Great Psychologists

The Scientific Analysis of Psychology's Past and Present to Predict and Control Its Future

Outline

- **The Scientific History of Psychology**
- **Output and Impact**
- **Individual Characteristics**
- **Developmental Correlates**
- **Sociocultural Context**
- **Implications**

THE SCIENTIFIC HISTORY OF PSYCHOLOGY

- **The History of Psychology**
    - ❑ **Eminence in Psychology**
    - ❑ **Eponyms in Psychology**

Representative Eponyms in the History of Psychology

Schools – Aristotelian, Cartesian, Comptian, Hegelian, Kantian, Machian, Marxist, Platonist, Thomist, Watsonian; ***Therapeutics*** – Adlerian, Bernheim's, Freudian, Jungian, Pinel's system, Rankian, Reichian, Rogerian; ***Theories*** – Cannon-Bard, Darwinian, Hebb's, Heider's, Hering's, James-Lange, Ladd-Franklin, Lamarckian, Malthusian, Thurstone's, Young-Helmholtz; ***Laws*** – Bell-Magendie, Donder's, Emmert's, Fechner's, Galton's, Heinis, Mendel's, Müller-Schumann, Ribot's, Steven's, Weber, Yerkes-Dodson, Zipf's; ***Syndromes*** – Brown-Séquard, Down's, Klinefelter's, Korsakoff's, Selye's, Tourette; ***Diseases*** – Alzheimer's, Charcot's, Daltonism, Janet's, Parkinson's; ***Symptoms*** – Broca's aphasia, Charcot's triad, Wernicke's agnosia; ***Neuroanatomy*** – Bekherev nucleus, Bell's circle of nerves, Golgi apparatus, Purkinje cell; ***Phenomena*** – Aubert, Féré, Köhler-Restorff; ***Effects*** – Brewster, Broadbent, Brücke, Garcia, Gibson, Greenspoon, Rosenthal, Stroop, Zeigarnik; ***Illusions*** – Aristotle's, Ebbinghaus, Hering, Jastrow, Müller-Lyer, Ponzo, Wundt; ***Figures*** – Ebbinghaus, Lissajou's, Purkinje, Rubin's; ***Reflexes*** – Babinski, Darwinian, Moro; ***Triangles*** – Hellwag's, Helmholtz, Koenig, Maxwell's, Pascal's; ***Scales*** – Bayley, Guttman, Likert, Oseretsky, Thorndike's, Thurstone, Wechsler-Bellevue; ***Experiments*** – Cannon-Washburn, Fechner's, Franklin, Stratton's;

Tests – Bárány, Bender, Goodenough, Fourier's, Henmon-Nelson, Jung, McNemar, Otis, Rorschach, Stanford-Binet, Torrance, Turing, Vygotsky; ***Measurement units*** – angstrom, Celsius, decibel, Fahrenheit, hertz, Kelvin, ohm, volt; ***Curves*** – Ebbinghaus, Gaussian, Gompertz, Laplacean, Vincent; ***Techniques*** – Aubert diaphragm, Dunlap chronoscope, Erdmann-Dodge tachistoscope, Galton's whistle, galvanometer, Gesell observation dome, Jastrow cylinders, Koenig cylinders, Lashley's jumping stand, Luria technique, Seashore's audiometer, Skinner box, Thorndike's puzzle box, Wundt gravity phonometer, Yerkes-Watson discrimination apparatus; ***Statistics*** – Bayes' theorem, Bernoulli trials, Cronbach's alpha, Fisher distribution, Pearsonian correlation, Poisson distribution, Spearman's *g*; ***Mathematics*** – Boolean algrebra, Fourier's law, Markov process, Shannon-Wiener information measure; ***Paradoxes*** –Fechner's, Leonardo's, Lord's, Zeno's; ***Miscellaneous*** – Ames demonstration, Asch situation, Bekhterev's nystagmus, Berger rhythm, Brunswik ratio, Buridan's ass, Freudian slip, Galenic temperaments, Hering's afterimage, Ishihara plates, Jungian typology, Kraepelin's classification, Lloyd Morgan's canon, mesmerism, Montessori method, Newton's color circle, Occam's razor, Pavlovian conditioning, Purkinje afterimage, statue of Condillac, Titchener's circles.

THE SCIENTIFIC HISTORY OF PSYCHOLOGY

- **The History of Psychology**
  - **Eminence in Psychology**
  - **Eponyms in Psychology**
- **The Psychology of Science**
  - **The Metasciences**
  - **The Psychology of Scientific Eminence**

THE SCIENTIFIC HISTORY OF PSYCHOLOGY

- **Their Integration**
  - *Main Methodological Approaches*
    - **Psychometric Studies of Contemporary Great Psychologists (still living)**
    - **Historiometric Studies of Historical Great Psychologists (mostly deceased)**
  - *Key Substantive Issues*
    - **Genius and Zeitgeist as Causal Agents (individual versus situational factors)**
      - **Genius – Nature vs. Nurture Factors**
      - **Zeitgeist – Internal vs. External Influences**

OUTPUT AND IMPACT

- **Individual Differences**
- **Longitudinal Changes in Creativity**
- **The Creative Product in Psychology**
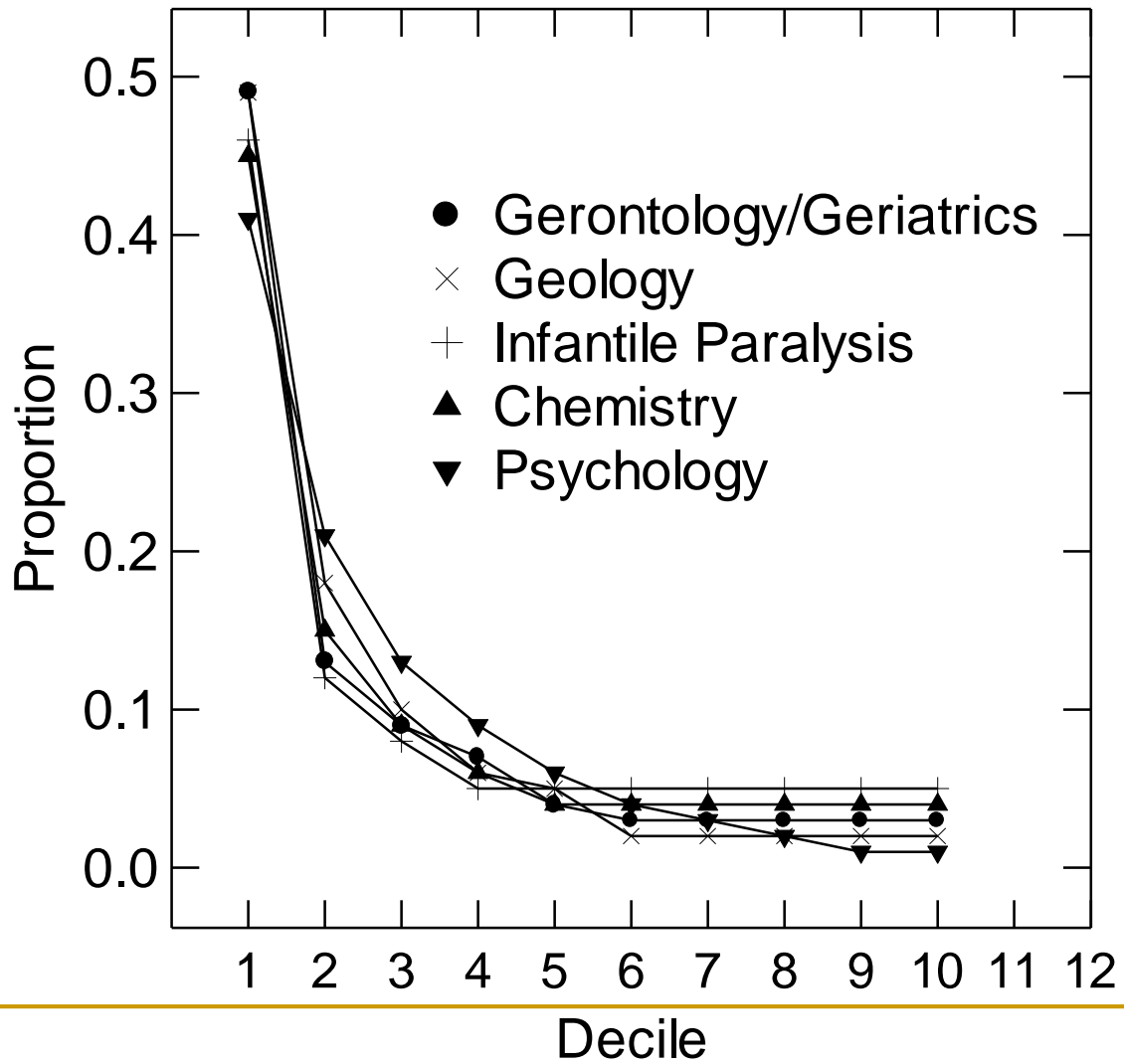
Individual Differences: Productivity

