

**Psychology 4010/6017**  
**Human Abilities**  
**Spring, 2010**  
**Mondays, 4:05 - 6:55 p.m., Room 217 J.S. Coon Building**

**Instructor: Prof. P. L. Ackerman**

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**Prerequisites:**

Undergraduate: Psychology 2020  
Graduate: Graduate status

**Course Description:**

Theory, methods and applications of research in human abilities. Topics include intelligence, aptitude, achievement, specific abilities, information processing/learning and intelligence, aptitude/treatment interactions, and quantitative measurement issues.

**Required Texts:**

Cronbach, L. J. (1990). *Essentials of psychological testing. 5th Edition*. New York: Harper & Row.

Kim, J., & Mueller, C. W. (1978). *Introduction to factor analysis: What it is and how to do it*. Beverly Hills, CA: Sage.

Additional Readings [availability to be arranged on the first day of class]

**General Course Information and Requirements:**

Class meetings will primarily be devoted to lectures by the instructor. Students are encouraged to ask questions and take part in discussion during regular class periods. A midterm exam and a cumulative final exam will be given. Also, one term paper will be required from each class member.

**Course Grading:**

Your grade for the course will be determined as follows:

	<i>Weight</i>
Mid Term Exam	30%
Term Paper	25%
Final Exam	45%

**Term Paper:**

One of the important goals of this advanced course in human abilities is to be able to critically evaluate historical arguments and current theoretical/empirical research. Critical treatment of such issues depends on developing competence in evaluating the theoretical and methodological adequacy of journal articles and book chapters. The term paper will require you to critically evaluate research discussed in the course readings and additional readings.

**Term Paper:**

The term paper is due at the beginning of class, on the last day of class, **April 26, 2010**, will allow some freedom in the choice of topics. Any topic from the last half of the class may be considered (e.g., the differentiation hypothesis; intelligence & learning; the existence of aptitude - treatment interactions; the foundation of sex, race, or ethnic differences in abilities; or bias in mental testing). The assignment is to choose one of these controversial issues and **critically evaluate the controversy**. The evaluation should focus on the strength of the theoretical arguments and empirical support for each position. The paper are to be based mainly on **primary** literature (e.g., empirical and theoretical journal articles), and not on secondary sources (e.g., books, chapters, review articles). The final product is to include your own conclusions and clear justification for your position. [**Target length: 12 Pages**]

References are to be cited using APA style. (For such information, you should consult the following reference: *Publication Manual of the American Psychological Association: 6th Edition*. (2009). Washington, DC: APA.) Although papers will not specifically be graded on the basis of grammar or spelling, poorly written papers are very difficult to read; it is often hard to see good ideas in a jumble of misspelled words, with stream-of-consciousness writing, and so on. Therefore, it is important to pay attention to style in addition to content in the preparation of your paper. **LATE TERM PAPERS WILL BE DOCKED 5 POINTS FOR EACH DAY LATE.**

**MEETING TOPICS AND ASSIGNMENTS**

<b>Meeting Date</b>	<b>Topic</b>	<b>Assignment</b>
1/11	Overview and History of Human Abilities Galton, Cattell, Binet . . .	Cronbach Chs. 1,2
	Methodology I. Theory and Method. A review of test theory	Cronbach Chs. 5,6
<b>1/18</b>	<b><i>Official School Holiday -- No class</i></b>	

Meeting Date	Topic	Assignment
1/25	Methodology I. Continued	
a.	Reliability/Validity	
b.	Bandwidth/Fidelity Paradox	
	Methodology II. Factor Analysis Techniques	Kim & Mueller (1978)
a.	The data foundation	Cronbach Ch. 10
b.	Various procedures (factor extraction, rotation, model-testing, etc.)	
2/1	Completion of Factor Analysis	
	Test Construction and Measurement Issues.	Cronbach Chs. 7,8
a.	Individual Measures (Stanford-Binet, WAIS, etc.)	
b.	Group Measures	
c.	"Culture-free" vs. Culture-Loaded tests	
2/8	Models and Theories of Abilities (Factor Analysis, Multiple Factors)	Wolfe (1940)
a.	Spearman	Guilford (1956)
b.	Thurstone	McNemar (1964)
c.	Guilford	
2/15	Modern Models and Theories of Abilities (Hierarchical Factors, The Radex)	Humphreys (1962)
a.	Vernon	Horn & Cattell (1966)
b.	Cattell & Horn	Horn (1968)
c.	Humphreys	Humphreys (1979)
d.	Snow et al.	
2/22	Specific Abilities	
a.	Intelligence, Aptitude, & Achievement	Humphreys (1973)
b.	Differential Abilities	Lohman (2005)
c.	Classification Issues	Ackerman (1994)
d.	Taxonomies of Abilities	Horn (1989)
e.	Verbal vs. Non-Verbal Abilities	
3/1	Information Processing Abilities (including Working Memory)	
a.	Hunt et al.	Hunt et al. (1975)
b.	Carroll	Carroll (1993)
c.	Sternberg	Sternberg (1985)

