent president is above the mean in general intelligence!

Intelligence Scored from Personality Profiles



- Solutions:
  - Adapt an established psychometric instrument for application to the personality profiles
    - R. B. Cattell's (1963) application of the 16 PF to eminent scientists (i.e., B+ = abstract-thinking, more intelligent, bright, higher general mental capacity, fast learner)
  - Adapt an established psychometric instrument for application to a different data source, namely, developmental histories
    - Hence …

Intelligence Scored from Developmental Histories



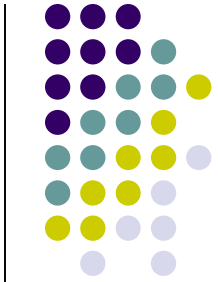
- Historical Context:
  - Binet-Simon (1905): intelligence test
  - Stern (1912): IQ = 100 x MA/CA
  - Lewis M. Terman:
    - Develops the revised Stanford-Binet (1916)
    - Estimates Francis Galton's IQ (1917)

Written to his older sister Adèle before his 5th birthday:

“I am 4 years old and I can read any English book. I can say all the Latin Substantives and Adjectives and active verbs besides 52 lines of Latin poetry. I can cast up any sum in addition and can multiply by 2, 3, 4, 5, 6, 7, 8, [9], 10, [11].
I can also say the pence table. I read French a little and I know the clock.

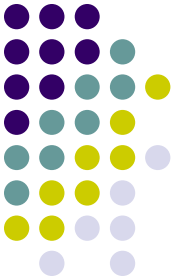
Francis Galton, Febuary 15, 1827”

Intelligence Scored from Developmental Histories



- Historical Context:
  - Terman:
    - Begins longitudinal study of “Termites” (1921)
    - Publishes
      - Volume 1 of *Genetic Studies of Genius* (1925)
      - Volume 2 of *Genetic Studies of Genius* (1926)

Catharine Cox's (1926) *Early Mental Traits of Three Hundred Geniuses*

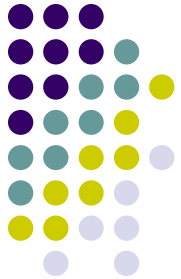


- Sample: The most eminent creators and leaders on Cattell's (1903) list subject to certain restrictions
- Data: Extensive chronologies of intellectual accomplishments in childhood and adolescence

J. S. Mill

- 3: he began to learn Greek; studied the Greek classics until 9, reading Plato at 7
- 5: discussed the comparative merits of Marlborough and Wellington with Lady Spencer
- 6½: wrote a history of Rome
- 8: began Latin, reading Latin writers before 9
- 8: also began geometry and algebra
- 9: began conic sections, spherics, and Newton's arithmetic
- 11: began fluxions (calculus)
- 11: wrote a synoptic table of Aristotle's *Rhetoric*
- 12: did philosophy and logic, and at 13 political economy
- 14: read French writers
- 16: began the study of the law

Catharine Cox

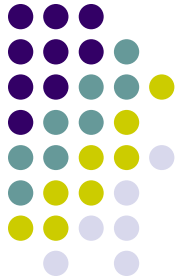


- Measure:
  - Using 4 independent judges (including Terman and Florence Goodenough!)
  - obtained IQ estimates based on MA/CA
    - early/late (i.e., 0-17/17-26): IQ I and IQ II
    - uncorrected/corrected (viz. for reliability): IQ U and IQ C
- Validation: Correlation with Cattell's (1903) ranked eminence measure:
  - Zero-order .25 (IQ I U)
  - First-order partial .16 (controlling for reliability)

Three Follow-Up Studies

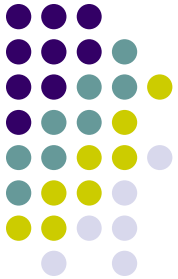
- Simonton: “Biographical determinants of achieved eminence: A multivariate approach to the Cox data” (*JPSP*, 1976)
- Walberg, Rasher, & Hase: “IQ correlates with high eminence” (*GCQ*, 1978)
- Simonton: “Childhood giftedness and adulthood genius: A historiometric analysis of 291 eminent African Americans” (*GCQ*, in press)

Two Minor Measurement Traditions



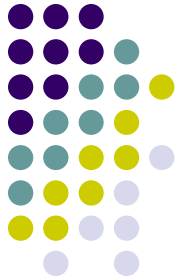
- “Intelligence” Scored from Content Analyses
  - Integrative complexity (Suedfeld, Tetlock, etc.)
    - e.g. IC correlates .59 with presidential greatness
- “Intelligence” Scored from Expert Surveys
  - Openness to experience (Rubenzer & Faschingbauer (2004)
    - e.g. O correlates .32 with presidential greatness