- **Variation and Distribution**

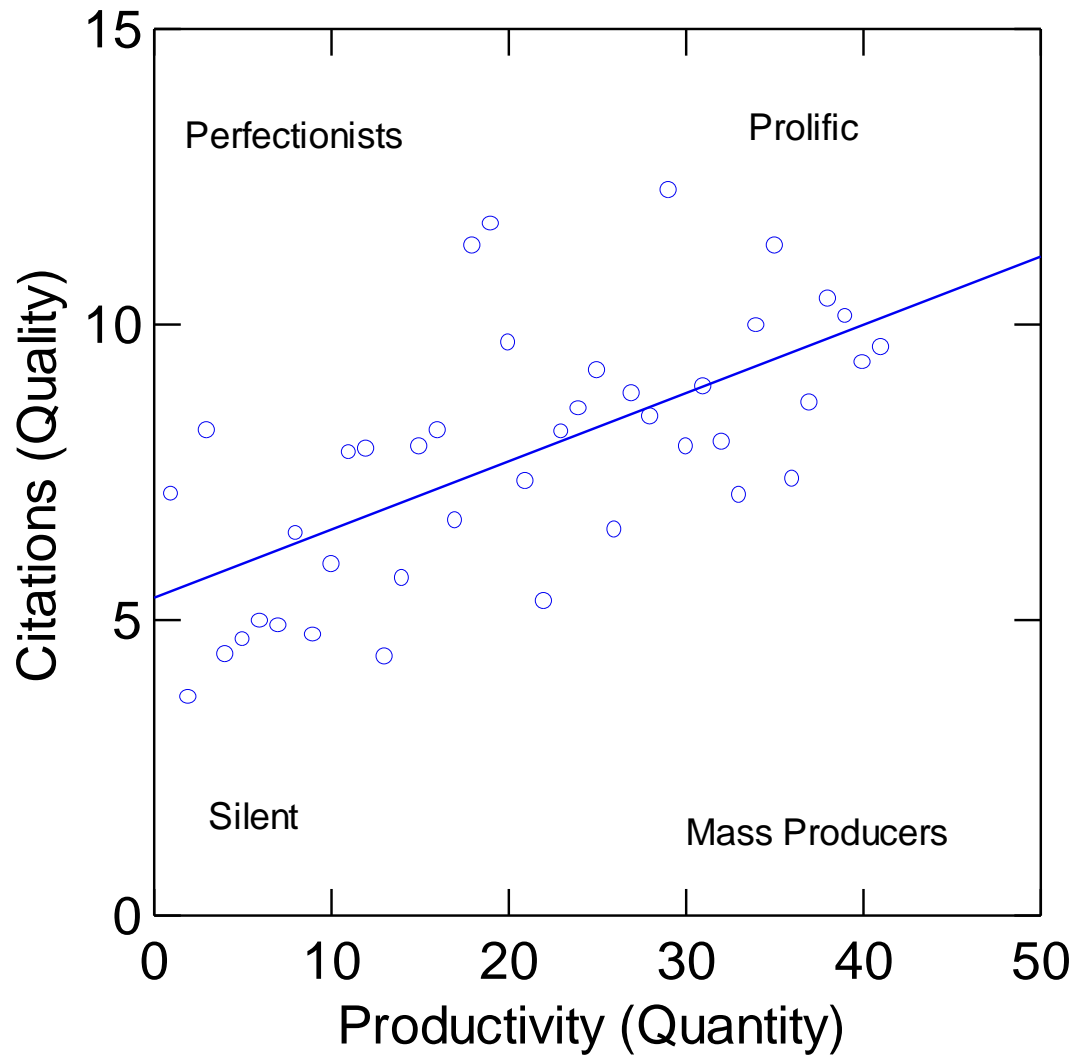# Productivity Distribution for Psychologists: Percentage Contributed by Deciles for Four Groups

			Group		
Decile	I	II	III	IV	M
1	47	37	42	37	40.75
2	21	21	21	21	21.00
3	12	14	14	11	12.75
4	8	10	9	9	9.00
5	5	8	6	5	6.00
6	3	6	4	3	4.00
7	2	3	2	3	2.50
8	1	1	1	3	1.50
9	1	0	1	3	1.25
10	0	0	0	3	0.75

Individual Differences: Productivity

- **Variation and Distribution**
- **Quantity and Quality**
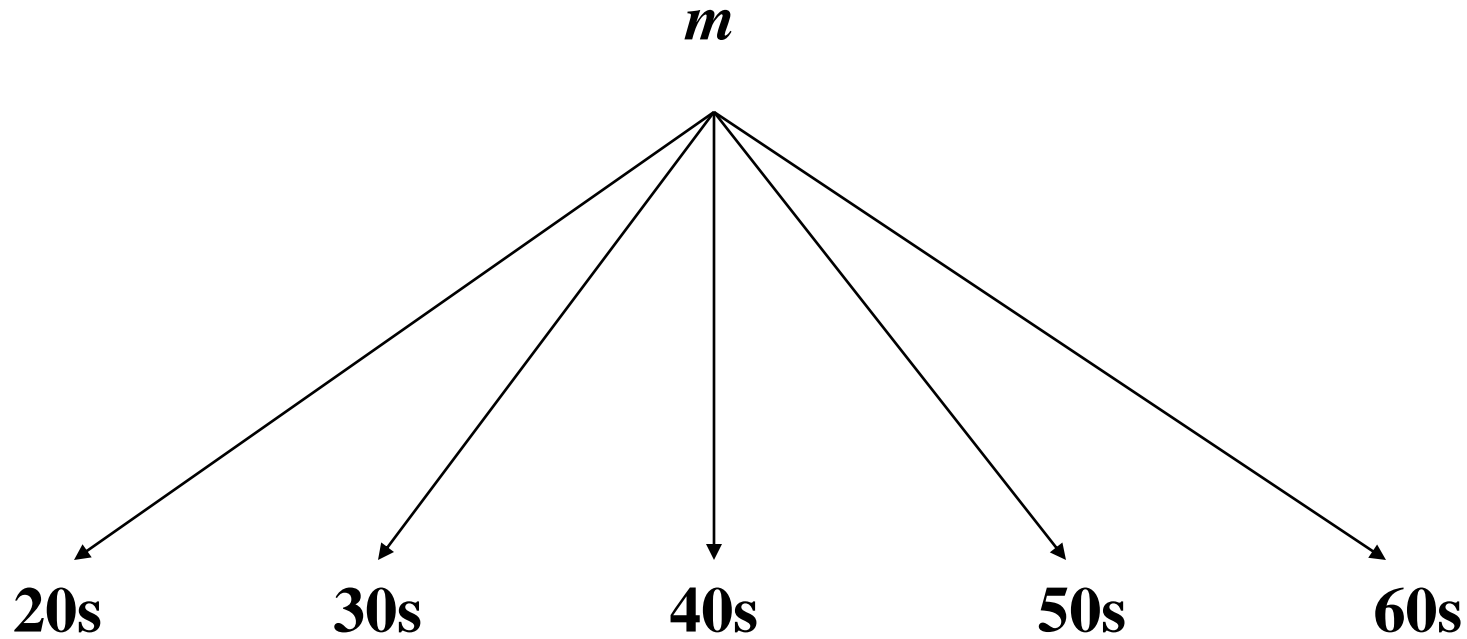
Individual Differences: Productivity

