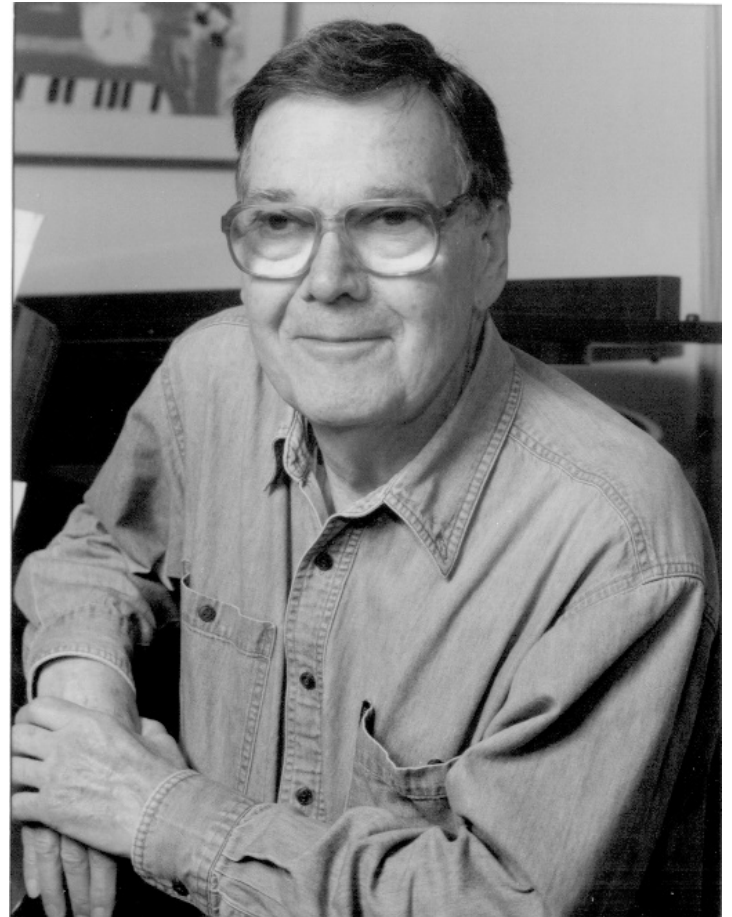


A Natural History of
the Development of
Talent:
Illustrations from the
Career of John L.
Holland (1919 –
2008)

Gary D. Gottfredson
University of Maryland



My *post hoc* Reconstruction of the Aims of Today's Talk

- What, in general terms, have been Holland's contributions?
- What were the educational and work environmental influences on the development of these contributions?
- How did Holland's personal style and interactions with others affect his work and his influence on the field?
- How did opportunities and misfortunes or mistakes influence these developments?

Categories of Contribution

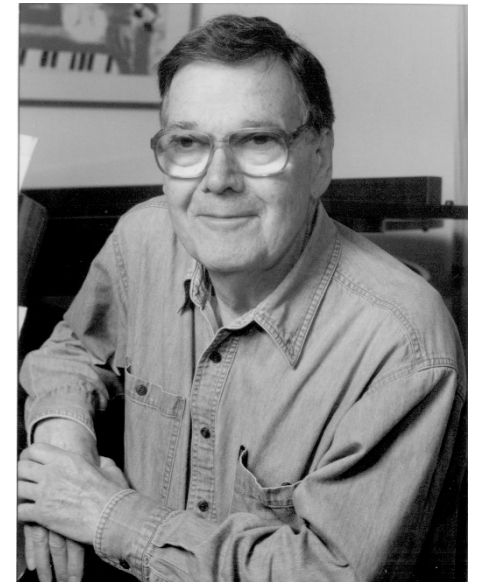
- Intellectual contributions in higher education, vocational psychology, & counseling
- Engineering of useful and transparent assessment & intervention tools
- Unfrocking contributions
- Influence on other productive contributors

Contributions in Higher Education

- College productivity outputs understood as largely a product of student inputs
- Demonstration of moderate correlations between different kinds of student accomplishment--implying that selection focusing on academic ability or achievement results in lost talent of other kinds
- Assessment of college environments using an environmental typology
- Provision of a structure to organize college offerings and career development in college according to a typology

Contributions in Vocational Psychology & Career Counseling

- A theory of vocational personalities, work environments, and person-environment interaction
- A structure for organizing interest assessment that counselors and clients can understand
- Tools for the assessment of the interests/vocational personalities of both men & women using a single scheme
- A psychological classification of occupations/work environments useful in vocational exploration
- Methods for assessing educational or occupational demands and rewards in typological terms
- Evaluations of the effects of assessments on clients (assessment as intervention)



Key to Timeline

1940	1950	1960	1970	1980	1990
------	------	------	------	------	------

Education

Positive
Personal

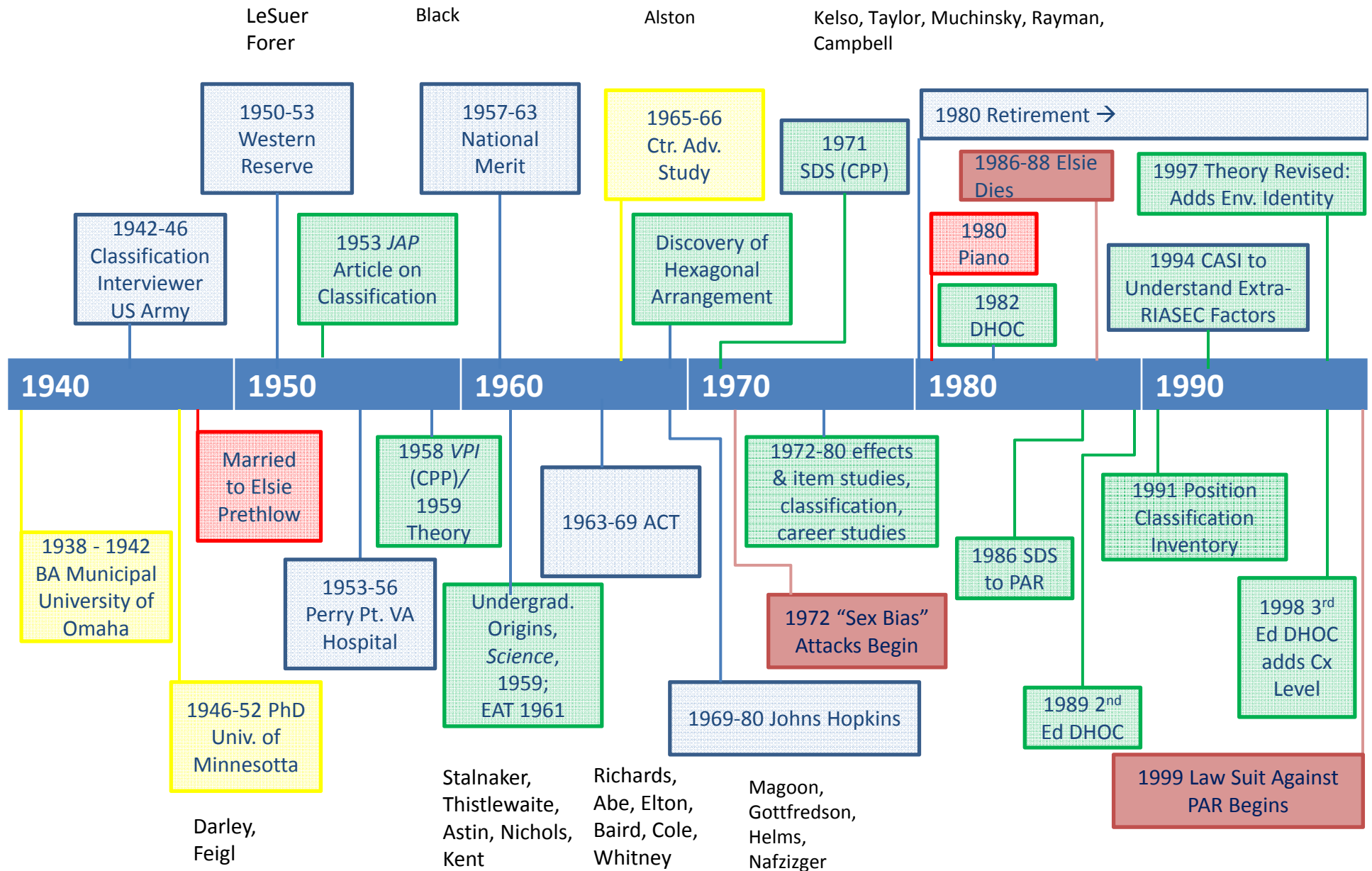
Problems,
Tensions

Employment

Products

Influential
individuals

Employment and Other Developments in John Holland's Career, College to Post-Retirement



U.S. Army 1942-46

- Classification interview, psychol. testing, clerk
- Military men appeared to fall into a few common characters or types
- Worked with social workers, psychologists, physicians—reinforced desire to become a psychologist
- “The base rate for bad guys in the military seems about the same as the base rate I experienced later in academia.”

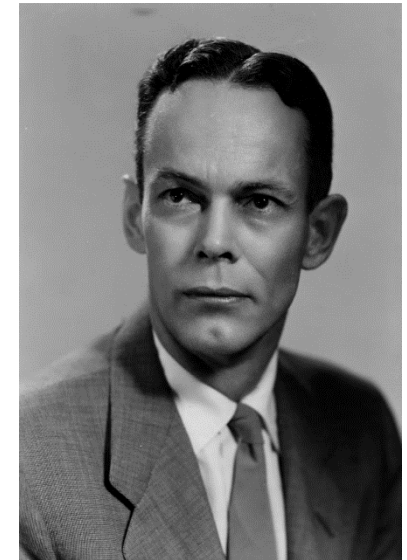


Pvt. John L. Holland

Note: Source for most quotations in these slides is a draft on an unpublished autobiography, *My Life with a Theory* (2004).

Graduate School, U. Minn. (1946-52)

- John G. Darley, advisor
 - Darley & Patterson (1937). *Student personnel work: An outline of clinical procedures.*
 - Darley & Hagenah (1955). *Vocational interest measurement: Theory & practice.*
- Worked as intern in the counseling center.
- “The Strong Vocational Interest Blank could be . . . mailed to a scoring service with about a 10-day wait. If a client was interested in an unkeyed occupation, one had to use one’s imagination.”



John (“Jack”) Darley

“The problem [of slow and cumbersome scoring procedures for interest inventories] was compounded by the lack of a compatible occupational classification for the Strong or Kuder. As always the Dictionary of Occupational Titles (DOT) was a formidable collection of books and files. Using them was a depressing experience.”



“At that time, the Strong Vocational Interest Blank could be scored with a Veeder Counter in about an hour or mailed to a scoring service with about a 10-day wait.”

