



Validity and Reliability Issues in the Large-Scale Assessment of English Language Proficiency

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Topic

- The measurement of language proficiency
- Assessment design: How to build a valid English-language assessment that reliably measures English-language proficiency
 - Building blocks
 - Constraints
 - Trade-offs
- Selected validity issues

Dimensions of Language Proficiency

- In measurement proficiency is defined as the unobserved (“latent”) variable that explains individual differences in performance on an observable set of measures.
- How is language proficiency measured?
 - Listening
 - Speaking
 - Reading
 - Writing
 - Composite scores for Oral (Listening & Speaking), Comprehension (Listening & Reading), Production (Speaking & Writing) may be of interest

Validity

Tests are validated by systematically collecting evidence to support the appropriateness of the intended use of the assessment?

Requires clear statements regarding the intended uses; validity is not assumed a priori

E.g., Will the assessment be used to classify English language proficiency in

- academic settings?
- business/employment settings?

Assessment Building Blocks

- Content standards
- Test Blueprints
- Forms configuration
- Test items
- Measurement and Scaling models
- Equating and linking procedures
- Standard setting procedures
- Score reporting methods

Content Standards

- Organize expectations about what students should know and be able to do
- Example: Washington students in grades 3-5 at an intermediate level of achievement should be able to:
 - Respond to directions, questions, and some idiomatic expressions.
 - Use simple sentences to retell or state main point and details of conversations and stories.
 - Recognize inappropriate use of register.

Test Blueprints

- Specify number and types of items for each of the content standards
- Match is in the eye of beholder
- Example: LAS Links

Grade Spans	Content		Item Type	Items
K-1, 2-3, 4-5, 6-8, 9-12	Listening	Listen for Information	MC	10
		Listen in the Classroom	MC	4
		Listen and Comprehend	MC	6
	Speaking	Speak in Words	DCR	10
		Make Conversation	CR	4
		Speak in Sentences	CR	5
		Tell A Story	CR	1
	Reading	Analyze words	MC	9
		Read Words	MC	8
		Read for Understanding	MC	18
	Writing	Use Conventions	MC	20
		Write About	SCR	2
		Write Why	SCR	2
		Write in Detail	CR	1

Key—MC: Multiple-choice—CR: Constructed-response—DCR: Dichotomous CR—SCR: Short CR

Forms Configuration

- Within One Administration
 - Single form
 - Parallel forms
 - Non-parallel forms
 - Hybrid
- Across Administrations
 - Constant form(s)
 - Overlapping forms
 - Non-overlapping forms

Degrees of Test Comparability

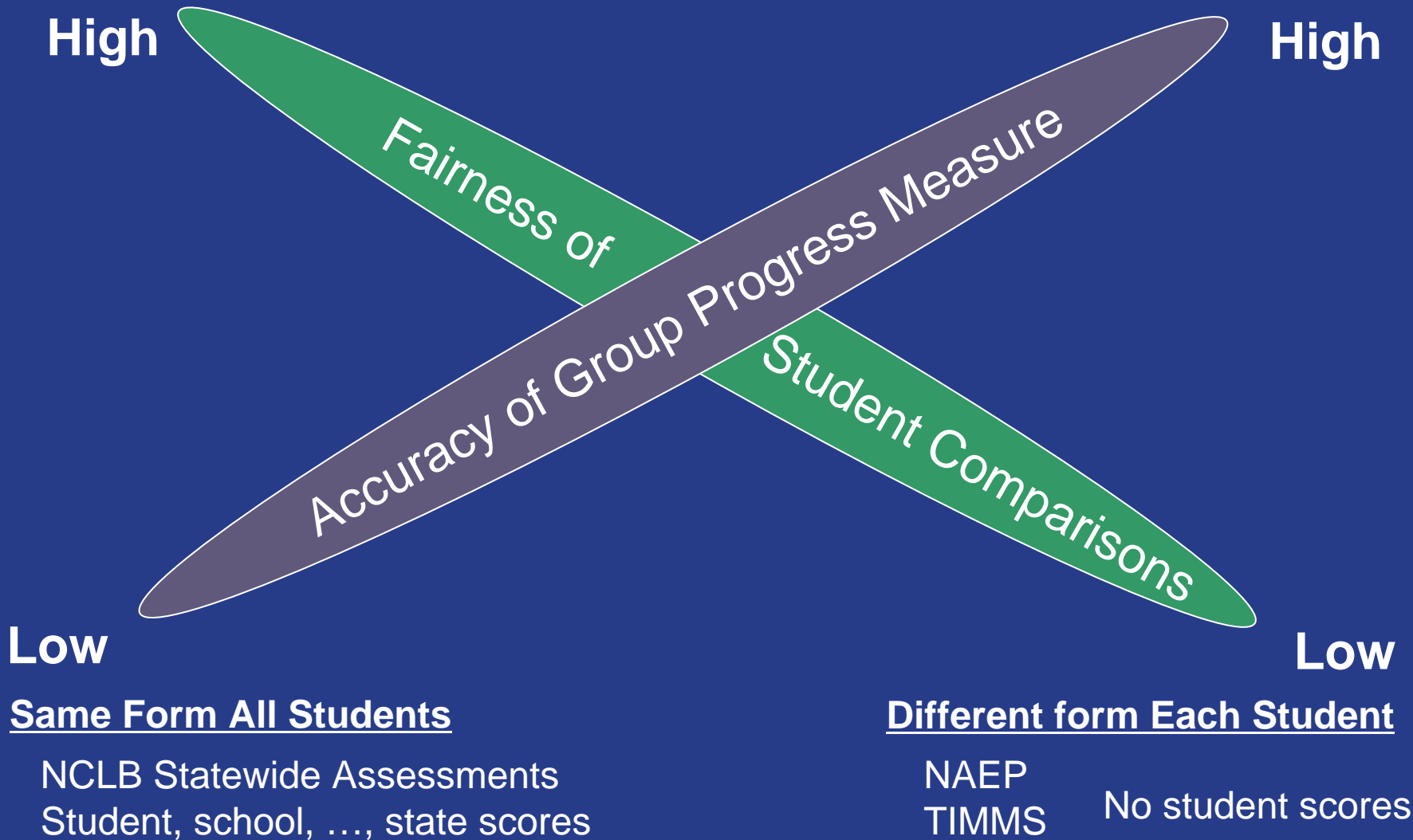
- Equated forms
 - Measure same construct
 - Forms are parallel
 - Each student indifferent to assignment of form
 - Same expected score, measurement error
 - “Strict comparability”
- Linked forms
 - Measure the same construct
 - Forms may differ in length, coverage, reliability
- Statistically related (e.g., regression)