- **Variation and Distribution**

- **Quantity and Quality**

- **Longitudinal Stability**

Single-Factor Model

$$m$$

20s   30s   40s   50s   60s

Autoregressive Model

20s ⟶ 30s ⟶ 40s ⟶ 50s ⟶ 60s

Individual Differences: Eminence

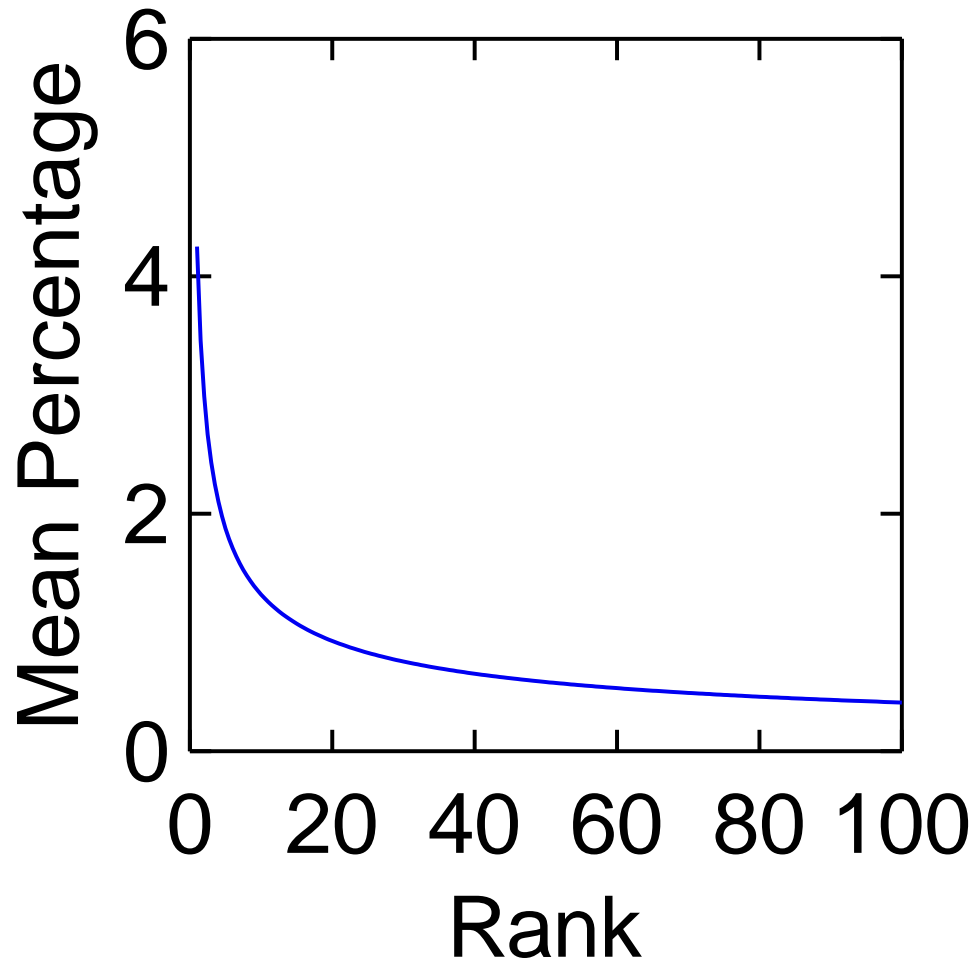- **Galton's *G*: The Greatness Consensus**
- **Variation and Distribution**

$$Y = 0.0001 + 4.251X^{-0.508}$$

Individual Differences: Eminence

- **Galton's *G*: The Greatness Consensus**

- **Variation and Distribution**

- **Correlation with Lifetime Output**

- **Transhistorical Stability**

Longitudinal Changes in Creativity
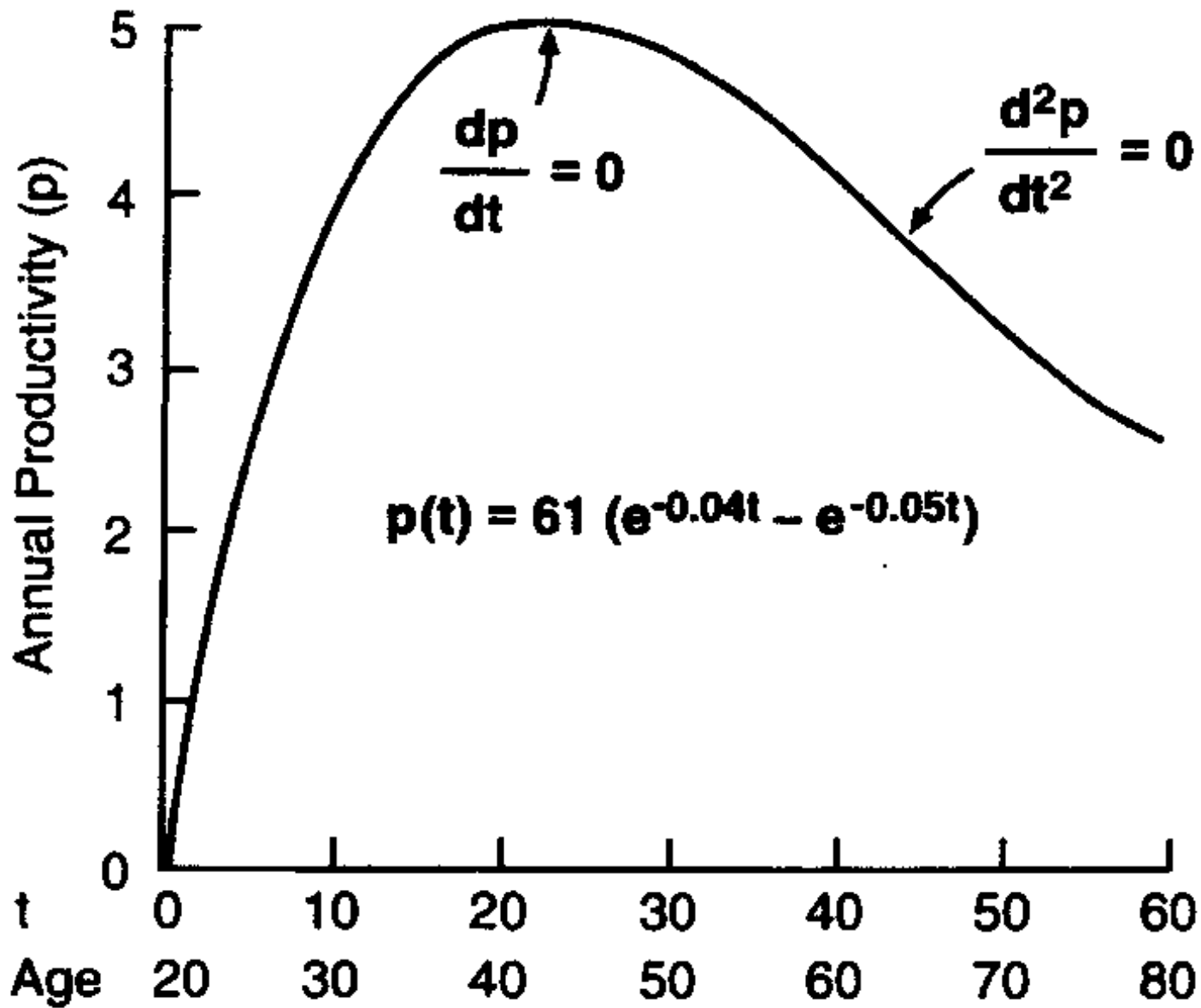
- ***Age and Achievement***
  - ❑ **Typical Career Trajectory**