Integrative Illustration: US Presidents



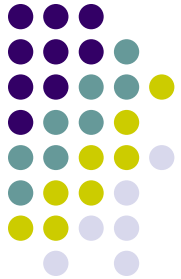
- Series of studies since 1986:
  - Simonton (1988, *JPSP*)
  - Simonton (1991, *Presidential Studies Quarterly*)
  - Simonton (2001, *Journal of Social Psychology*)
  - Simonton (2002, *Advances in Psychology Research*)
- All replicating the same 6-predictor equation even when introducing new measures of presidential performance (the betas for Intellectual Brilliance always .20-.30)

Integrative Illustration: US Presidents



- Although Intellectual Brilliance has the most available scores (*n* = 39), it is a *z*-score standardized to the mean of US presidents
- Openness to experience is an alternative predictor – and O is scaled relative to the general population (0-100) – but has many more missing values (*n* = 32)
- IQ is the most interpretable relative to the general population, but has the fewest available scores (*n* = 8)

Integrative Illustration: US Presidents



- Assuming that the variables share sufficient variance, we can impute scores for those cases lacking data on one or two of the three variables (using the EM algorithm)
- The imputed IQ scores will provide easily interpreted interval estimates
- The three types of historiometric assessments can also be validated against presidential performance

Table 3. Pearson Product-Moment Correlations among Original Measures

Variable	1	2	3	4	5
1. Intellectual brilliance					
2. Openness	.69				
3. IQ I-U	.71	.74			
4. IQ I-C	.82	.92	.84		
5. IQ II-U	.72	.80	.94	.92	
6. IQ II-C	.70	.81	.81	.94	.89

Note. All correlations are significant at the $p < .05$ level or better except for that between Intellectual Brilliance and IQ II-C ($p = .054$).

Table 4. Statistics and Leader Performance Correlations (rs) for Measures with Imputed Values (N = 42)

			IQ estimates			
President	Intellectual brilliance	Openness	I-U	I-C	II-U	II-C
Minimum	−2.0	0.0	107.8	115.0	125.0	130.0
Maximum	3.1	99.1	165.0	170.0	165.0	175.0
M	−0.0	33.4	121.0	134.4	136.0	146.8
SD	1.0	29.6	10.9	12.5	7.6	8.3
r	.56	.34	.34	.35	.32	.31

Note. The *r*s are Pearson product-moment correlation coefficients. All coefficients except the last are significant at the $p < .05$ level, and for the last ($p = .054$). The correlation for Intellectual Brilliance is significant at the $p < .001$ level.

N.B.: If the variables are each given the opportunity to enter the 6-variable prediction equation (with administration duration, war years, scandal, assassination, and war hero), Intellectual Brilliance emerges as the only statistically significant predictor, with a standardized partial regression coefficient of .29 (vs. .19 for the others)

Additional Validation

Alternative Intelligence Measures	Thorndike Intelligence	Integrative Complexity
Intellectual Brilliance	.89	.59
Openness to Experience	.84	.58
IQ (all four estimates)	.84	.58
n	9	11*

* Includes the current incumbent

Table 1. Original and Imputed Scores for 42 Presidents

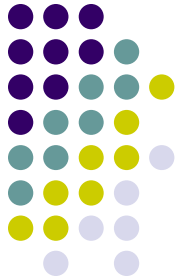
President	Intellectual brilliance	Openness	IQ estimates			
			I-U	I-C	II-U	II-C
Washington	**0.3**	**14.0**	**125.0**	**130.0**	**135.0**	**140.0**
J. Adams	**0.6**	**61.0**	**120.0**	**150.0**	**145.0**	**155.0**
Jefferson	**3.1**	**99.1**	**145.0**	**160.0**	**150.0**	**160.0**
Madison	**0.6**	**62.0**	**120.0**	**150.0**	**135.0**	**160.0**
Monroe	**−1.4**	3.7	109.0	120.7	128.2	138.6
J. Q. Adams	**1.2**	**98.0**	**165.0**	**170.0**	**165.0**	**175.0**
Jackson	**−0.6**	**0.5**	**110.0**	**120.0**	**130.0**	**145.0**
Van Buren	**−0.3**	**31.0**	119.4	132.9	135.1	146.0
W. Harrison	**−0.1**	**31.5**	120.3	133.6	135.5	146.3
Tyler	**0.2**	37.9	122.9	136.6	137.2	148.1
Polk	**−0.6**	**21.0**	116.0	128.7	132.7	143.4
Taylor	**−1.2**	9.0	110.8	122.7	129.3	139.8
Fillmore	**−0.7**	**46.0**	120.8	136.7	137.4	149.0
Pierce	**−0.3**	**37.0**	120.6	134.8	136.3	147.4
Buchanan	**−0.8**	**5.0**	111.9	122.8	129.4	139.6
Lincoln	**0.8**	**95.0**	**125.0**	**145.0**	**140.0**	**150.0**
A. Johnson	**−1.2**	8.0	110.8	122.7	129.3	139.8
Grant	**−1.4**	**2.3**	**110.0**	**115.0**	**125.0**	**130.0**
Hayes	**−0.1**	31.5	120.3	133.6	135.5	146.3
Garfield	**0.9**	52.9	129.0	143.5	141.2	152.3
Arthur	**0.9**	52.9	129.0	143.5	141.2	152.3
Cleveland	**−0.5**	23.0	116.9	129.6	133.3	144.0
B. Harrison	**−0.7**	**30.0**	117.5	131.4	134.3	145.4
McKinley	**−0.6**	20.8	116.0	128.6	132.7	143.4