Western Reserve (1950-53)

- Counseling center director, instructor
- Continued to experience test scoring delays, incomplete interest information, incompatible classification of occupations
- Discovered an undated Occupational Interest Blank by Bruce LeSeur scored for level of occupation
- “Why not build an interest inventory that uses only occupational titles as test items and create scales for the main kinds of occupations rather than for single occupations?”
- Constructed a 10-scale inventory, no norms, scored as % of items liked. “A psychometric abomination.”

Western Reserve (1950-52 Cont.)

- Discovered Forer's (1948) *Diagnostic Interest Blank*
- Forer believed items could be interpreted clinically
- “For me, the key element in this journal article was that Forer gave inference lessons.”
- Holland set out to try to interpret the keys for Strong scales—forming groups of items, making notes
- “I was surprised that my grouping of the notes for each scale led to plausible sketches of people in different occupations.”
- Became first formulations for personality types

Perry Point VA Hospital (1953-56)

- Vocational counseling service for psychiatric patients, internships for graduate students, experience in assessments & therapy
- Tried out test items (occupational titles) and developed experimental scales
- Went through multiple sets of scale titles, searching for titles that were easily comprehended, connoted meaning, and were inoffensive
- “The freedom to explore what might work for many years without worrying about promotion was a major benefit. I feel sorry for the frenetic way young scientists now have to look creative, rational, and productive at a time when they have little experience, confidence, or time before being evaluated up or down.”*

**An article on the Vocational Preference Inventory wasn't published until 1958. John Darley published it after it was rejected by two other editors.*

National Merit Scholarship Corporation (1957-63)

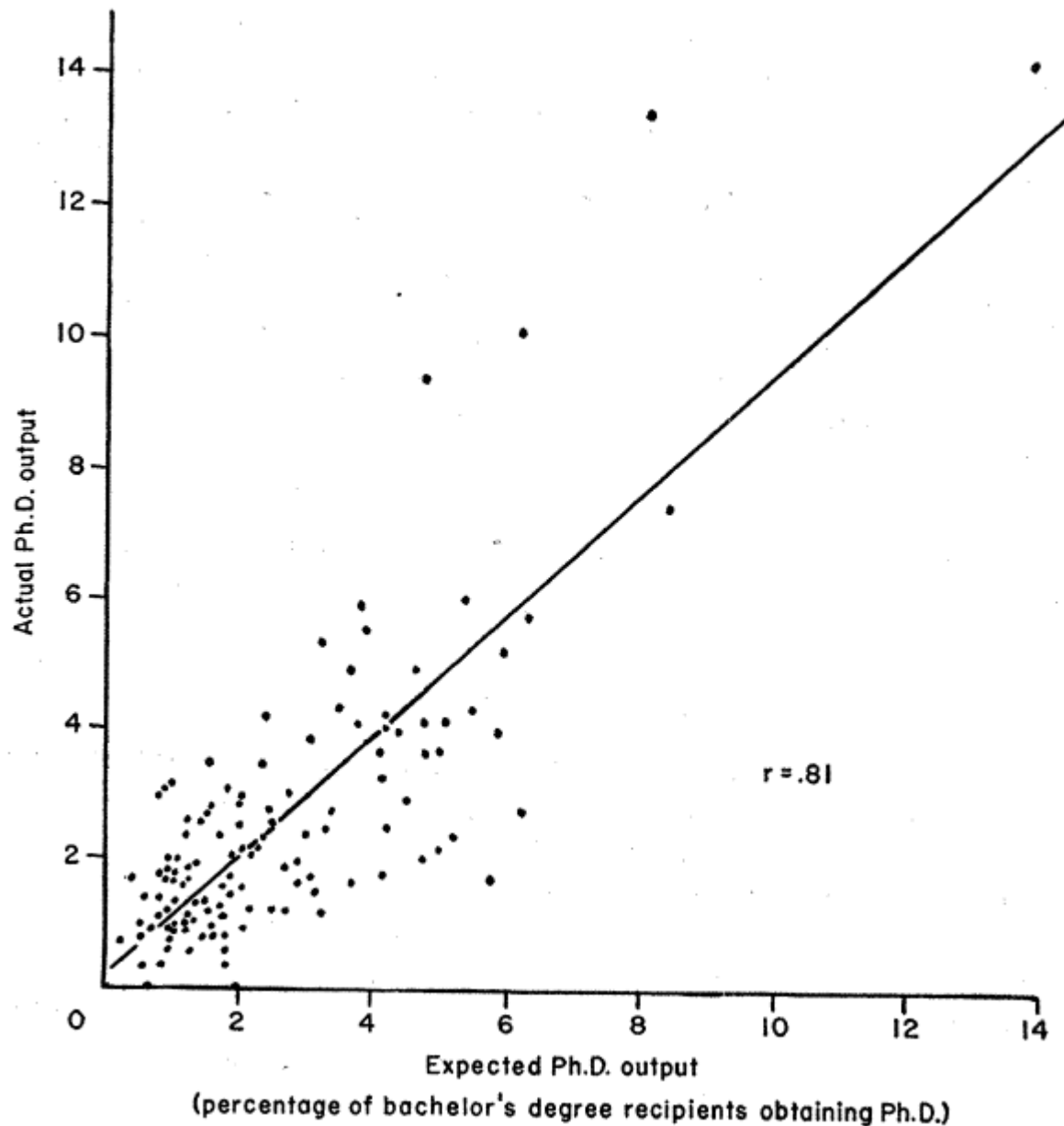
- Director of research: highly talented students, longitudinal studies
- Vocational interests related to characteristic achievements, competencies, personality traits, and values
- Predictive validity of vocational aspirations
- Studies of the “undecided” student
- Productivity of institutions of higher education related to their highly selected pool of students
- Freedom and resources to develop and test theory

Table 1. Percentage of expected and actual attendance of high-aptitude students at “high” and “low” productive institutions. Each 2 by 2 table is significant beyond the 0.001 level of significance.

Criterion	Males				Females			
	Cert. of Merit college attendance		Merit Scholars college attendance		Cert. of Merit college attendance		Merit Scholars college attendance	
	Ex-pected	Ob-served	Ex-pected	Ob-served	Ex-pected	Ob-served	Ex-pected	Ob-served
Knapp and Greenbaum								
High productivity	7.3	42.8	7.3	43.3	1.6	16.2	1.6	24.7
Low productivity	92.7	57.2	92.7	56.7	98.4	83.8	98.4	75.3
Total	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0
Knapp and Goodrich								
High productivity	3.9	13.4	3.9	16.2	3.9	14.9	3.9	17.5
Low productivity	96.1	86.6	96.1	83.8	96.1	85.1	96.1	82.5
Total	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0

Holland, J. L. (1957). Undergraduate origins of American scientists. *Science*, 126, 433-437.

Relation Between Expected and Actual PhD Outputs for Coeducational and Women's Colleges ($N =$ 124 Colleges)



Astin, A. W. (1962).
"Productivity" of
undergraduate
institutions. *Science*,
136, 129-135.

National Merit Scholarship Corporation (1957-63, Cont.)

- Freedom and resources to develop and test theory
 - “We spent no time looking for funds.”
 - “Our research group received only casual oversight.”
- Work habits and goals
 - Daily, weekly, monthly
 - “If you don’t have something you want to do when you arrive at work, someone else will have plans for you.”

National Merit Scholarship Corporation (1957-63, Cont.)

- Laura Kent and influences on writing
 - Berkeley graduate student hired on Frank Barron's recommendation
 - Operated counter-sorter and did clerical work
 - Aspiring poet
- Promoted Kent to editor
 - “My zeal for better writing was fed by the realization that I had no graduate students who might carry on my work but also that I would have more influence on other professionals if I learned to write well. At any rate, my reports would be clear even if my research was flawed.”
- Published 1st version of the RISCEA theory (1959) and multiple longitudinal tests (7 years after PhD)

American College Testing Program (1963-1969)

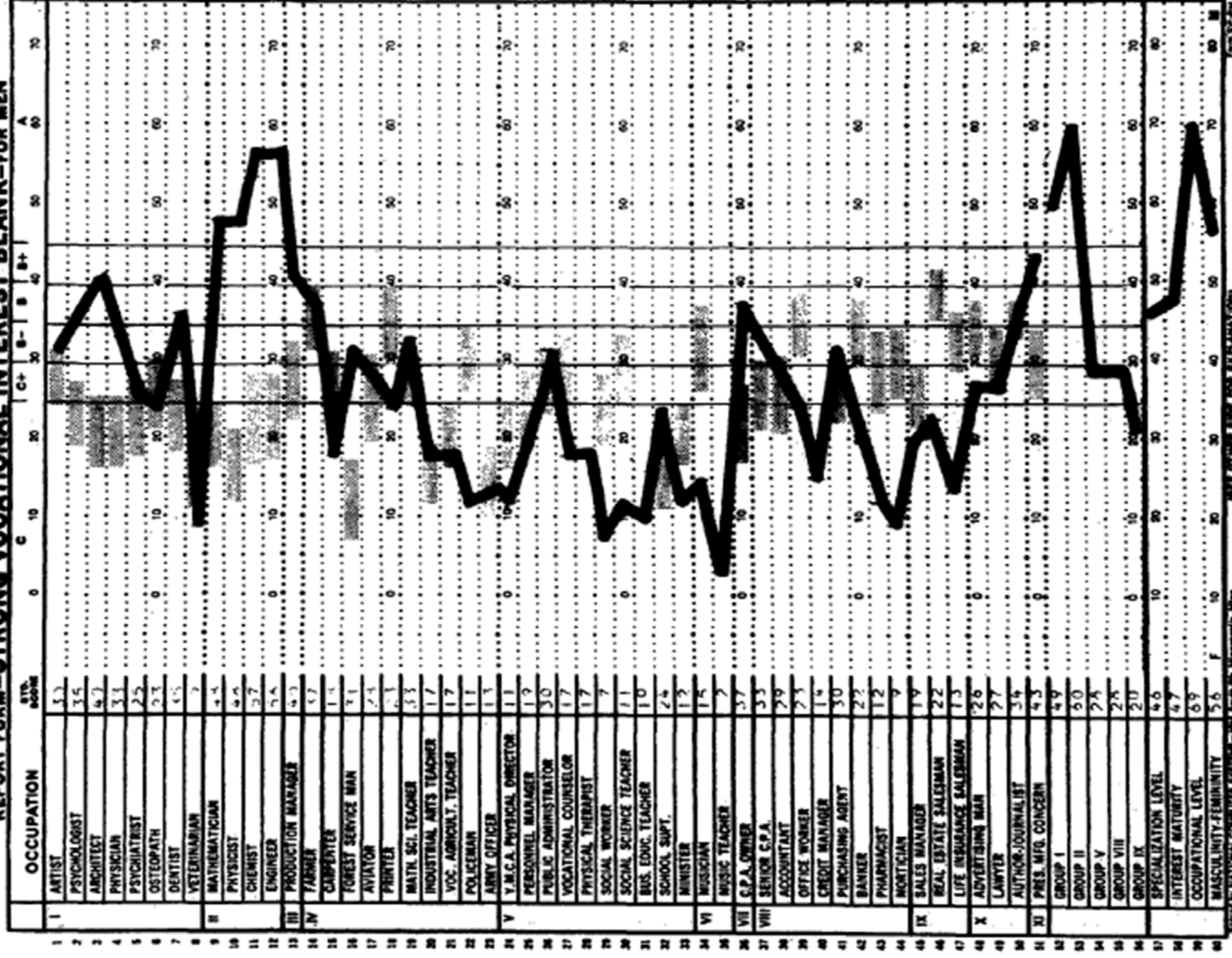
- Vice President, Research and Development
- Large-sample research with more typical college students
- Collection of much data relating interests to other characteristics
- Further research and demonstrations on variety of talent and the downside of selecting solely on the basis of academic talent
 - James M. Richards, Jr. (Mac) revised accomplishment scales from NMSC and devised new ones

American College Testing Program (1963-1969, Cont.)