$$\frac{dp}{dt} = 0$$

$$\frac{d^2p}{dt^2} = 0$$

$$p(t) = 61\,(e^{-0.04t} - e^{-0.05t})$$

Longitudinal Changes in Creativity

- ***Age and Achievement***
  - ❑ **Typical Career Trajectory**
  - ❑ **Quantity and Quality**
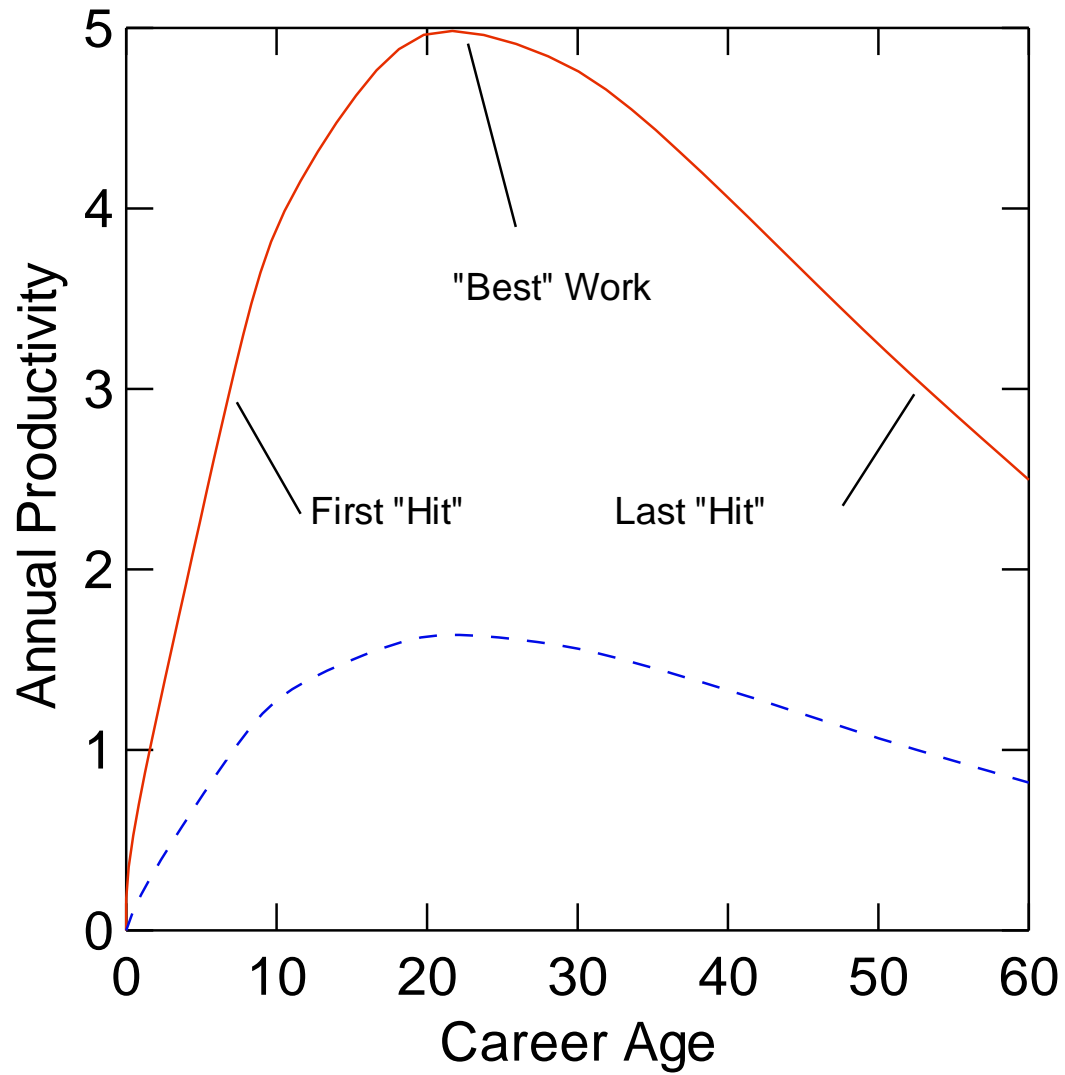
Longitudinal Changes in Creativity

- ***Age and Achievement***
  - ❑ **Typical Career Trajectory**
  - ❑ **Quantity and Quality**
- ***Individual Variation in Career Development***
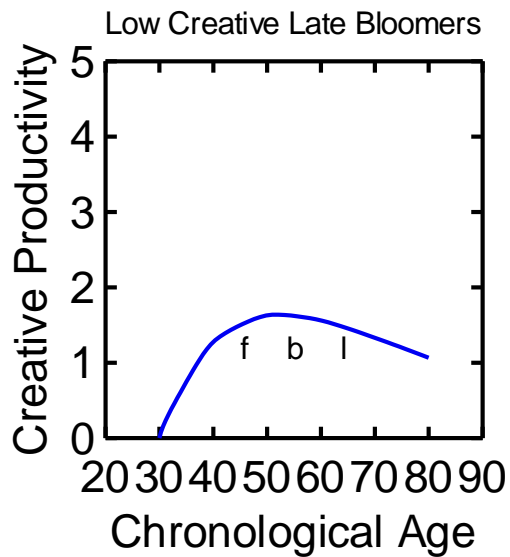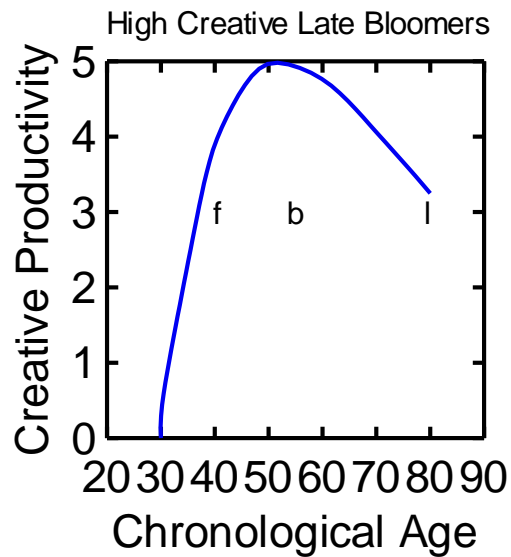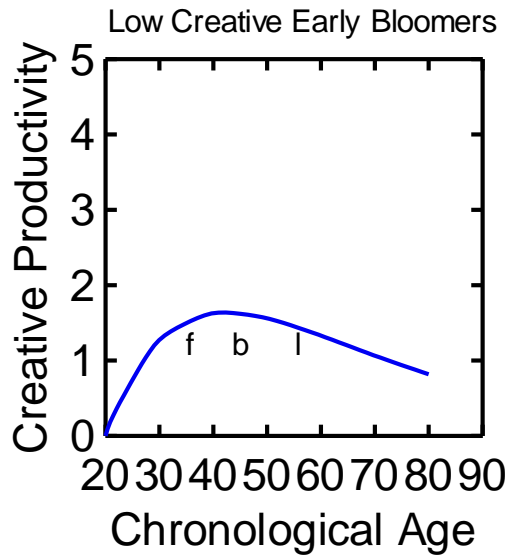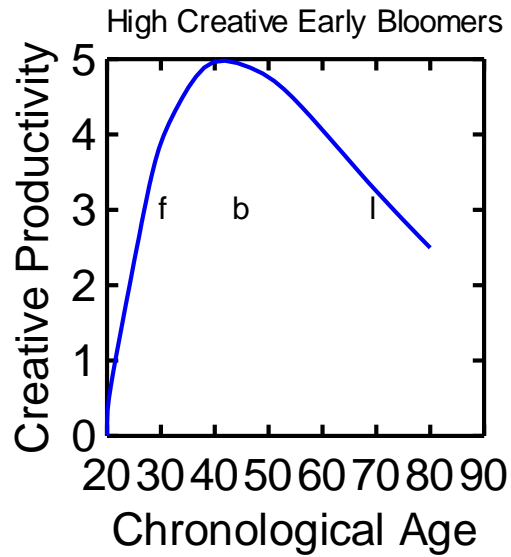
The Creative Product in Psychology