<b>Meeting Date</b>	<b>Topic</b>	<b>Assignment</b>
3/8	<b>Midterm Examination</b>	
3/15	Development and Stability	
a.	Measurement of Change -- Lord	Lord (1963)
b.	Differentiation	Garrett (1946)
c.	Life-Span Approaches	Schaie & Strother (1968)
		Reinert (1970)
		Ackerman (1996)
3/22	<b>No Class - Spring Recess</b>	
3/29	Trait complexes -- Personality, Interests, and Intelligence	Lubinski (2000)
		Ackerman (2000)
		Ackerman & Heggstad (1997)
4/5	Specific Learning & Intelligence	
a.	Woodrow	
b.	Ferguson	Ferguson (1954)
c.	Zeaman & House	Zeaman & House (1967)
d.	Brown, Campione	Campione, Brown, & Bryant (1985)
e.	Fleishman	Fleishman (1972)
g.	Learning Abilities	Ackerman (1987, 2007)
4/12	Aptitude - Treatment Interactions	
a.	Theory -- Cronbach	Cronbach (1957, 1975)
b.	Cronbach & Snow	Snow (1989)
		Snow (1996)
4/19	Gender, Race, & Ethnic Group Differences.	
a.	Magnitude and source of differences	Hyde (1981)
b.	Theory	Halpern (2000)
4/26	<b>Term Paper Due</b>	
	Bias	
a.	Background (Discrimination vs. Bias)	Cleary, et al. (1975)
b.	Theory and statistical issues (Cleary, et al.)	Reschly (1980)
c.	Public Policy: The data and the court cases (Jencks, et al., Peterson & Novick, Larry P. v. Riles, P.A.S.E. v. Hannon)	
d.	Summary and directions for the future.	Carroll (1997)

**FINAL EXAMINATION -- Friday, May 7, 11:30 am - 2:20 pm**

## TEXTS

- Cronbach, L. J. (1990). *Essentials of psychological testing. 5th Edition*. New York: Harper & Row.
- Kim, J., & Mueller, C. W. (1978). *Introduction to factor analysis: What it is and how to do it*. Beverly Hills, CA: Sage.

## Additional Required Readings

- Ackerman, P. L. (1987). Individual differences in skill learning: An integration of psychometric and information processing perspectives. *Psychological Bulletin*, 102, 3-27.
- Ackerman, P. L. (1994). Intelligence, attention, and learning: Maximal and typical performance. Chapter in D. K. Detterman (Ed.) *Current Topics in Human Intelligence; Volume 4: Theories of Intelligence*, pp. 1-27. Norwood, NJ: Ablex.
- Ackerman, P. L. (1996). A theory of adult intellectual development: process, personality, interests, and knowledge. *Intelligence*, 22, 229-259.
- Ackerman, P. L. (2000). Domain-specific knowledge as the “dark matter” of adult intelligence: gf/gc, personality and interest correlates. *Journal of Gerontology: Psychological Sciences*, 55B (2), P69-P84.
- Ackerman, P. L. (2007). New developments in understanding skilled performance. *Current Directions in Psychological Research*, 16, 235-239.
- Ackerman, P. L., & Heggstad, E. D. (1997). Intelligence, personality, and interests: Evidence for overlapping traits. *Psychological Bulletin*, 121, 219-245.
- Campione, J. C., Brown, A. L., & Bryant, N. R. (1985). Individual differences in learning and memory. Chapter 5 In R. J. Sternberg (Ed.), *Human abilities: An information-processing approach*, pp. 103-126. San Francisco: Freeman.
- Carroll, J. B. (1993). *Human cognitive abilities* (Chapter 16, pp 631-655). New York: Cambridge University Press.
- Carroll, J. B. (1997). Psychometrics, intelligence, and public perception. *Intelligence*, 24, 25-52.
- Cleary, T. A., Humphreys, L. G., Kendrick, S. A., & Wesman, A. (1975). Educational uses of tests with disadvantaged students. *American Psychologist*, 30, 15-41.
- Cronbach, L. J. (1957). The two disciplines of scientific psychology. *American Psychologist*, 12, 671-684.
- Cronbach, L. J. (1975). Beyond the two disciplines of scientific psychology. *American Psychologist*, 30, 116-127.
- Ferguson, G. A. (1954). On learning and human ability. *Canadian Journal of Psychology*, 8, 95-112.
- Fleishman, E. A. (1972). On the relation between abilities, learning, and human performance. *American Psychologist*, 27, 1017-1032.
- Garrett, H. E. (1946). A developmental theory of intelligence. *American Psychologist*, 1, 372-378.
- Guilford, J. P. (1956). The structure of intellect. *Psychological Bulletin*, 53, 267-293.