- College selection practices relying heavily on measures of academic potential result in much lost talent.
 - Selecting from top decile on H.S. grades would exclude 86% of H.S. class presidents
 - Selecting only “A” students results in the exclusion of about 95% of national science award winners
- Munday & Davis (1974) continuing this research at ACT later showed that earlier accomplishments predict later accomplishments in the same area
- Subsequent review by Richards (1978)

REPORT FORM—STRONG VOCATIONAL INTEREST BLANK—FOR MEN

NAME STRONG, Edward K., Jr. AGE _____ SEX _____ DATE _____



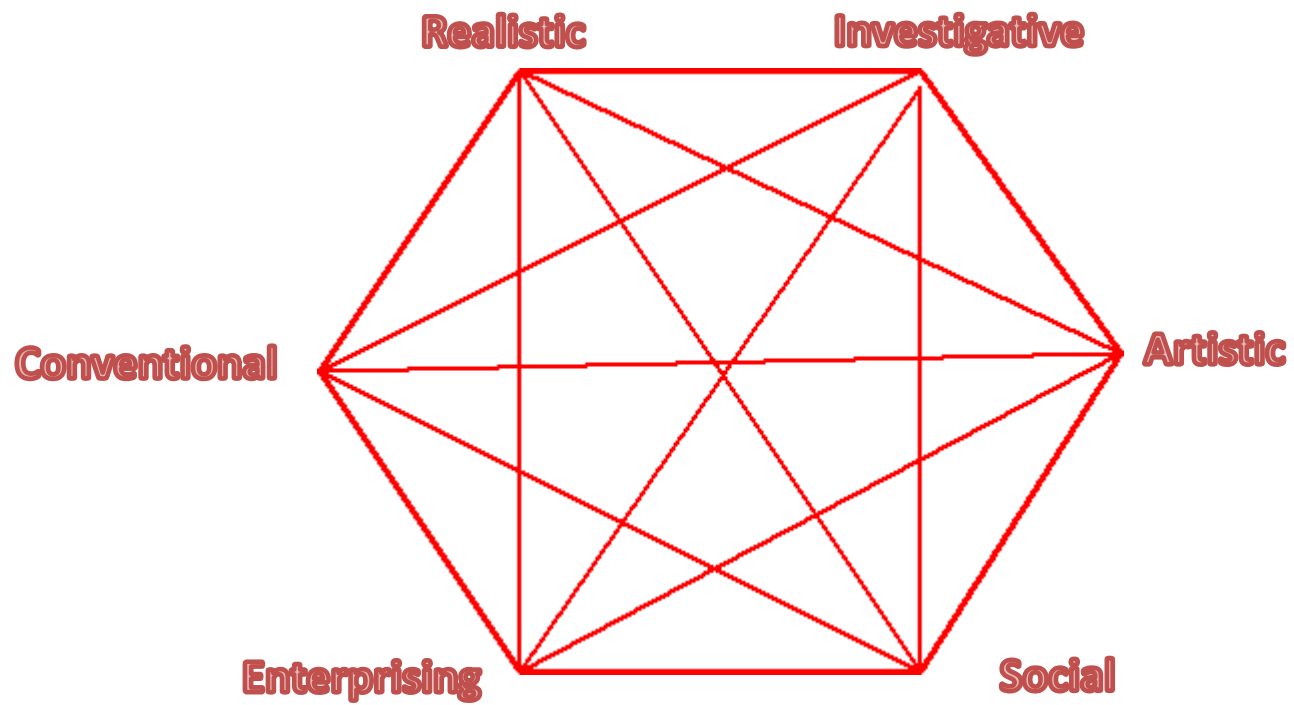
SCORE BY NATIONAL COMPUTER CENTER—1957 Form 88, Minneapolis, Minn. SEE OTHER SIDE FOR EXPLANATION

A Brief Description of the Holland Personality Typology

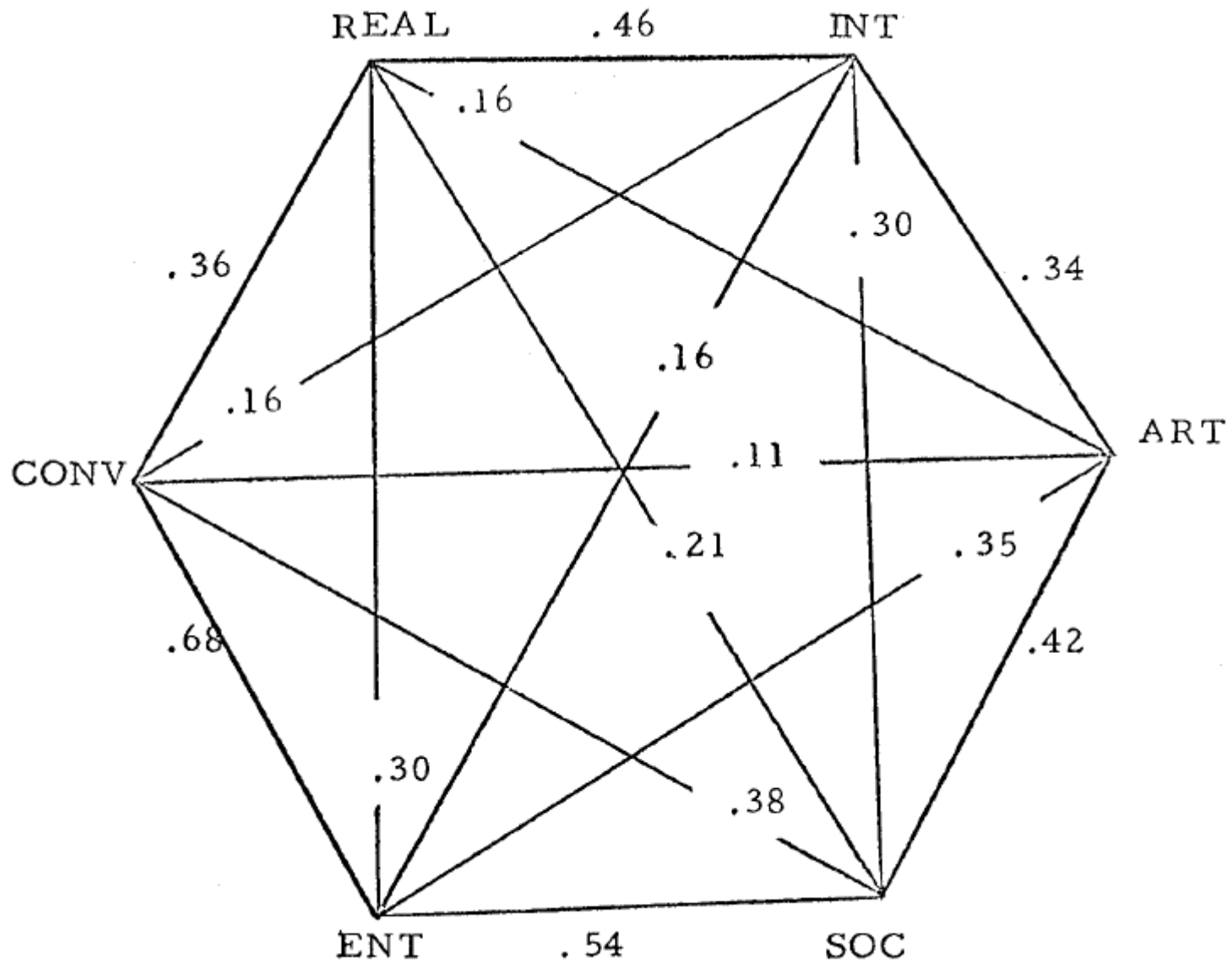
Attribute	Personality Type					
	Realistic	Investigative	Artistic	Social	Enterprising	Conventional
Preferences for activities and occupations	Manipulation of machines, tools and things	Exploration, understanding and prediction or control of natural and social phenomena	Literary, musical, or artistic activities	Helping, teaching, treating, counseling, or serving others through personal interaction	Persuading, manipulating, or directing others	Establishing or maintaining orderly routines, application of standards
Values	Material rewards for tangible accomplishments	Development or acquisition of knowledge	Creative expression of ideas, emotions or sentiments	Fostering the welfare of others, social service	Material accomplishment and social status	Material or financial accomplishment and power in social, business, or political arenas
Sees self as	Practical, conservative, and having manual and mechanical skills—lacking social skills	Analytical, intelligent, skeptical and having academic talent—lacking interpersonal skills	Open to experience, innovative, intellectual—lacking clerical or office skills	Empathic, patient, and having interpersonal skills—lacking mechanical ability	Having sales and persuasive ability—lacking scientific ability	Having technical skills in business or production—lacking artistic competencies
Others see as	Normal, frank	Asocial, intellectual	Unconventional, disorderly, creative	Nurturing, agreeable, extroverted	Energetic, gregarious	Careful, conforming
Avoids	Interaction with people	Persuasion or sales activities	Routines and conformity to established rules	Mechanical and technical activity	Scientific, intellectual, or abstruse topics	Ambiguous or unstructured undertakings

Gottfredson, G. D., & Holland, J. L. (1996). *Dictionary of Holland occupational codes* (3rd ed.). Odessa, FL: Psychological Assessment Resources. (Table 1, p. 3)