- *General Research Programs*

- *Specific Scientific Publications*
  - The Ideal: What Psychologists Say
  - The Real: What Psychologists Do

INDIVIDUAL CHARACTERISTICS

- **Cognition**
- **Disposition**
- **Worldview**

Individual Characteristics: Cognition

- ***Eminence and Intelligence***
  - ❑ **Psychometric Inquiries**
  - ❑ **Historiometric Inquiries**
- ***Interdisciplinary Contrasts***

Psychometric IQs: Means and Ranges for 64 Eminent American Scientists

Achievement domain	Verbal		Spatial		Mathematical	
	M	Range	**M**	Range	**M**	Range
Psychologists	163	133-176	141	127-161	162	139-194
Anthropologists	165	150-175	135	123-151	142	128-154
Biologists	162	138-176	137	123-164	165	133-194
Experimental physicists	154	121-174	141	123-161	–	–
Theoretical physicists	168	158-177	149	149-161	–	–

Individual Characteristics: Disposition

- ***Personality Traits***
  - ❑ **Motivational Attributes**
  - ❑ **Social Attributes**
- ***Pathological Symptoms***
  - ❑ **Historical Populations**

Eminent Contributors with Supposed Mental Disorders

Schizophrenic disorders (and other cognitive psychoses):

Philosophers – Kant and Nietzsche;

Scientists – Copernicus, Descartes, Linnaeus, Newton, and Pascal;

Psychologists – Jung, Reich.

Affective disorders (depression, mania, or bipolar):

Philosophers – Comte, Goethe, W. James[b], J. S. Mill, Rousseau, and Schopenhauer;

Scientists – C. Darwin and J. P. Müller[a];

Psychologists – D. T. Campbell, J. Cohen, K. Duncker[a], Fechner, G. S. Hall, K. Horney[b], O. H. Mowrer[a], and J. B. Watson.

Personality disorders (including severe neuroses):

Philosophers – Descartes, Hegel, Hobbes, Hume, Kierkegaard, B. Russell, Spencer[c], and Voltaire;

Scientists – Mendel, Pavlov, and Ellis;

Psychologists – Bettleheim[a], S. Freud[a,c] and Galton.

Note. Egon Brunswik and Else Frenkel-Brunswik both committed suicide, the latter 3 years after her spouse. In Else's case, at least, the suicide may have been provoked by severe depression.

[a]Suicide. [b]Attempted suicide. [c]Substance abuse (alcohol, opium, etc.)

Individual Characteristics: Disposition

- ***Personality Traits***
  - ❑ **Motivational Attributes**
  - ❑ **Social Attributes**
- ***Pathological Symptoms***
  - ❑ **Historical Populations**
  - ❑ **Contemporary Populations**

Individual Characteristics: Worldview

- *Religious Convictions*
- *Scientific Philosophies*
  - Types: Natural versus Human Science
  - Impact: Long-Term Citation Rates
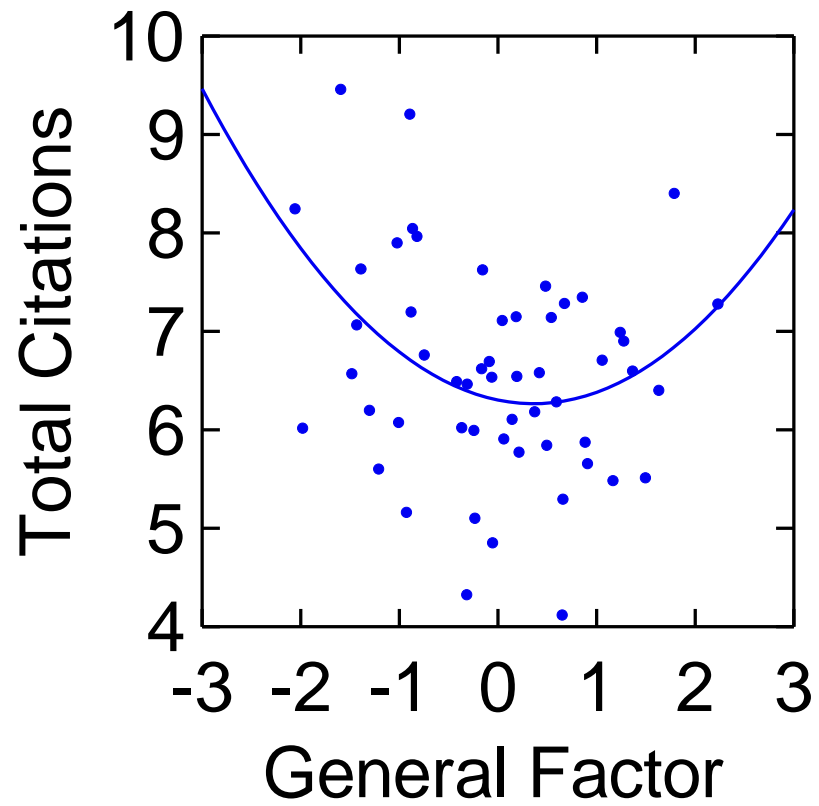
DEVELOPMENTAL CORRELATES

- **Family Background**
- **Career Training**
- **Maturity and Aging**

Developmental Correlates: Family Background

- *Home Environment*
  - Class
  - Religion
  - Ethnicity
  - Geography
- *Ordinal Position*

Representative Ordinal Positions

ONLY CHILD:
    A. Anastasi, A. Binet, D. Broadbent, L. Carmichael, E. Erikson, H. Eysenck, J. R. Hilgard, B. Inhelder, C. Jung (until 9), G. W. Leibniz, J. Locke (older brother died in infancy), C. Mayo, B. Milner, M. Montessori, M. Rioch, J. P. Sartre, E. S. Spelke, H. Spencer, W. Stern, H. S. Sullivan (2 older brothers died in infancy), S. Taylor, M. F. Washburn.

