

Final Exam Study Guide — PSY 444 — Spring, 2009

The final exam will be an in-class, closed book exam on Tuesday, May 5th, from 10:00am to 12:00pm. The exam will cover material presented in class and in Crocker and Algina (1986). The exam will be in three parts as described below. The final exam is cumulative and covers all material and chapters covered in the course, with some emphasis on material covered after the midterm. Thus, the study questions for the midterm are still relevant to this exam. The final exam will be worth 400 points.

Part 1: Definitions

This part of the midterm will consist of a number of terms drawn from the list below, which you must define in one or two sentences. For example, you might define the term, "test-retest reliability" as "Test-retest reliability is a form of estimating reliability by administering the same test to the same examinees at two points in time." You will have limited space in which to write your definitions, so longer answers are not necessarily better answers. Further, precise and concise definitions will earn more points than vague or "meandering" definitions.

absolute decisions	Spearman-Brown split-half reliability
alternate forms reliability	split-half reliability
Classical True-Score Model	standard deviation
coefficient alpha	standard error of measurement
composite score	standard error of the estimate
covariance	test
criterion-referenced interpretation	test theory
decision (D) study	test-retest reliability
dichotomous item	true score
difference score	variance
domain-sampling model	variance-covariance matrix
facets and levels	z-score
generalizability (G) study	base rate
generalizability coefficient	biserial correlation
Generalizability Theory	common variance/communality
Hoyt's Method	component loading
internal consistency	component rotation
item difficulty	concurrent validity
KR_{20}	confirmatory factor analysis
linear combination	construct validity
mean square error	content validity
measurement	convergent validity
measurement error	correction for attenuation
MS_{items}	criterion-related validity
$MS_{persons}$	discriminant/divergent validity
norming	exploratory factor analysis (EFA)
one-facet analysis	face validity
p and q	factor analysis
Pearson product moment correlation	factor extraction
percentile ranks	factor loading
relative decisions	factor rotation
reliability coefficient	Kaiser's criterion
reliability generalization	multitrait-multimethod matrix
reliability index	oblique rotation
residual	orthogonal rotation
Rulon-Guttman split-half reliability	predictive validity
Spearman-Brown prophecy formula	principal components analysis (PCA)

principal-axis factoring (PAF)
range restriction
scree plot
selection ratio
simple structure

success ratio/hit rate
Taylor-Russell tables
validation
validity coefficient
varimax rotation

Part 2: Short Answers

This section of the exam includes questions that require a response of perhaps two to four sentences each. These questions will require you to list, explain, compare, or contrast concepts related to test theory. Some, but not all, questions in this section of the exam will be drawn from the list below.

- Crocker and Algina (1986) discuss five problems with psychological measurement that require the study of test theory. What are these five problems?
- Explain one way in which variance and covariance are similar to each other and one way in which they are different from each other.
- How would one go about determining the mean of a composite score found by summing three components?
- How would one go about determining the variance of a composition score found by summing three components?
- How would one go about determining the covariance of two composites, each of which is comprised of two components?
- Describe the Classical True Score Model and define all terms and all assumptions.
- Why is the reliability of a composite score higher than the reliability of the components, whereas the reliability of a difference score is lower than the reliability of the components?
- How does the Spearman-Brown approach to split-half reliability differ from the Rulon-Guttman approach?
- Explain one way in which the standard error of the estimate and the standard error of measurement are similar to each other and one way in which they are different.
- Explain the difference between a G-study and a D-study in generalizability theory.
- Define the generalizability coefficient and explain one way that it is similar to a reliability coefficient and one way in which it is different.
- Briefly explain each of the four different designs employed in generalizability theory.
- Describe the different purposes of content, construct, and criterion-related validation.
- List three practical concerns related to estimating criterion-related validity and briefly explain why they are problematic.
- List and describe three statistical/methodological methods of providing construct validity evidence.
- Assuming a constant base rate, what are the relationships among the (a) selection ratio, (b) validity coefficient, and (c) success ratio (hit rate)?
- Briefly explain six different definitions of fairness in selection.
- With respect to exploratory factor analysis (EFA), list and define the three types of variance specified in the specification equation.

- List and describe three ways a factor analyst could decide how many factors to retain in an exploratory factor analysis (EFA).
 - In principal-axis factoring (PAF), what are the mathematical differences between initial communalities estimates and extracted communalities estimates?
 - For the purpose of developing construct validity evidence, which of the three related methods provides the most compelling evidence: principal components analysis, exploratory factor analysis, and confirmatory factor analysis? Why?
 - What are three ways in which principal components analysis differs from (true) exploratory factor analysis?
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Part 3: Derivations, Demonstrations, and Calculations

This section of the exam will require you to make calculations, to demonstrate numerical relationships, and to derive one formula from another. You will be allowed to use a formula sheet of your own creation on one 8.5" by 11" sheet of paper. You may write on both sides of this sheet of paper, but you may only include formulas (and their labels). You may not add definitions, drafts of answers to practice questions, or other non-formula related text. Formula sheets that do not conform to these guidelines will be confiscated.