Relations Among the Six Ideal Personality Types

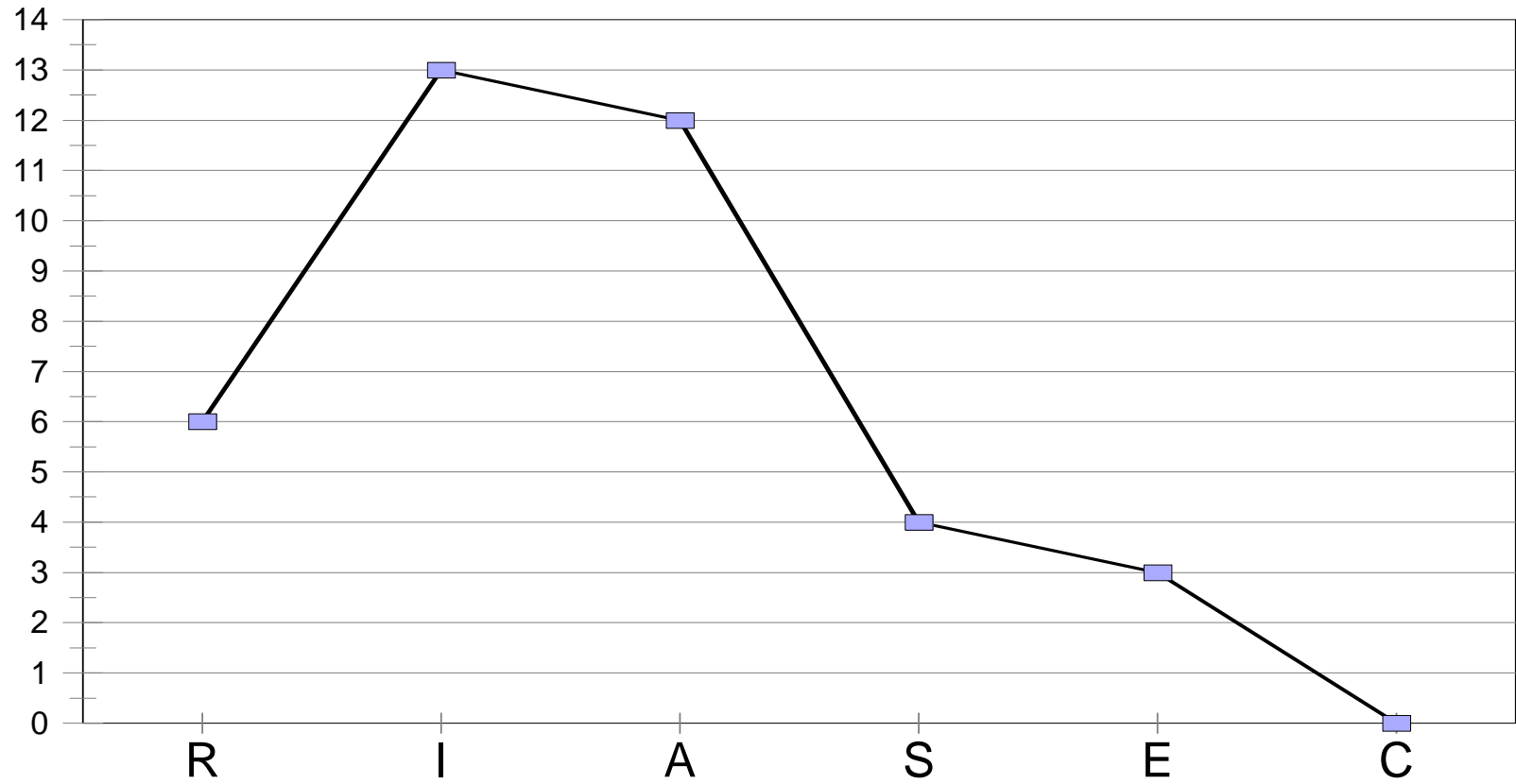


Discovering the Hexagonal Arrangement



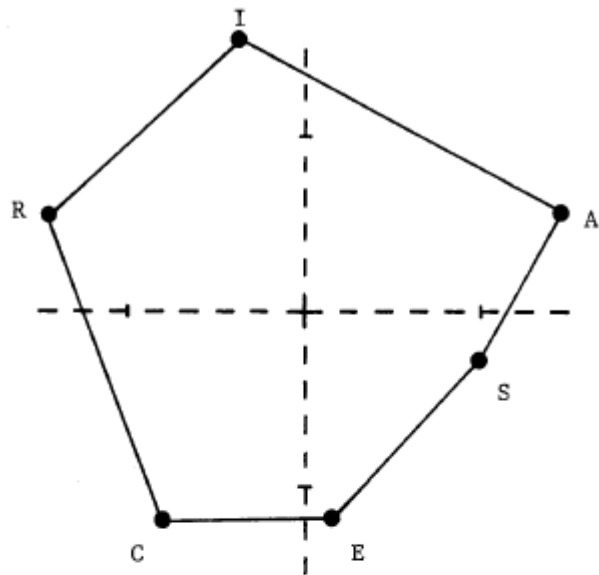
Holland, Whitney, Cole, & Richards (1969). An empirical occupational classification . . . *ACT Research Report No. 29*. Iowa City, IA.

Vocational Preference Inventory

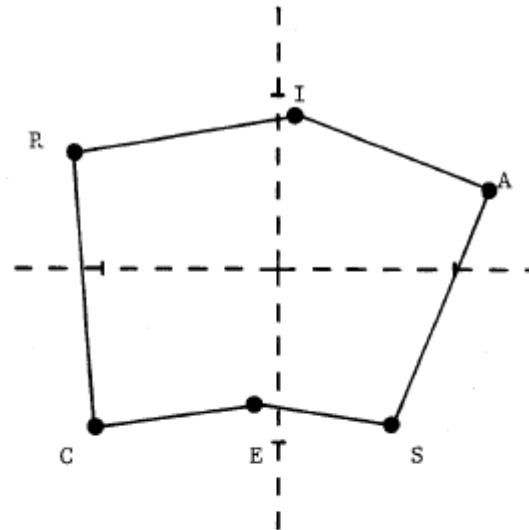


“We began . . . With the Realistic scale . . . because we had to start somewhere. Then we scanned the matrix for the scale with the highest correlation with R, it was I. Then we looked for the highest correlation with I, it was A. Then A was followed by S; S by E, and last C by R.

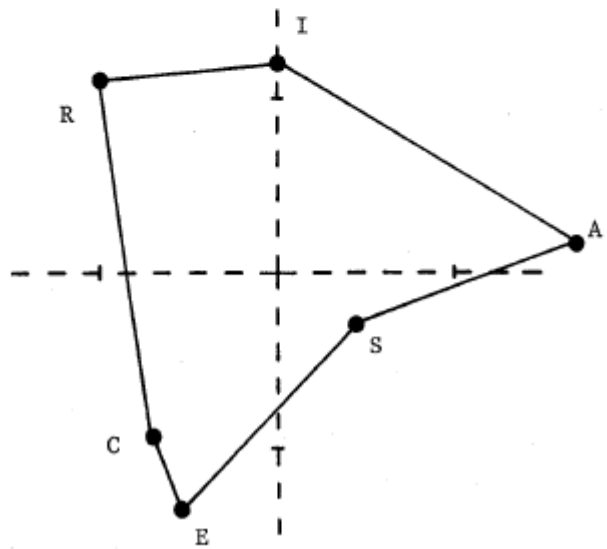
We both saw that these simple correlations created a circle of RIASEC. At this point, we were surprised and pleased but unaware of the value of these relationships, so we made a diagram with the correlations around the perimeter and filled in all the intermediate values. Then we noticed that the values around the perimeter were, on average, the largest correlations, that the intermediate distances were associated with smaller correlations and the greatest distances (opposed scales on the circle) had the smallest correlations. Whitney noticed that we had a circular diagram; Holland said that Roe (1956) had a claim on the circle, but we could have a hexagon.”



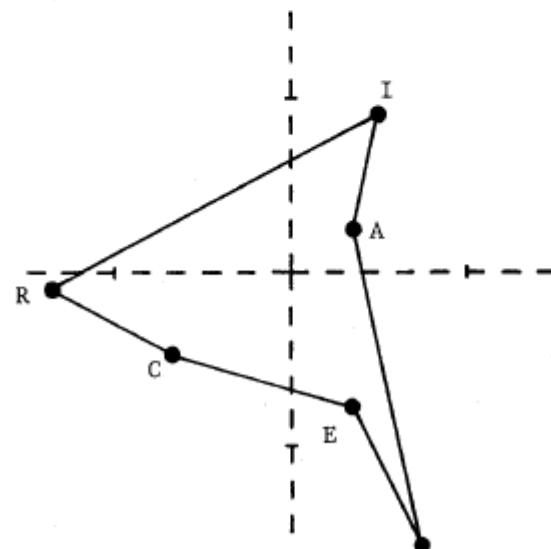
Holland's VPI



SVIB Occupational Scales



SVIB Basic Scales



Kuder OIS

Spatial configuration recovered by Cole & Hanson (1971) for Several Inventories

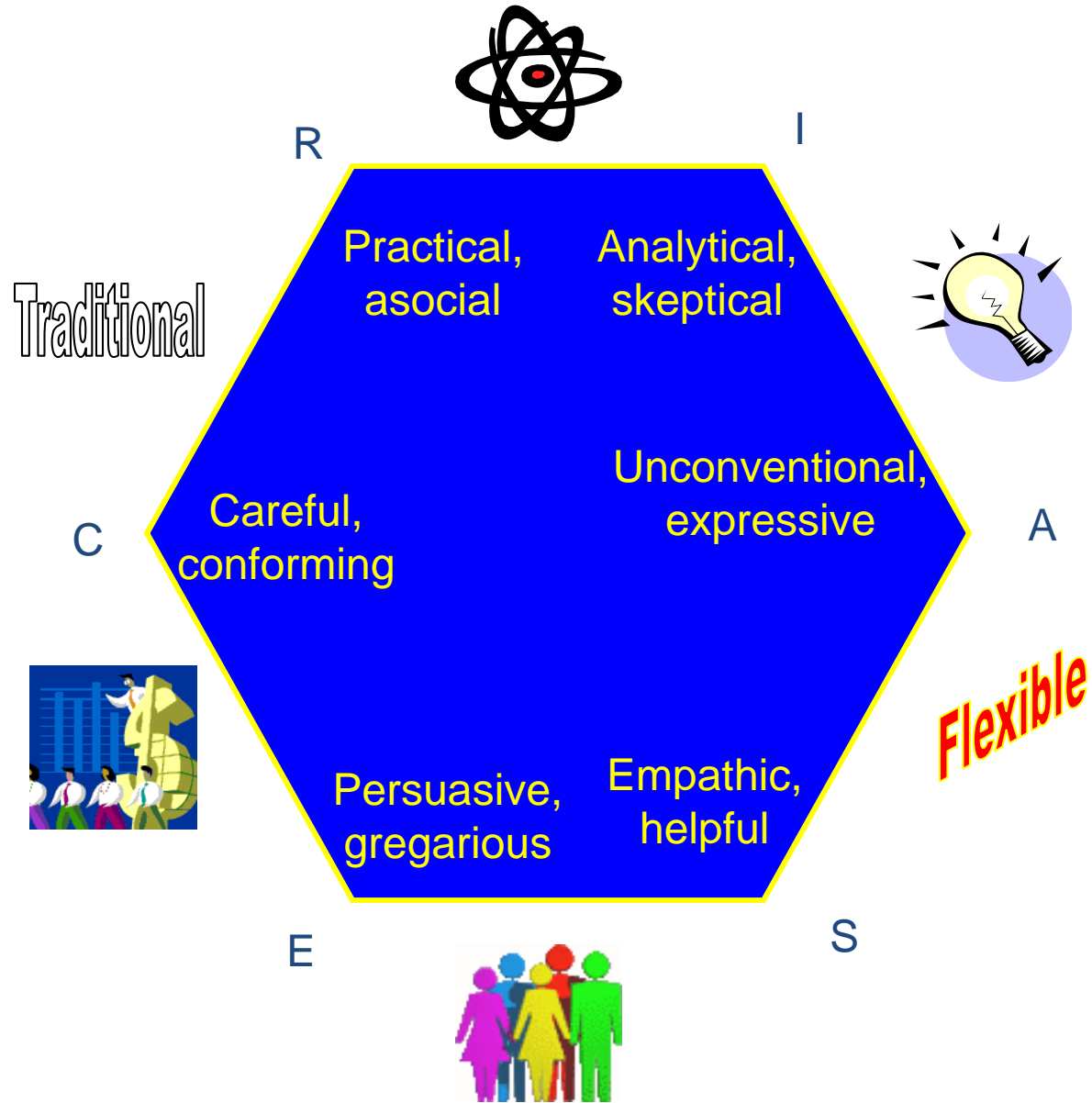
Cole, N. S., & Hanson, G. R. (1971). *An analysis of the structure of vocational interests* (ACT Report No. 40). Iowa City, IA: ACT.