FIRST BORN OF:
    2, Avicenna, S. Bem, R. Benedict, C. M. Bühler, B. S. Burks, C. Burt, J. M. Cattell, M. Clark, Galileo, E. Gibson, M. R. Harrower, C. Hull, A. Kinsey, M. Mead, W. R. Miles, C. S. Myers, B. L. Neugarten, C. Osgood, M. K. Phipps, S. L. Pressey, J. E. Purkinje, W. Reich, R. Sears, B. F. Skinner, J. T. Spence, B. R. Strickland, L. L. Thurstone, A. Treisman, H. C. Warren; 3, D. Dix, J. Dollard, J. Gibson, G. S. Hall, R. Helson, L. S. Hollingworth, J. Piaget, T. G. Thurstone, E. H. Weber, B. L. Wellmen, L. Witmer, R. S. Woodworth (by mother); 4, E. S. Berscheid, J. Drever, C. H. Graham, D. O. Hebb, H. Helmholtz, L. J. Martin, L. Tyler, G. Watson, J. Wolpe, P. Zimbardo; 5, F. Brentano, M. Calkins, A. Gesell, E. Guthrie, W. James, C. Ladd-Franklin, I. Pavlov, P. Pinel, C. E. Seashore, R. Yerkes; 7, J. W. Goethe, A. Maslow; 8, S. Freud (3rd of father); 9, L. M. Gilbreth; ?, P. Abélard (oldest son), G. Berkeley (oldest son), Albertus Magnus, Maimonides.

MIDDLE CHILD:
    2/3, M. E. Bernal, R. B. Cattell, K. M. Dallenbach, E. Frenkel-Brunswick, J. P. Guilford, E. Hilgard, T. Hobbes, D. Hume, Q. McNemar, S. Milgram, H. Murray, T. Newcomb, B. Pascal; 2/4, F. Allport, K. Lewin, E. E. Maccoby, S. Scarr, E. L. Thorndike; 2/5, W. McDougall, J. B. Rhine, J. B. Watson; 2/6, A. Adler, J. Garcia, J. J. Goodnow; 2/8, W. Harvey, K. Marx, L. Vygotsky; 3/4, J. Dewey, H. Harlow; 3/5, N. Bayley, R. M. Elliott, E. Heidbreder, D. C. McClelland, B. Spinoza; 4/4, R. A. Hinde; 4/5, R. Descartes, P. S. Sears; 4/6, C. Rogers; 4/7, B. Rush; 5/6, C. Darwin; 6/10, F. J. Gall; 7/8, D. Katz; 8/9, D. Krech; 9/12, J. F. Dashiell; 10/11, J. D. Matarazzo; 12/14, L. M. Terman.

LAST BORN OF:
    2, F. Denmark, F. A. Geldard[a] (s = 9), M. Henle (with twin sister), K. Horney (4 older step-sibs), F. D. Horowitz, W. S. Hunter, A. E. Michotte, C. L. Morgan, C. R. Payton, H. Pieron, H. A. Simon, W. Wundt[a] (or only child; s = 8); 3, J. R. Angell[a] (s = 6), C. H. Judd, H. O. Mowrer[a] (s = 15), C. W. Sheriff, E. C. Tolman[a] (s = 5), M. S. Viteles; 4, G. Allport, E. G. Boring, J. Bruner[a] (s = 14), H. Deutsch, K. von Frisch, M. Klein, J. Konorski, V. S. Sexton; 5, E. Claparède, E. A. Doll, Voltaire; 6, W. Bingham, A. Freud; 7, T. Aquinas, F. Galton, S. A. Kierkegaard, D. Wechsler; 8, F. L. Goodenough; 9, W. E. Blatz; 11, J. B. Lamarck; ?, N. Malebranche (youngest child).
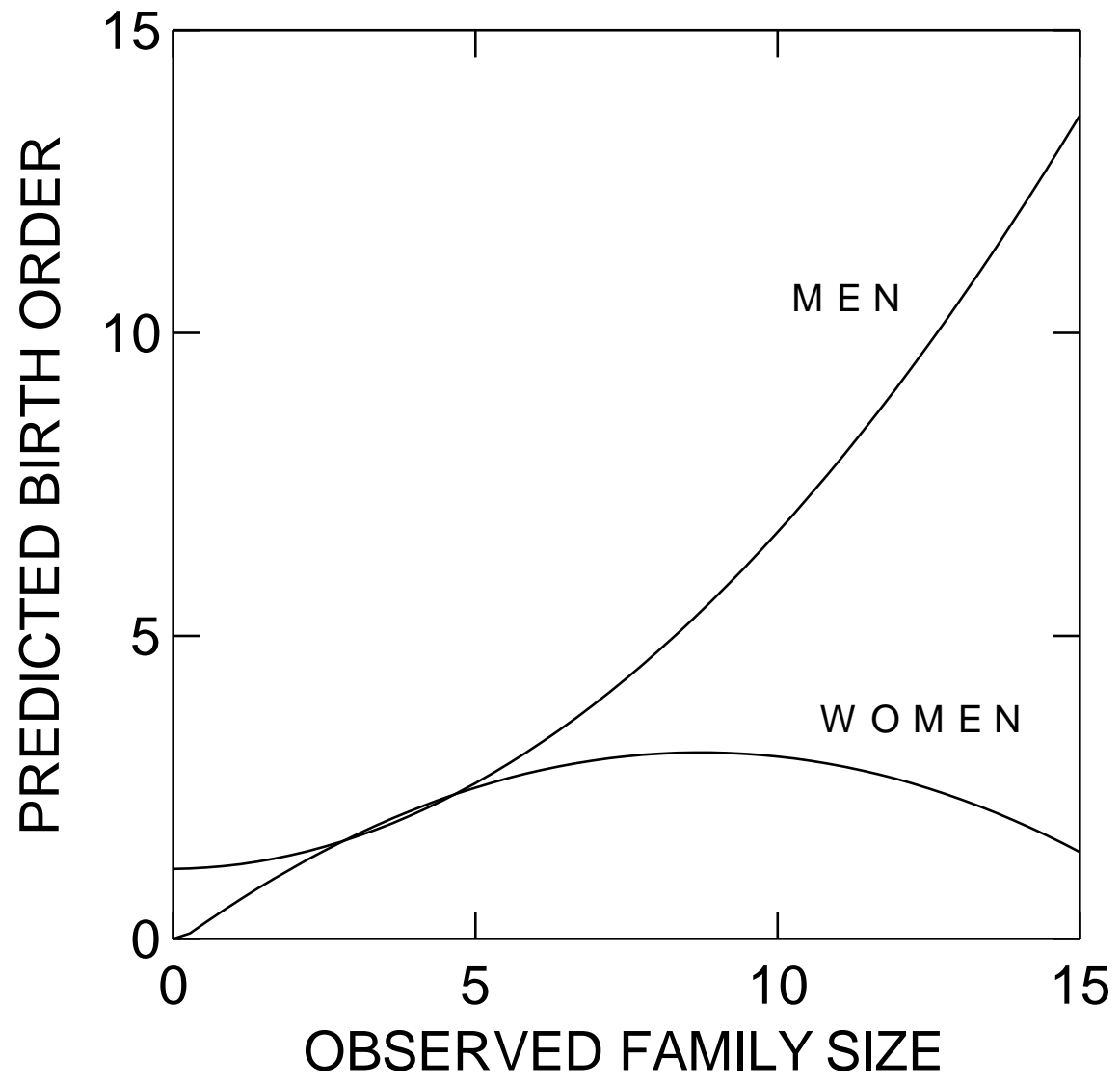
Developmental Correlates: Family Background