- Halpern, D. F. (2000). *Sex differences in cognitive abilities*. (3rd Edition). Mahwah, NJ: Erlbaum. (Chapter 3. pp. 81-130).
- Horn, J. L. (1968). Organization of abilities and the development of intelligence. *Psychological Review*, 75, 242-259.
- Horn, J. L. (1989). Cognitive diversity: A framework of learning. In P. L. Ackerman, R. J. Sternberg, & R. Glaser (Eds.). *Learning and individual differences. Advances in theory and research* (pp. 61-116). New York: W. H. Freeman.
- Horn, J. L. & Cattell, R. B. (1966). Refinement and test of the theory of fluid and crystallized general intelligences. *Journal of Educational Psychology*, 57, 253-270.
- Humphreys, L. G. (1962). The organization of human abilities. *American Psychologist*, 17, 475-483.
- Humphreys, L. G. (1973). The misleading distinction between aptitude and achievement tests. In D. R. Green (Ed.), *The aptitude-achievement distinction*. Proceedings of the Second CTB/McGraw-Hill Conference on Issues in Educational Measurement (pp. 262-285). Carmel, CA: CTB/McGraw-Hill.
- Humphreys, L. G. (1979). The construct of general intelligence. *Intelligence*, 3, 105-120.
- Hunt, E., Lunneborg, C., & Lewis, J. (1975). What does it mean to be high verbal? *Cognitive Psychology*, 7, 194-227.
- Hyde, J. S. (1981). How large are cognitive gender differences? A meta-analysis using  $\omega^2$  and  $d$ . *American Psychologist*, 36, 892-901.
- Lohman, D. F. (2005). Is ability separate from achievement? *Cognitively Speaking*, 4, 1-7.
- Lord, F. M. (1963). Elementary models for measuring change. In C. W. Harris (Ed.) *Problems in measuring change*. Madison, WI: University of Wisconsin Press, 21-38.
- Lubinski, D. (2000). Scientific and social significance of assessing individual differences: "Sinking shafts at a few critical points." *Annual Review of Psychology*, 51, 405-444.
- McNemar, Q. (1964). Lost: Our intelligence? Why? *American Psychologist*, 19, 871-882.
- Reinert, G. (1970). Comparative factor analytic studies of intelligence throughout the human life-span. In L. R. Goulet & P. B. Baltes (Eds.), *Life-span developmental psychology*, 467-484. New York: Academic Press.
- Reschly, D. J. (1980). Psychological evidence in the Larry P. Opinion: A case of right problem - wrong solution? *School Psychology Review*, 9, 123-135.
- Schaie, K. W., & Strother, C. R. (1968). A cross-sequential study of age changes in cognitive behavior. *Psychological Bulletin*, 70, 671-680.
- Snow, R. E. (1989). Aptitude-treatment interaction as a framework for research on individual differences in learning. In P. L. Ackerman, R. J. Sternberg, & R. Glaser (Eds.). *Learning and individual differences. Advances in theory and research* (pp. 13-59). New York: W. H. Freeman.
- Snow, R. E. (1996). Aptitude development and education. *Psychology, Public Policy, and Law*, 2, 536-560.
- Sternberg, R. J. (1985). Introduction: What is an information processing approach to human abilities? (pp. 1-4) and General intellectual ability. (Chapter 1; 5-29). In R. J. Sternberg (Ed.). *Human abilities: An information-processing perspective*. San Francisco: Freeman.