Configurations for Strong & Kuder inventories group several scales for each RIASEC category.

Developments Following Incorporation of the RIASEC Hexagon in Typology

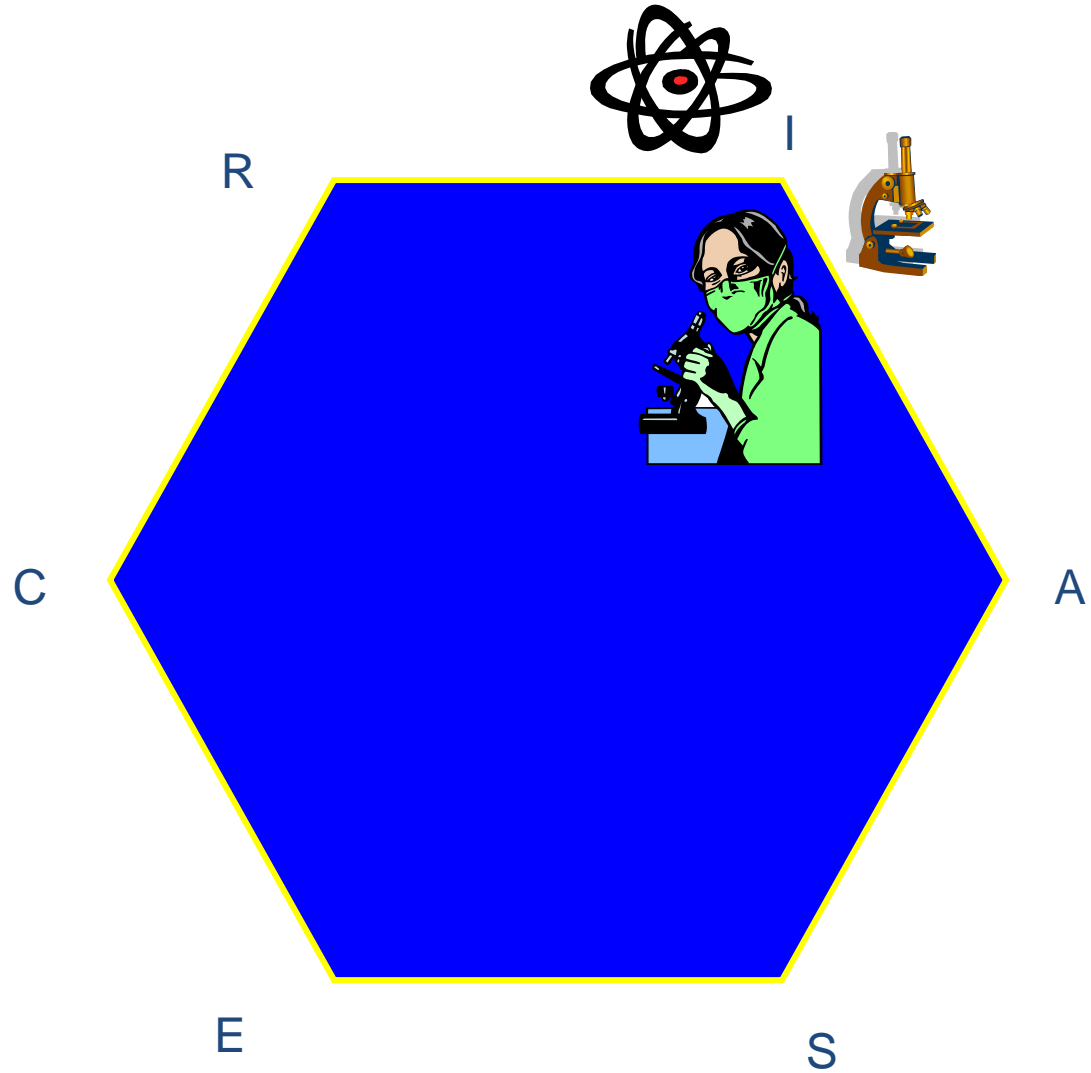
- Use of the hexagonal arrangement as a way to describe degrees of person-environment congruence
- Interpretation of the 2-dimensional space and its application by Prediger
- Extensive study of the generality of the hexagonal structure by Rounds and his students/colleagues
- Incorporation of this structure in most contemporary interest inventories
- Incorporation in career exploration games and instructional materials
- Multiple (13 or more) congruence indexes stimulated by the idea of hexagonal congruence

Relations Among the Personality Types

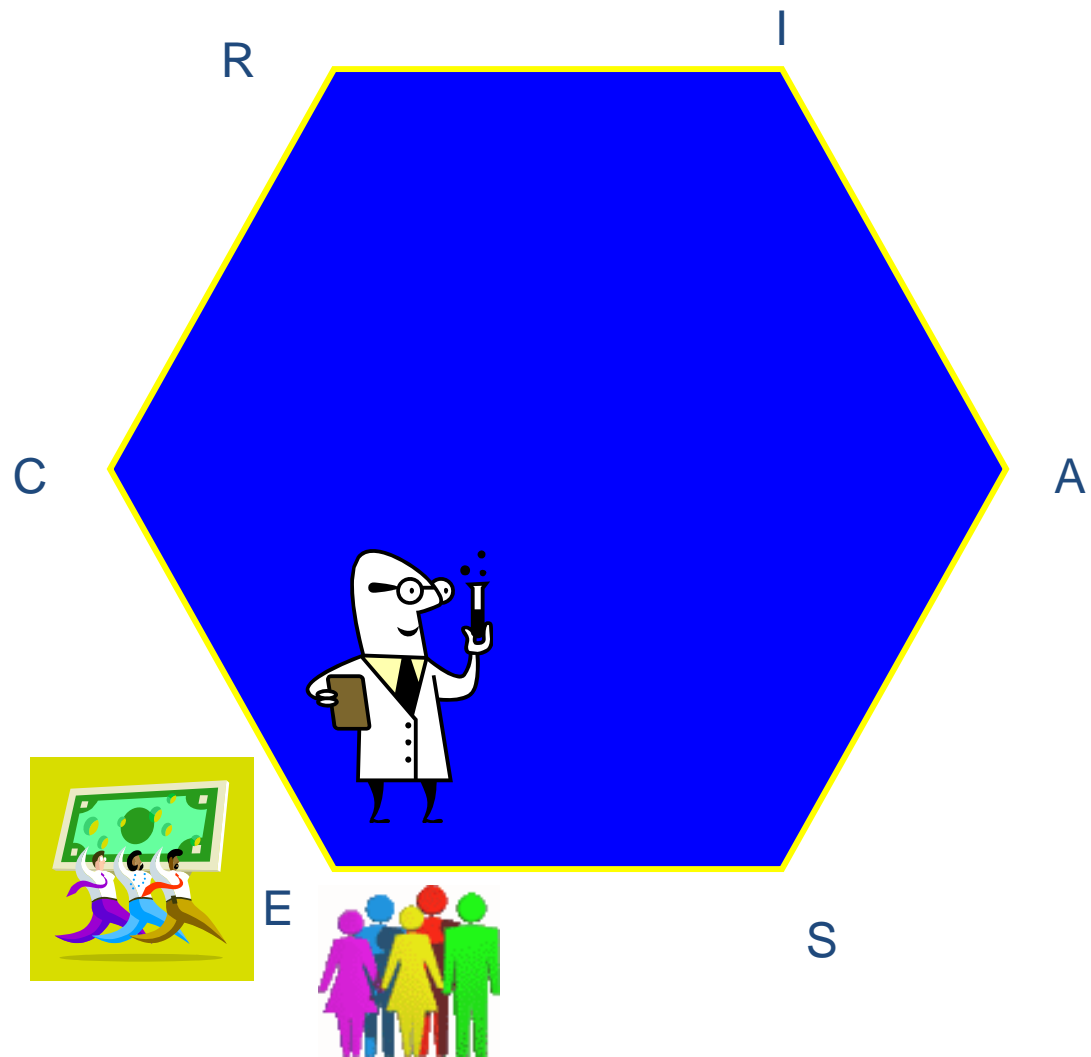


Resemblance to personality types is assessed by the SDS

Congruence: An Investigative Person in an Investigative Environment



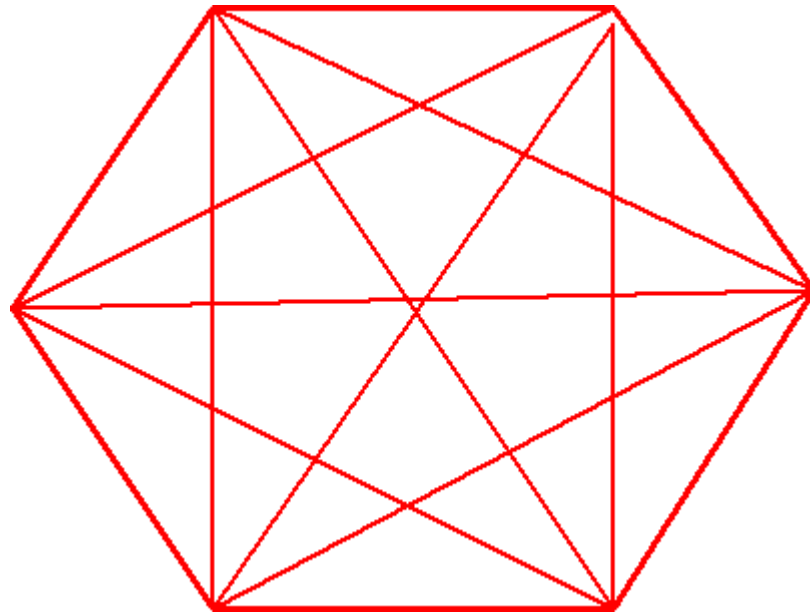
Incongruence: An Investigative Person in an Enterprising Environment



Getting Fired, 1969

John Holland

HAVE HEXAGON



WILL TRAVEL

Johns Hopkins (1969-1980)

- Assembled first form of a self-scored inventory to assess
 - vocational preferences
 - preferred activities
 - competencies
 - and self-ratings of abilities
- No scoring keys or norms
- John's fellow graduate student from Minnesota, Thomas Magoon (by then director of the counseling center at the University of Maryland)
 - advised him on the name of the device (call it self-directed something)
 - tried it with students engaged in educational and career planning, and
 - provided encouragement
- Published by Consulting Psychologists Press in 1971, the Self-Directed Search (SDS) became a successful, widely imitated test
- "Later, I realized that developing the SDS was an attempt to demonstrate that I was still a valuable person."