- *Home Environment*

- *Ordinal Position*

- *Trials and Tribulations*

Instances of Early Parental Loss

<u>Philosophers</u>: **R. Descartes (m 0), J.-J. Rousseau (m 0, f 10), Montaigne (m 0), J.-P. Sartre (f 1), D. Hume (f 3), B. Russell (m 2, f 3), F. Nietzsche (f 4), G. W. Leibniz (m 18, f 6), B. Spinoza (m 6), Voltaire (m 7), T. Hobbes (f childhood), M. Merleau-Ponty (f childhood), G. W. F. Hegel (m 11), J. Bentham (m 12), I. Kant (m 13), A. Schopenhauer (f 17), F. Bacon (f 18), St.Thomas Aquinas, Aristotle, St.Augustine, Montesquieu.**

<u>Scientists</u>: **I. Newton (f 0), R. Benedict (f 2), P. Sorokin (m 3, f 11), B. Pascal (m 4), B. Rush (f 5), Paracelsus (m small boy), A. Quetelet (f 7), C. Darwin (m 8), N. Copernicus (f 10, m early age), C. S. Sherrington (f child), J. B. Lamarck (f 16).**

<u>Psychologists</u>: **E. Erikson (f before birth), A. Anastasi (f 1), M. Rioch (f 1), H. Hollingworth (m 1), L. Hollingworth (m 4), G. T. Fechner (f 5), C. Osgood (f 6), H. Eysenck (m, f when young), J. Cohen (f when young), W. S. Hunter (m 12), C. Ladd-Franklin (m 12), J. Bruner (f 12), R. Perloff (f 12), H. Rorschach (m 12, f 18), J. B. Watson (f 13), W. Wundt (f 14), E. Hilgard (f 14), E. Loftus (m 14), E. H. Weber (m 16), M. Klein (f 18), H. Münsterberg (m, f before 20).**

<u>Note</u>. **Loss through death or other form of separation, such as divorce or abandonment (when known, f = father, m = mother, following integer = age).**

Developmental Correlates: Career Training

- ***Formal Education***
  - ❑ **Highest Degree**
  - ❑ **Scholastic Performance**
  - ❑ **Accelerated Progress**

Precocious Doctorates in the History of Psychology
24 R. Arnheim, G. Békésy, S. L. Bem, E. Brunswik, R. B. Cattell, L. Cronbach, D. Elkind, W. K. Estes, H. J. Eysenck, R. M. Gagné, R. A. Gardner, P. Gassendi, K. F. Gauss, A. Gelb, J. Gibson, C. H. Graham, M. P. Haggard, R. J. Havigurst, F. Heider, H. T. Himmelweit, C. I. Hovland, W. S. Hunter, H. Kelman, D. Krech, K. Lashley, K. Lewin, E. A. Locke, K. Marbe, D. Marquis, D. C. McClelland, C. T. Morgan, W. B. Pillsbury, A. Pilzecker, E. H. Schein, H. Schlosberg, F. Schumann, R. R. Sears, N. W. Stock, E. L. Thorndike, F. M Urban, M. Verworn, M. S. Viteles, H. Werner, M. Wertheimer, and G. Whipple.
23 G. Allport, W. J. Crozier, H. Ebbinghaus, L. Festinger, W. Hellpach, E. M. von Hornbostel, J. Jastrow, C. H. Judd, K. Koffka, F. Krüger, M. E. Lamb, T. Lipps, M. F. Meyer, W. Moede, G. E. Müller, Z. A. Piotrowski, W. Poppelreuter, R. Shank, M. F. Washburn, H. A. Witkin, T. Young, and K. Zenner.
22 A. Anastasi, V. Benussi, M. Dessoir, H. De Vries, H. A. E. Driesch, E. Fromm, E. Husserl, A. Jost, D. Katz, G. O. Klemm, W. Köhler, E. Kris, E. Mach, H. Münsterberg, W. Nagel, J. Piaget, W. Stern, D. N. Uznadze, H. Vaihinger, and F. L. Wells.
21 G. W. Leibniz, J. P. Müller, H. Pièron, W. T. Preyer, and W. Wirth.
20 P. Feuerbach, G. W. F. Hegel, and C. Stumpf.
19 A. E. Michotte. **18** N. Wiener.

Developmental Correlates: Career Training

- *Formal Education*
    - ❑ Highest Degree
    - ❑ Scholastic Performance
    - ❑ Accelerated Progress
    - ❑ Institution Prestige
    - ❑ Distinguished Mentors

Eminent Psychologists among Wilhelm Wundt's Direct Doctoral Descendants

First Generation	Second Generation	Third Generation
H. Münsterberg (1885) →		
	Boris Sidis (1897)	
	K. Dunlap (1903) →	
		C. Murchison (1923)
	L. T. Troland (1915)	
J. M. Cattell (1886) →		
	E. L. Thorndike (1898) →	
		T. L. Kelley (1914)
	R. S. Woodworth (1899) →	
		D. Wechsler (1925)
		G. Razran (1933)
	S. I. Franz (1899)	
	C. Wissler (1901)	
	F. L. Wells (1906)	
	E. K. Strong, Jr. (1911)	
O. Külpe (1887) →		
	R. M. Ogden (1903)	
	M. Wertheimer (1904)	
	H. J. Watt (1904)	
F. Angell (1891)		
E. W. Scripture (1891) →		
	C. E. Seashore (1895)	
L. Witmer (1892)		
E. B. Titchener (1892) →		
	M. F. Washburn (1894)	
	W. B. Pillsbury (1896)	
	M. Bentley (1899)	
	G. M. Whipple (1900)	
	J. W. Baird (1902)	
	K. M. Dallenbach (1913)	
	E. G. Boring (1914) →	
		H. Helson (1924)
		S. S. Stevens (1933)
	P. T. Young (1918)	
	J. P. Guilford (1927)	
F. Kiesow (1894)		
C. H. Judd (1896)		
G. M. Stratton (1896)		
W. D. Scott (1900)		
W. Hellpach (1900)		
C. E. Spearman (1904)		

Developmental Correlates: Career Training

- *Formal Education*

- *Self-Education*

- *Professional Marginality*

Developmental Correlates: Maturity and Aging

- ***Career Development***
  - ❑ **Onset and Ascent**
  - ❑ **Climax**
  - ❑ **Dénouement and Epilogue**
- ***Marriage and Family***