T. Roosevelt	**0.9**	**56.0**	129.7	144.6	141.8	153.0
Taft	**0.0**	**1.0**	114.5	123.8	129.8	139.5
Wilson	**1.3**	**64.0**	133.0	148.3	143.9	155.2
Harding	**−2.0**	**10.0**	107.8	121.1	128.4	139.9
Coolidge	**−1.5**	**17.0**	111.4	124.8	130.6	141.6
Hoover	**0.5**	**8.0**	118.0	127.5	132.0	141.6
F. Roosevelt	**0.9**	**45.0**	127.4	140.9	139.7	150.5
Truman	**0.2**	**1.7**	115.5	124.6	130.3	139.8
Eisenhower	**−0.7**	**29.0**	117.3	131.1	134.1	145.1
Kennedy	**1.8**	**82.0**	138.9	155.7	148.2	159.8
L. Johnson	**−0.2**	**7.0**	114.8	125.2	130.7	140.6
Nixon	**0.4**	**14.0**	118.9	129.2	133.0	142.9
Ford	**−0.6**	**8.0**	113.3	124.4	130.2	140.4
Carter	**0.0**	**77.0**	130.2	149.0	144.4	156.8
Reagan	**0.4**	**10.0**	118.0	127.9	132.2	141.9
G. H. W. Bush	−0.3	**18.0**	116.5	128.4	132.6	143.0
Clinton	1.0	**82.0**	135.6	153.6	147.0	159.0
G. W. Bush	−0.7	**0.0**	111.1	121.4	128.5	138.5

N.B.: Although G. W. Bush's imputed scores for Intellectual Brilliance and the IQ estimates depends solely on his extremely low score on Openness, the latter score fits his score on Integrative Complexity – the lowest of any scored US president.

Conclusions

- *Historical*: The development of historiometric measures of intelligence often ran in parallel with psychometric measures, the developments frequently involving the same or related persons
- *Substantive*: The conclusions drawn from historiometric measures are very close to those drawn from psychometric measures (e.g., intelligence and leadership: ~ .25, i.e., one *SD* increase yields ¼ SD increment)



Thanks!

Any Questions?

“a genius” “complex man” “passion to exhaust a subject before he could say he knew it was a matter of unshakable integrity” “extraordinarily intuitive and speculative nature, reacting with the utmost sensitivity to experience” “esthetic side” “not only an artist; he was even somewhat Bohemian” “artist-scholastic” “His interests seem to have covered everything except metaphysics and such physical recreation as...sports; he was as talented as Leonardo da Vinci” “most civilized man” “Master of any talent or profession to which he turned his hand,” “achieve[d] success as lawyer, farmer, philosopher, writer, architect, scientist, musician, and inventor” “had an abundance of talents and interests” “a skillful architect, an accomplished violinist, an ingenious inventor, a competent scientist, a serious student of religion, and an expert on agricultural methods” “a sound classical education” “intellectual drive” “a skilled legal craftsman, a scholar who drew on his comprehensive knowledge of law and history”

“He was an extraordinarily learned man, and the range of his knowledge and inquiry is scarcely credible in the modern age of specialization. He knew Latin, Greek, French, Spanish, Italian, and Anglo-Saxon and concerned himself with such questions as the difference between the ancient and modern pronunciation of Greek. At the age of 71 he tackled Plato’s *Republic* in the original and found its author greatly overrated. He attempted an analysis of the New Testament in order to discover what Jesus really said as distinguished from what he reported to have said. He enjoyed the study of mathematics and found its precision and certitude a welcome relief from the untidiness of politics and government. He was an ardent student of the natural sciences...and sometimes contributed time and money to progress in these fields. The discovery of fossil remains in various parts of the country fascinated him, and he tried to collect and classify as many as he could.”

“While he was abroad, he sent back to his friends at home various mechanical and scientific gadgets produced in Europe” “His travel notes record impressions ranging from nearly ecstatic admiration of architectural movements to sober economic analysis of the reasons for the differences in prosperity between regions producing white and red wine” “He was an enthusiastic practitioner of scientific farming, conducted numerous experiments..., was always on the lookout for some new plant or seed..., and kept meticulous meteorological records. His interest in architecture was intense and enduring” “farmer, lawyer, family man, statesman, scientist, architect, linguist, philosopher, inventor, amateur musician”