Pink and Blue Interest Inventories

- Campbell & Holland (1972) collaborated to develop Holland scales for the SVIB.
- These were used to organize the “Merged” form (for both men and women) of the Strong-Campbell Interest Inventory
 - Eventually revised with odd norms to become today’s Strong Interest Inventory
 - Campbell no longer involved
- Earlier, Campbell had committed what he called the biggest psychometric blunder in history: Selecting the wrong colors for a revision of the Strong. This had helped to kindle a controversy that lasted most of the decade of the 1970s.

Johns Hopkins (1969-1980, Cont.)

- The SDS attracted the wrath of the women's movement around 1972. Among the complaints:
 - Men and women obtain different scores, on average
 - Men scored much higher on the Realistic scale (preferences for mechanics and working with things) and women scored much higher on the Social scale (preferences for helping and teaching others)
 - Inclusion of items such as “I can make simple plumbing repairs” but not “I can operate a sewing machine” in the Realistic scale signifies bias
 - Use of sexist wording such as “stock and bond salesman” limits the options of women
 - Sex differences could be erased by using within sex norms
 - This and other tests limited the options of women

Johns Hopkins (1969-1980, Cont.)

- Research conducted in the 1970s showed . . .
 - Use of words such as “fireman” rather than “firefighter” has little effect on scores
 - “Knitting” and similar popular suggestions are poor items for a Realistic scale. Many suggested improvements don’t work
 - Experimental results imply that the SDS has beneficial effects for both men and women
 - Within sex norming implies that women who say “no” to most Realistic items would get scores suggesting that they consider the occupation of diesel mechanic
- Nevertheless the SDS and VPI were revised to eliminate sexist wording and to suggested changes that were not contraindicated by empirical evidence
- Between about 1972 and 1978 this issue consumed a tremendous amount of research time

Johns Hopkins (1969-1980, Cont.)

- Other research progress related to Holland's theory in the 1970s
 - Revisions and validity tests of the SDS and accessory materials (the occupational classification)
 - Theoretical studies of congruency and career decision-making
 - Extensions and revisions of the occupational classification
 - Studies of adult work histories as tests of the theory
 - Experimental studies of the effects of the SDS on the test taker
 - Research on the Vocational Identity Scale
 - Application of the classification to describe the U.S. occupational structure, changes in the structure over time, and the relation between the work people want and what is available

Early Retirement (1980 on)

- Why?
 - “I was ambivalent about teaching and academic life.”
 - “A major source of stress was the time I had to spend dealing with criticism about the alleged sex bias of the SDS.”
 - “My stress came on top of my full time teaching and SDS maintenance work—revisions and manuals, and working on revisions of the theory.”
 - “I talked my retirement over with Elsie; it worried her, but our accountant reassured us.”
 - “I saw early retirement as a chance to spend more time with my hobbies—playing the piano, woodworking, and planning a revision of the theory.”
- “I retired in 1980 and bought a grand piano—a dream I had for many years. Even mistakes sound OK on a grand piano.”



1980



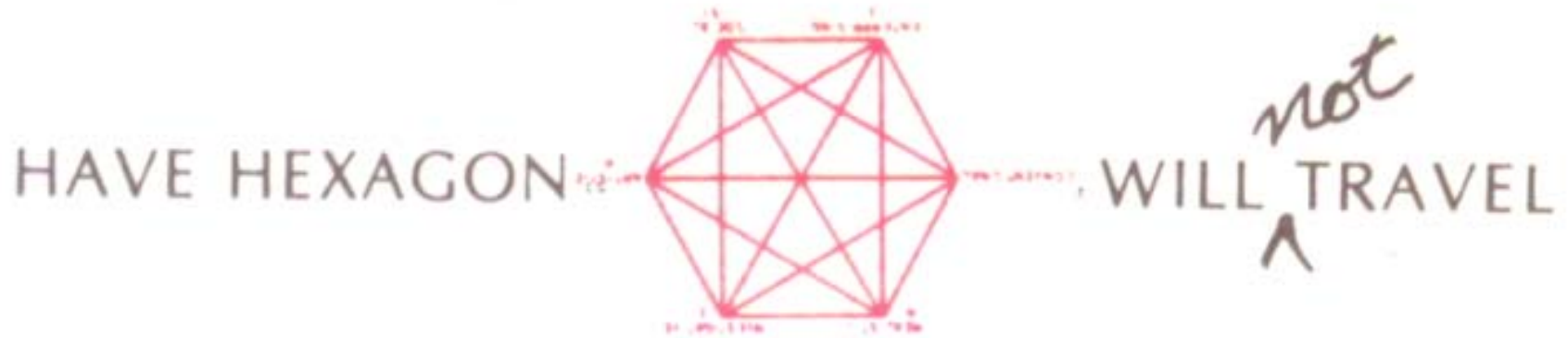
Above: Holland making speech on the occasion of his retirement (basement of the Hopkins Club). Above left: Holland and Arnie Spokane, same occasion



John & Elsie Holland, New Year's Eve, 1979

John Holland

Critic/Developer/Researcher



Baltimore

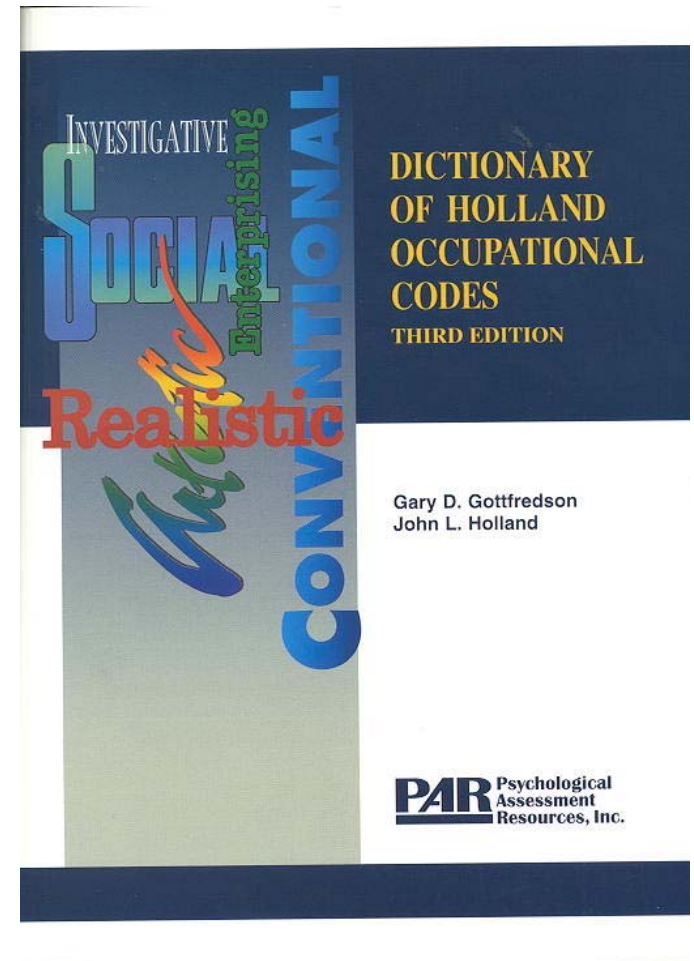
Odessa

Omaha

Tampa

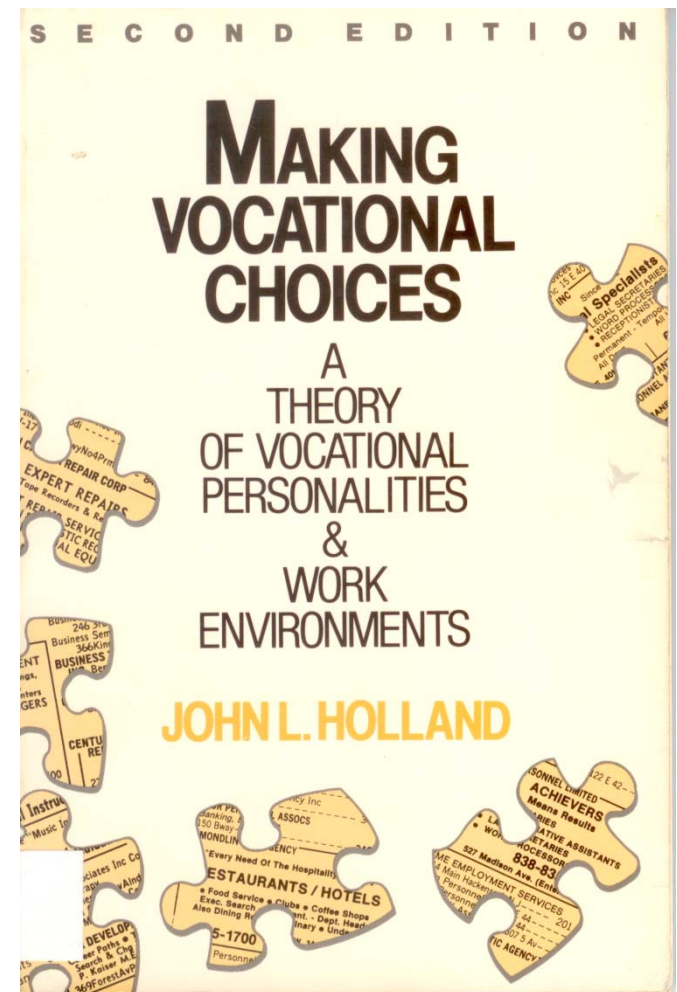
1980s and 1990s

- 1982--Collaborated with Gottfredson on empirical extension of the occupational classification using job analysis data archives for the DOT (over 12,000 occupations)
- 1989—Revised and extended to more occupations
- 1998—Revised and extended again
 - cognitive complexity level added to the classification
 - DOT, Census, OES, CIP, SOC classifications