SOCIOCULTURAL CONTEXT

- **Internal Milieu**
- **External Milieu**
- **Genius versus Zeitgeist**

Sociocultural Context: Internal Milieu

- ***Kroeberian Configurations***
- ***Comtian Progress***
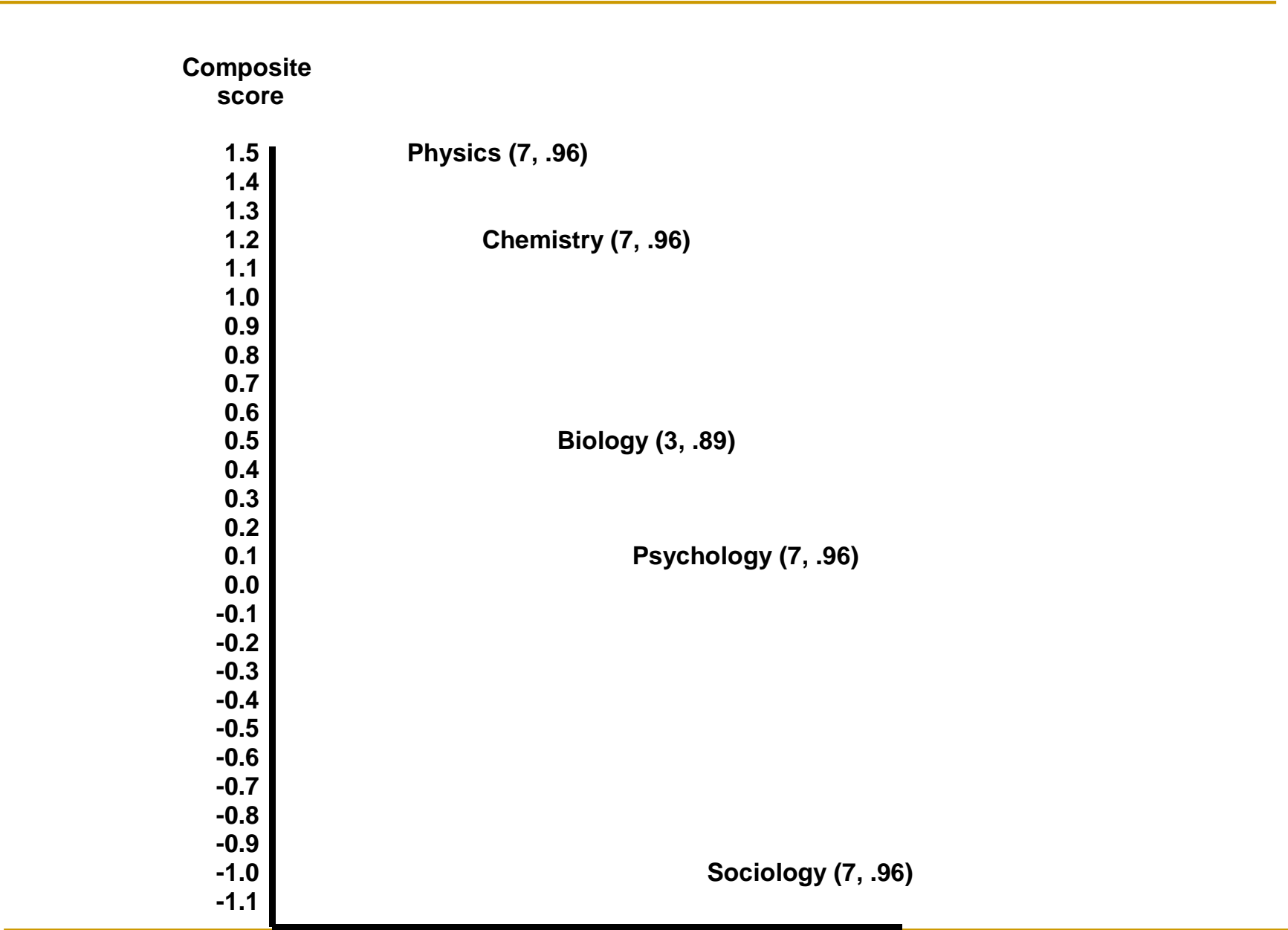
Sociocultural Context: Internal Milieu

- *Kroeberian Configurations*
- *Comtian Progress*
- *Kuhnian Transformations*
- *Hegelian Dialectics*
- *Mertonian Multiples*

Some Putative Instances of Multiple Discoveries and Inventions

Context theory of meaning: Berkeley (1709); Titchener (1909).
Animal electricity: Sultzer (1768); Cotuguo (1786); Galvani (1791).
Color Theory: Young (1801); Helmholtz (1856-66).
Principle of least squares: Gauss (1809); Legendre (1806).
Evolution by natural selection: W. C. Wells (1813); P. Matthew (1831); C. Darwin (1844); Wallace (1858).
Purkinje effect: M. Klotz (1816); Purkinje (1825).
Unconscious motivation and repression: Schopenhauer (1819); S. Freud (1895).
Term "objective psychology": Purkinje (1827); H. Spencer (1855).
Emmert's Law: Schopenhauer? (1815); Séguin (1854); Lubinoff (1858); Zehender (1856); Emmert (1881).
Genetic laws: Mendel (1865); De Vries (1900); Correns (1900); Tschermak (1900).
Spinal nerve root functions: C. Bell (1811); Magendie (1822).
Theory of emotions: W. James (1884); Lange (1885).
Positivist basis for introspection: Mach (1886); Avenarius (1888-90).
The unconsciousness mind in psychopathology: Janet (1889); S. Freud (1895).
Classical conditioning: Pavlov (1902?); Twitmyer (1904).
Behaviorism: Piéron (1908); J. B. Watson (1913).

Observed Multiple Grades and Predicted Poisson Values for Three Data Sets

Grade	Ogburn-Thomas		Merton		Simonton	
	O	P	O	P	O	P
0	–	132	–	159	–	1,361
1	–	158	–	223	–	1,088
2	90	95	179	156	449	435
3	36	38	51	73	104	116
4	9	11	17	26	18	23
5	7	3	6	7	7	4
6	2	1	8	2	0	0
7	2	0	1	0	0	0
8	1	0	0	0	1	0
9	1	0	2	0	0	0
μ	1.2		1.4		0.8	

Sociocultural Context: External Milieu

- *Quantitative Effects*
  - Transient Fluctuations
  - Inertial Movements
  - Developmental Influences
- *Qualitative Effects*
  - Transient Fluctuations
  - Inertial Movements
  - Developmental Influences

Sociocultural Context: Genius versus Zeitgeist

- *General Theoretical Considerations*

- *Specific Empirical Investigations*
  - The Ortgeist
  - The Zeitgeist

Multiple Regression Analysis:
Predictors of the Eminence of a Thinker at Generation g

Independent variable	Standardized coefficient	Squared semipartial correlation
External factors		
Political fragmentation (g)	.158***	.012
Imperial instability (g - 1)	-.042	.000
Political instability (g - 1)	-.062*	.002
War intensity (g - 1)	-.008	.000
Internal factors		
Role-model availability (g - 1)	-.118*	.002
Ideological diversity (g - 1)	.022	.000
Zeitgeist fit		
Representativeness	-.179***	.012
Precursiveness	-.053**	.003
Modernity	.210***	.017
Belief structure		
Breadth	.526***	.067
Extremism	.144***	.012
Consistency	-.276***	.028
Generation (historical period)	.130***	.004

* p < .05. * p < .01. * p < .001.

IMPLICATIONS

- **Research**
  - ❑ *Empirical Questions*
  - ❑ *Theoretical Interpretations*
- **Teaching**
  - ❑ *Undergraduate Instruction*
  - ❑ *Graduate Training*
    - ■ **Professional: Psychology as Science**
    - ■ **Personal: Psychologist as Scientist**

	MORE CONSTRAINT	← CREATIVITY →	*MORE CHANCE*
	↓		↓

DEVELOPMENT

	more conventional, stable, homogeneous	← Home environment →	*more unconventional, unstable, heterogeneous*
	more likely firstborn	← Birth order →	*more likely laterborn*
	superior grades, more formal training, less likely marginal	← Education and training →	*inferior grades, less formal training, more likely marginal*
	few, homogeneous	← Mentors and role models →	*numerous, heterogeneous*
	politically stable, culturally uniform	← Sociocultural zeitgeist →	*politically unstable, culturally diverse*
	↓		↓

DISPOSITON

	more constrained, predictable, logical, conscious, deliberate	← Thought processes →	*more unconstrained, unpredictable, illogical intuitive, involuntary*
	more restricted, fewer interests, serendipity rare	← Openness to experience →	*more unrestricted, many diverse interests serendipity common*
	lower incidence rate, less severe symptoms	← Psychopathology →	*higher incidence rate, more severe symptoms*
	↓		↓

DOMAIN

Scientific   Artistic

←————————————————————————————————→   ←————————————————→

Paradigmatic   **Non-paradigmatic**   **Formal**
Expressive

←—————————————→

Normal   **Revolutionary**