- Wolfe, D. (1940). *Factor analysis to 1940*. Chicago: University of Chicago Press, (Also, *Psychometric Monograph* No. 3.)
- Zeaman, D., & House, B. J. (1967). The relation of IQ and learning. In R. M. Gagné (Ed.) *Learning and individual differences*. Columbus, OH: Charles Merrill, 192-212.

### **Supplemental References**

Below is a list of readings that you may find useful in following-up topics covered in this course.

#### **Ability Theory**

- Burt, C. (1949). The structure of the mind, a review of the results of factor analysis. *British Journal of Educational Psychology*, 19, 110-111, 176-199.
- Carroll, J. B. (1993). *Human cognitive abilities: A survey of factor-analytic studies*. New York: Cambridge University Press.
- Cattell, R. B. (1963). Theory of fluid and crystallized intelligence: A critical experiment. *Journal of Educational Psychology*, 54, 1-22.
- Guilford, J. P. (1967). *The nature of human intelligence*. New York: McGraw-Hill.
- Gustafsson, J. (1984). A unifying model for the structure of intellectual abilities. *Intelligence*, 8, 179-203.
- Humphreys, L. G. (1985). General intelligence: An integration of factor, test, and simplex theory. In B. B. Wolman, (Ed.). *Handbook of intelligence*. New York: Wiley.
- Jensen, A. R. (1998). *The g factor: The science of mental ability*. Westport, CT: Praeger.
- Lohman, D. F. (1987). Spatial abilities as traits, processes, and knowledge. In R. J. Sternberg (Ed.), *Advances of the psychology of human intelligence* (Vol. 4, pp. 181-248). Hillsdale, NJ: Erlbaum.
- Spearman, C. (1904). General intelligence objectively determined and measured. *American Journal of Psychology*, 15, 201-293.
- Sternberg, R. J. (1990). *Metaphors of mind: Conceptions of the nature of intelligence*. Cambridge: Cambridge University Press.
- Thurstone, L. L. (1938). Primary mental abilities. *Psychometric Monographs*, 1.
- Vernon, P. E. (1961). *The structure of human abilities*. New York: Wiley.
- Wechsler, D. (1950). Cognitive, conative, and non-intellective intelligence. *American Psychologist*, 5, 78-83.

#### **Ability Testing**

- Anastasi, A., & Urbina, S. (1997). *Psychological testing. 7th Edition*. New York: Prentice Hall.
- Carroll, J. B. (1982). The measurement of intelligence. In R. J. Sternberg (Ed.), *Handbook of human intelligence*. Cambridge: Cambridge University Press. 29-120.
- Wechsler, D. (1955). *Manual for the Wechsler Adult Intelligence Scale*. NY: Psychological Corporation.

### **Learning & Intelligence**

- Ackerman, P. L. (2000). A reappraisal of the ability determinants of individual differences in skilled performance. *Psychologische Beiträge*, 42, 4-17.
- Ackerman, P. L., & Kyllonen, P. C. (1991). Trainee characteristics. Chapter in J. E. Morrison (Ed.) *Training for performance: Principles of applied human learning* (pp. 193-229). West Sussex, England: John Wiley & Sons, Ltd.
- Allison, R. B. (1960). *Learning parameters and human abilities*. (Office of Naval Research Technical Report.) Princeton, NJ: Educational Testing Service.
- Ferguson, G. A. (1956). On transfer and the abilities of man. *Canadian Journal of Psychology*, 10, 121-131.
- Fleishman, E. A., & Hempel, W. E., Jr. (1954). Changes in factor structure of a complex psychomotor test as a function of practice. *Psychometrika*, 19, 239-252.
- Fleishman, E. A., & Hempel, W. E., Jr. (1955). The relation between abilities and improvement with practice in a visual discrimination reaction task. *Journal of Experimental Psychology*, 49, 301-316.
- Snow, R. E., Kyllonen, P. C., & Marshalek, B. (1984). The topography of ability and learning correlations. In R. J. Sternberg (Ed.), *Advances in the psychology of human intelligence*. Vol. 2. Hillsdale, NJ: Erlbaum. 47-103.
- Stake, R. E. (1962). Learning parameters, aptitudes, and achievements. *Psychometric Monographs*, 9, 1-70.
- Woodrow, H. (1946). The ability to learn. *Psychological Review*, 53, 147-158.