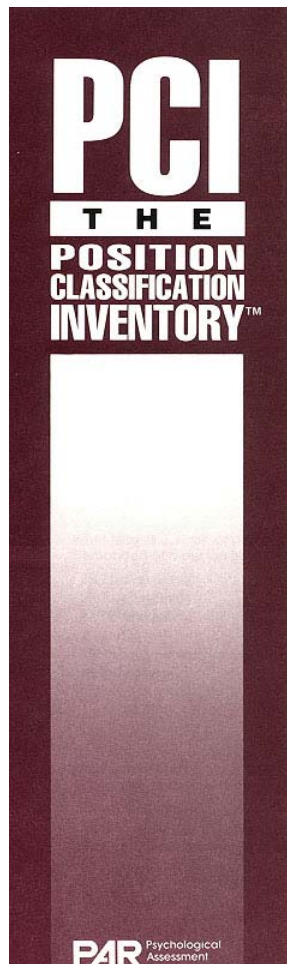


1980s and 1990s

- 1985—A major revision of the theory
 - More comprehensive and explicit in describing constructs and applications
 - Incorporated Identity
 - De-emphasized earlier ideas that hadn't worked (consistency)
 - Introduced new ideas about learning and development
 - Updated section on evidence



1980s and 1990s

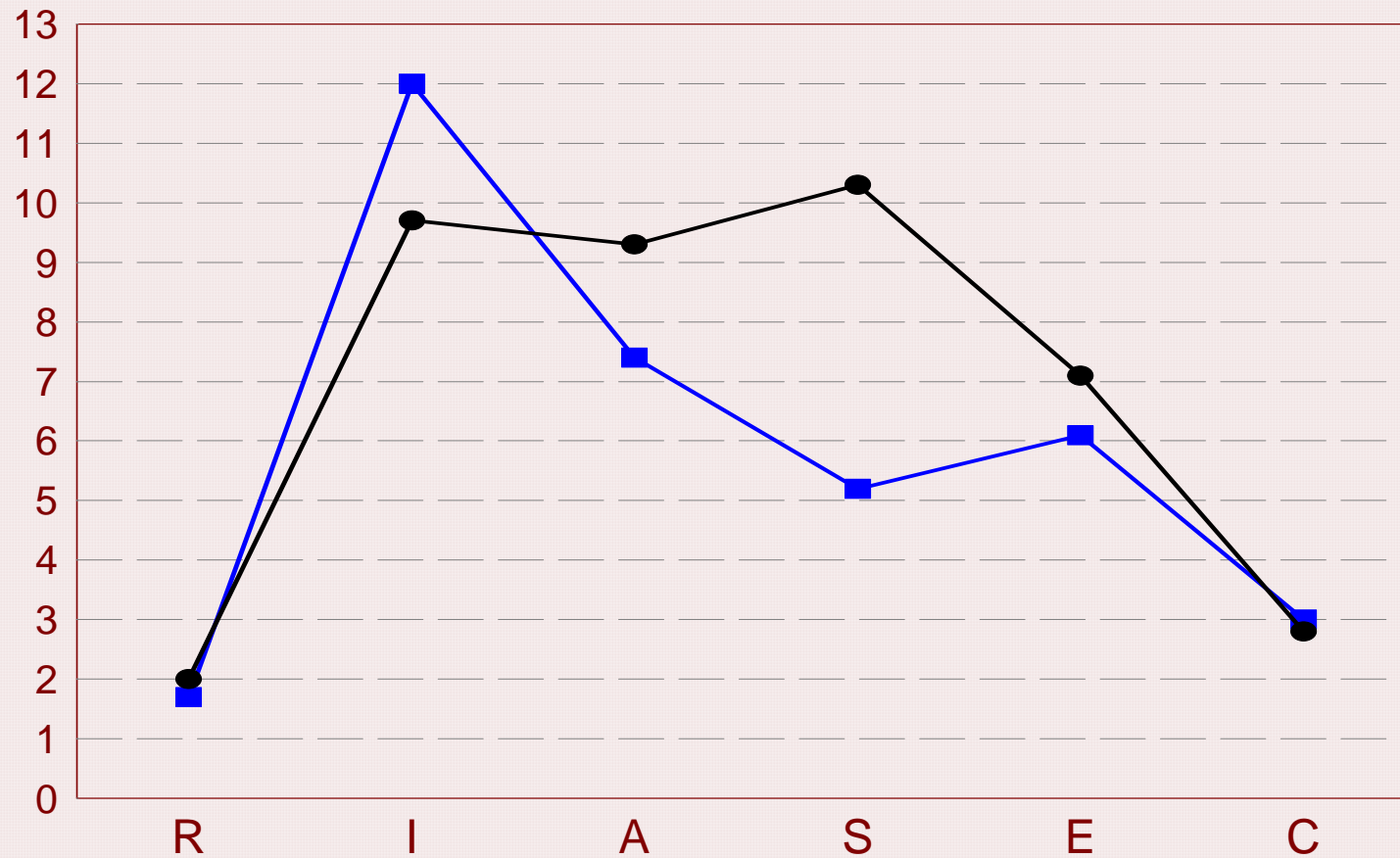


ITEM BOOKLET

By Gary D. Gottfredson, Ph.D.
John L. Holland, Ph.D.

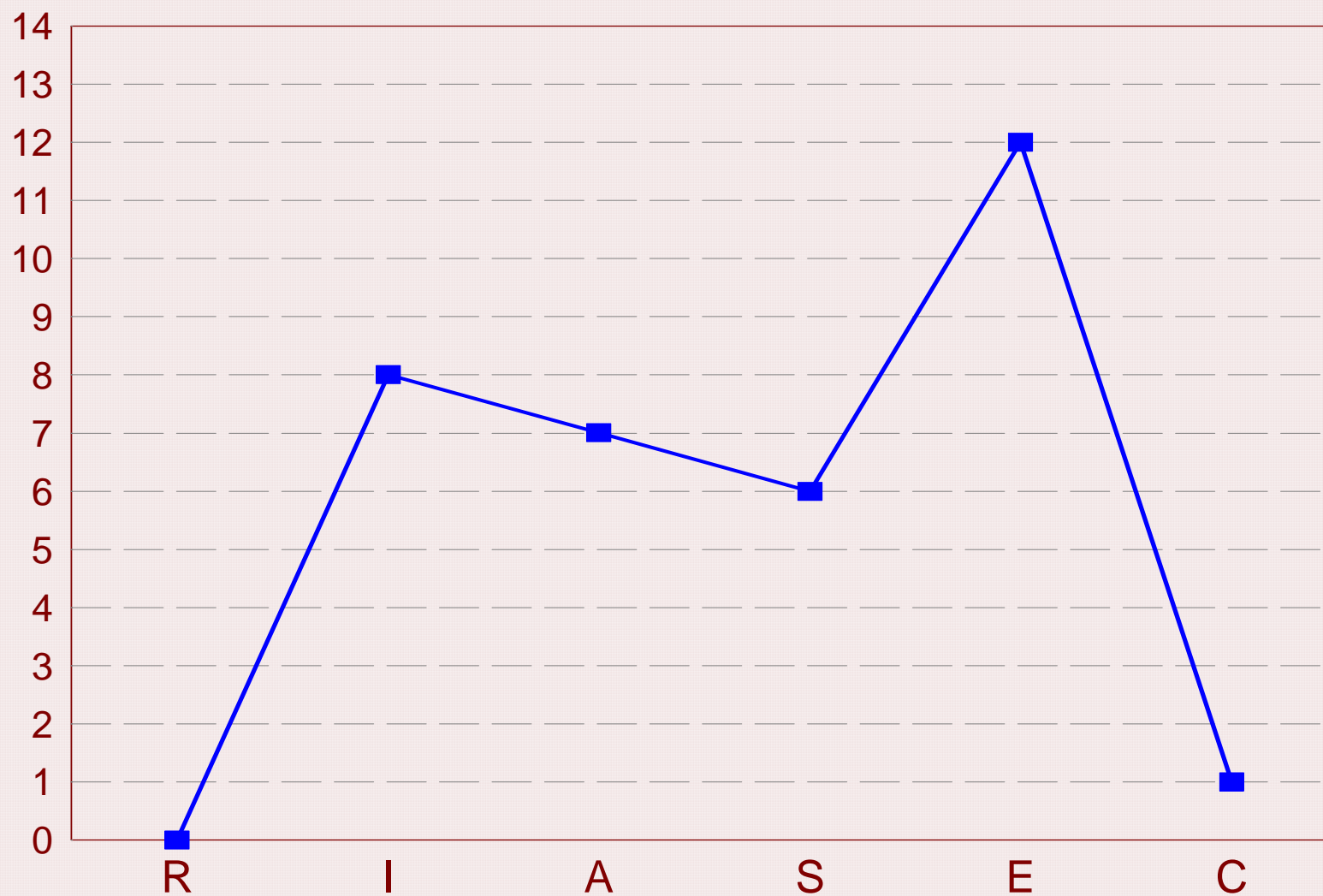
- 1991—Collaborated with Gottfredson in the development of the Position Classification Inventory (PCI)
 - An inventory to assess the resemblance of a work environment to the environmental models
 - Capable of replacing approximation methods (DHOC) for classifying work environments

Position Classification Inventory PCI Profile for Two Specialities

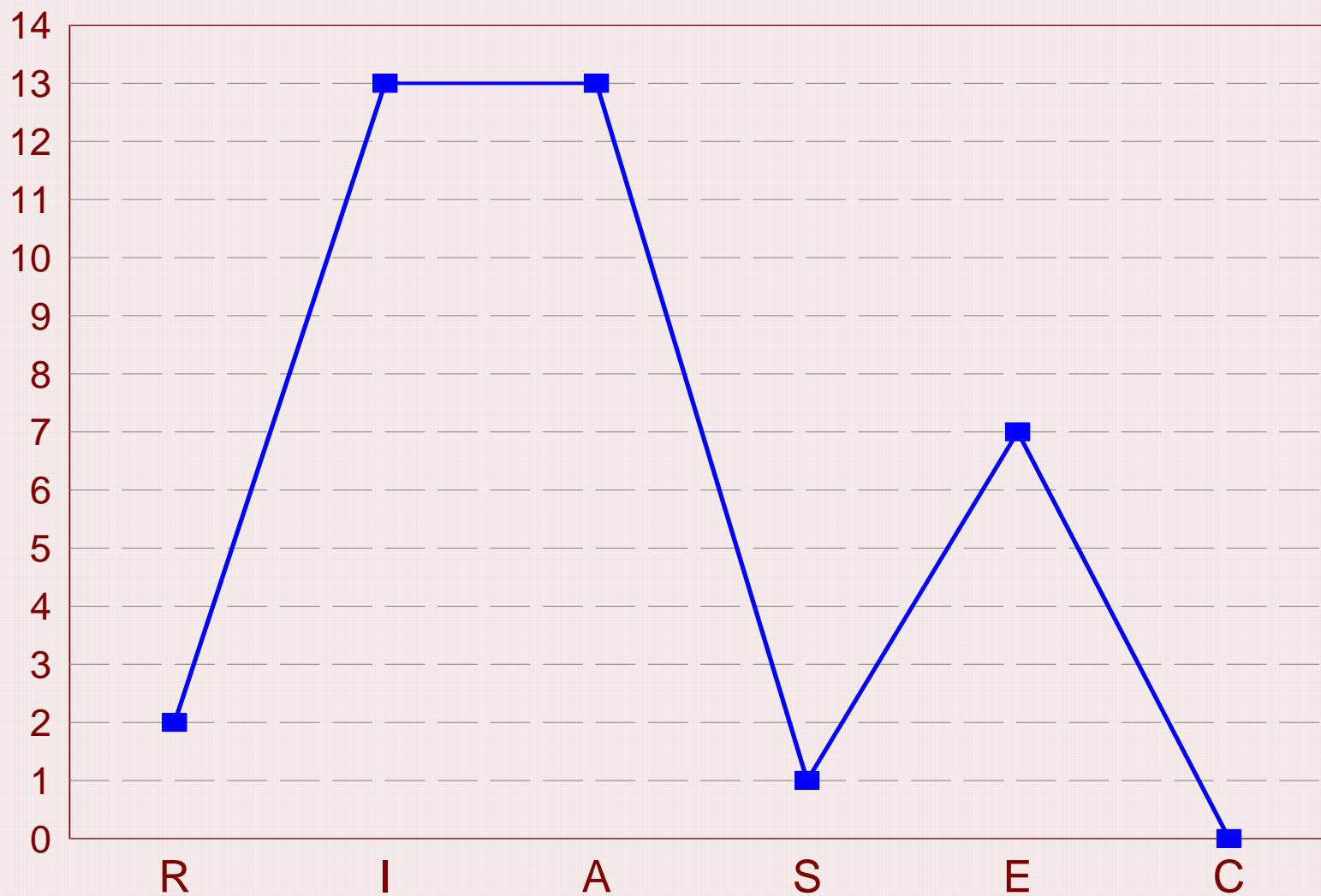


—■— Social psychologist (n = 22) —●— Clinical psychologist (n = 14)

Position Classification Inventory
Administrative Officer, APA -- 1977



Position Classification Inventory
Principal Research Scientist--JHU



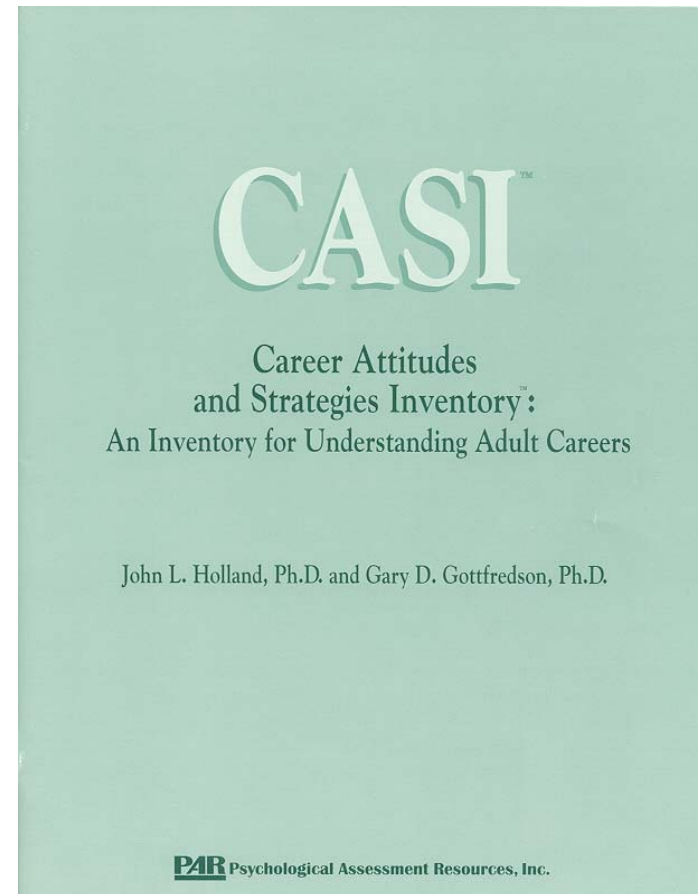
A Brief Description of the Holland Environmental Typology

Attribute	Environmental Type					
	Realistic	Investigative	Artistic	Social	Enterprising	Conventional
Requires	Manual and mechanical competencies, interaction with machines, tools, and objects	Analytical, technical, scientific, and verbal competencies	Innovation or creative ability, emotionally expressive interaction with others	Interpersonal competencies, skill in mentoring, treating, healing, or teaching others	Skills in persuasion and manipulation of others	Clerical skills, skills in meeting precise standards for performance
Demands and rewards the display of	Conforming behavior, practical accomplishment	Skepticism and persistence in problem solving, documentation of new knowledge, understanding or solution of problems	Imagination in literary, artistic or musical accomplishment	Empathy, humanitarianism, sociability, friendliness	Initiative in the pursuit of financial or material accomplishment; dominance; self-confidence	Organizational ability, conformity, dependability
Values or personal styles allowed expression	Practical, productive and concrete values; robust, risky, adventurous styles	Acquisition of knowledge through scholarship or investigation	Unconventional ideas or manners, aesthetic values	Concern for the welfare of others	Acquisitive or power-oriented styles, responsibility	Conventional outlook and concern for orderliness and routines
Occupations or other environments involve	Concrete, practical activity; use of machines, tools, materials	Analytical or intellectual activity aimed at trouble-shooting or creation and use of knowledge	Creative work in music, writing, performance, sculpture, or unstructured intellectual endeavors	Working with others in a helpful or facilitating way	Selling, leading, manipulating others to attain personal or organizational goals	Working with things, numbers, or machines to meet predictable organizational demands or specified standards
Sample occupations	Carpenter, truck operator	Psychologist, microbiologist	Musician, interior designer	Counselor, clergy member	Lawyer, retail store manager	Production editor, bookkeeper

Gottfredson, G. D., & Holland, J. L. (1996). *Dictionary of Holland occupational codes* (3rd ed.). Odessa, FL: Psychological Assessment Resources. (Table 2, p. 4)

1980s and 1990s

- 1992-94—Collaborated with Gottfredson on sources of career change and stability not explained by congruence
 - Result was the Career Attitudes and Strategies Inventory (CASI)



CASI Profile Sheet



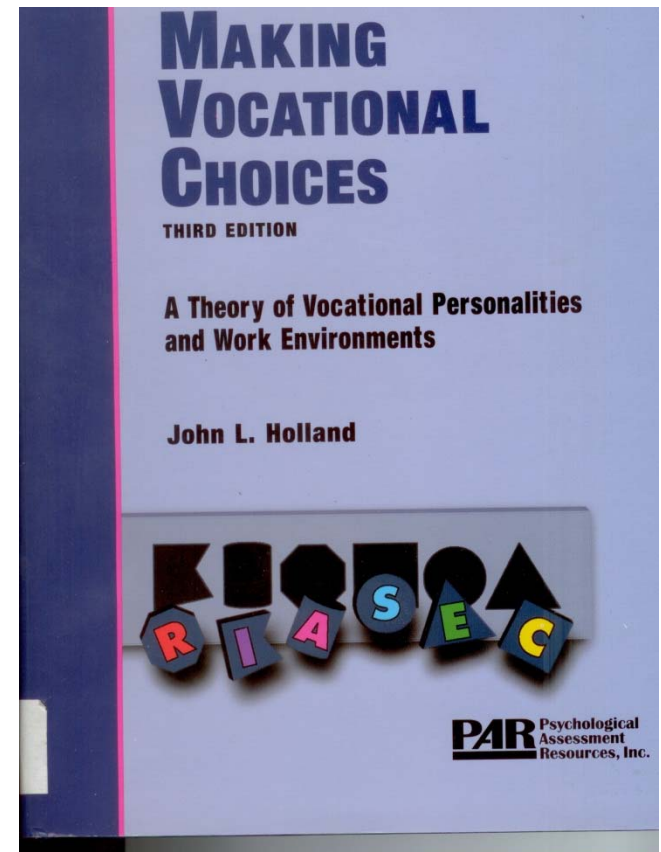
Name: Lenore
Date: June 2002

T score

Number of career obstacles: 0

1980s and 1990s

- 1997—Another revision of the theory
 - Summarized evidence about Identity
 - Made formulations about “Environmental Identity” (or Organizational Focus) parallel those for the individual formulations
 - Revised formulations of personality types and environmental models based on empirical research using the SDS and PCI as well as other tools



Publisher Trouble

- In 1999 PAR produced an Internet product it called the SDS
- This product
 - Lacked Holland's approval
 - Was not in any sense self-directed as it was scored and interpreted by computer
 - Omitted the aspiration section of the SDS (the component with the most predictive value)
 - Was produced and published without benefit of research
- PAR's President insisted that he did not need approval to publish this Internet product
- Holland sued, the suit continued for several years, with both sides eventually making some concessions
- The law suit was time and energy consuming and demoralizing; this dispute marked the end of Holland's scientific and professional productivity

Holland's Distinctive Style

- Persistence and goal directedness (short- & long-term)
- Attending to data (including what he observed)
- Revising ideas and eliminating those that don't work
- Using the help of others
 - technical skill (Astin, Richards, Cole, Gottfredson)
 - influence & connections (Darley, Rossi & Coleman)
 - the stock broker in the elevator
 - colleagues with knowledge in diverse areas (Alston, Feigl, Kent)
- Treating others with respect (in his own Paleolithic, unreconstructed way)

Holland's Distinctive Style (Cont.)

- Striving to write clearly about his ideas to higher education professionals, psychologists, counselors and clients
 - Using and presenting simple, straightforward data rather than complex or difficult-to-understand reports
- Developing devices that are self-administered and self-interpreted
- Engaging his colleagues and subordinates in his and their work
- Use of humor to communicate (“Roll for Life”)
- Calling it as he saw it rather than bowing to pressure

Some Unfrocking Contributions

- Classified vocational aspirations predict category of eventual occupation better than do interest inventories (any)
- Colleges that appear more productive of scientists to a large extent just recruit better students
- Selection on the basis of test scores and grades results in loss of nonacademic talent
- Accomplishment in college are better predicted by earlier accomplishments of the same type than by some traditional selection methods
- “Roll for Life”

To Read More

- Holland, J. L. (1997). *Making vocational choices: A theory of vocational personalities and work environments*. Odessa, FL: Psychological Assessment Resources. (www.parinc.com)
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