### **Information Processing and Abilities**

- Ackerman, P. L., Beier, M. E., & Boyle, M. O. (2002). Individual differences in working memory within a nomological network of cognitive and perceptual speed abilities. *Journal of Experimental Psychology: General*, 131, 567-589.
- Ackerman, P. L., Beier, M. E., & Boyle, M. O. (2005) Working memory and intelligence: The same or different constructs? *Psychological Bulletin*, 131, 30-60.
- Hunt, E., Frost, N., & Lunneborg, C. (1973). Individual differences in cognition: A new approach to intelligence. In G. Bower (Ed.), *Psychology of learning and motivation* (Vol. 7). NY: Academic Press.
- Sternberg, R. J. (1977). *Intelligence, information processing, and analogical reasoning: The componential analysis of human abilities*. Hillsdale, NJ: Erlbaum.
- Underwood, B. J. (1975). Individual differences as a crucible in theory construction. *American Psychologist*, 30, 128-134.

### **Developmental Aspects of Intelligence -- Aging**

- Baltes, P. B., Smith, J., & Staudinger, U. M. (1992). Wisdom and successful aging. In *Nebraska Symposium on Motivation*, 39, 123-167.
- Glaser, R. (1991). Intelligence as an expression of acquired knowledge. In H. A. H. Rowe (Ed.), *Intelligence: Reconceptualization and measurement*. Hillsdale, NJ: Erlbaum.



- Hoyer, W. J. (1987). Acquisition of knowledge and the decentralization of g in adult intellectual development. In C. Schooler and K. W. Schaie (Eds.), *Cognitive functioning and social structures over the life course* (pp. 120-141). Norwood, NJ: Ablex.
- Schaie, K. W. (1970). A reinterpretation of age related changes in cognitive structure and functioning. In L. R. Goulet & P. B. Baltes (Eds.), *Life-span developmental psychology*, pp. 423-466. New York: Academic Press.
- Schaie, K. W. (1996). *Intellectual development in adulthood: the Seattle longitudinal study*. New York: Cambridge University Press.

### **Aptitude - Treatment Interactions**

- Cronbach, L. J., & Snow, R. E. (1977). *Aptitudes and instructional methods*. NY: Irvington Publishers.
- Snow, R. E. (1989). Cognitive-conative aptitude interactions in learning. In R. Kanfer, P. L. Ackerman, and R. Cudeck (Eds.) *Abilities, motivation, and methodology: The Minnesota symposium on learning and individual differences* (pp. 435-474). Hillsdale, NJ: Erlbaum.
- Snow, R. E., and Yalow, E. (1982). Education and intelligence. In R. J. Sternberg (Ed.), *Handbook of human intelligence*, pp. 493-585. Cambridge: Cambridge University Press.
- Talbert, J. E., & Cronbach, L. J. (2002). *Remaking the concept of aptitude: Extending the legacy of Richard E. Snow / by the Stanford Aptitude Seminar*. Mahwah, NJ: Erlbaum.

### **Bias, Public Policy**

- Jencks, C., et al. (1972). *Inequality: A Reassessment of the effect of family and schooling in America*. New York: Basic Books.
- Jencks, C., Bartlett, S., Corcoran, M., Crouse, J., Eaglesfield, D., Jackson, G., McClelland, K., Mueser, P., Olneck, M., Schwartz, J., Ward, S., & Williams, J. (1979). *Who gets ahead? The determinants of economic success in America*. New York: Basic Books, Inc.
- Jensen, A. R. (1980). *Bias in mental testing*. New York: Free Press.

### **Factor Analysis**

- Harman, H. H. (1976). *Modern factor analysis*. Chicago: University of Chicago Press.
- Mulaik, S. A. (1972). *The foundations of factor analysis*. New York: McGraw-Hill.