Required comparability depends on use

Accountability Requirements

- Accountability requires fairness
- Fairness demands equivalent measurement
- Equivalent measures may be obtained from
 - Use of same instrument
 - Same test form(s)
 - Use of equated instruments
 - Documented technical quality

Breadth vs. Uniformity



Test Items

- Multiple Choice
 - Contrived, not “authentic” (perhaps)
 - Inexpensive to score
 - More items per unit time
 - Can measure complex thinking skills
- Constructed Response
 - More authentic, natural (not guaranteed)
 - Captures thinking process
 - Expensive to score (if by human)
 - Rater differences affect validity (within and across administrations)
 - Machine-scoreable constructed response looks promising
- Extended Response

Good and bad examples of all types exist

Measurement Models

- Specify relationship between student proficiency and success on items
- Unidimensional item response theory
 - 1-, 2-, 3-parameter logistic models
 - Partial credit models
- Multidimensional approaches
 - Multidimensional IRT
 - Bayesian inference networks
 - Cognitive diagnosis models
- Model fit critical
- Useful parameters need not make useful scores

Equating and Scaling

- Tied to forms configuration
- Complete before administration?
 - Requires equating study in advance
 - Enables immediate scoring
- Uses data from live administration?
 - Delays score reporting
 - Quicker development cycle
- Vertical scaling allows comparisons over age spans

Standard Setting

- Maps test scores to proficiency level
- Requires eliciting, synthesizing judgments
 - Categorizing students: “contrasting groups”
 - Categorizing (ordered) items: “bookmark”
- Good to involve variety of stakeholders
- Multiple methods, replication, support validity
- Descriptions of performance-levels follow

Reporting scores

- Statistically optimal estimates based on model/data
 - E.g., use information in full response pattern
- Simple and transparent rules
 - Use only number correct or total points

Large-Scale English Language Assessment

Large scale assessments bring challenges:

- Volume of work to administer, score
- Controlling exposure, timing of administrations

And opportunities:

- See population trends, characteristics
- Survey broad content efficiently
- Collect rich background information
- Research relationship of proficiency to background variables

Some Design Considerations

Designing for Validity

- Maintain broad definition of content domain
- Control exposure of items and item types
- Scoring algorithms (human, machine) robust

Designing for Reliability

- Optimize level of accuracy in scoring
- Sufficient test length: numbers of items/points

Designing for Efficiency

- Leverage technology: online assessment, speech processing, text analysis and AI scoring

Psychometric Design-Key Features

Similar challenges in large scale science assessment in United States. One design:

- Detailed framework of content standards
- Large development effort
 - Want to measure whole domain, not sample
- Multiple layers for multiple purposes
 - Public domain
 - Secure for teacher &/or district use
 - Secure for large-scale assessment testing

Patz, R. J. (2006). Building NCLB Science Assessments: Psychometric and Practical Perspectives.

Test blueprint

- 2/3 student test common to all
 - Common items or strictly parallel form
 - Reliable, comparable student scores
- 1/3 matrixed content
 - Matrixed (BIB) anchor test
 - Field test, link, new content
 - Background, OTL surveys

Matrixed Anchor Test

- Measures entire domain
- Arranged in balanced incomplete blocks
- Constant across administrations
- Provides accurate measures of progress in domain for groups (schools, districts, province, etc.)
- Supports research on growth in English-language proficiency
- Low exposure

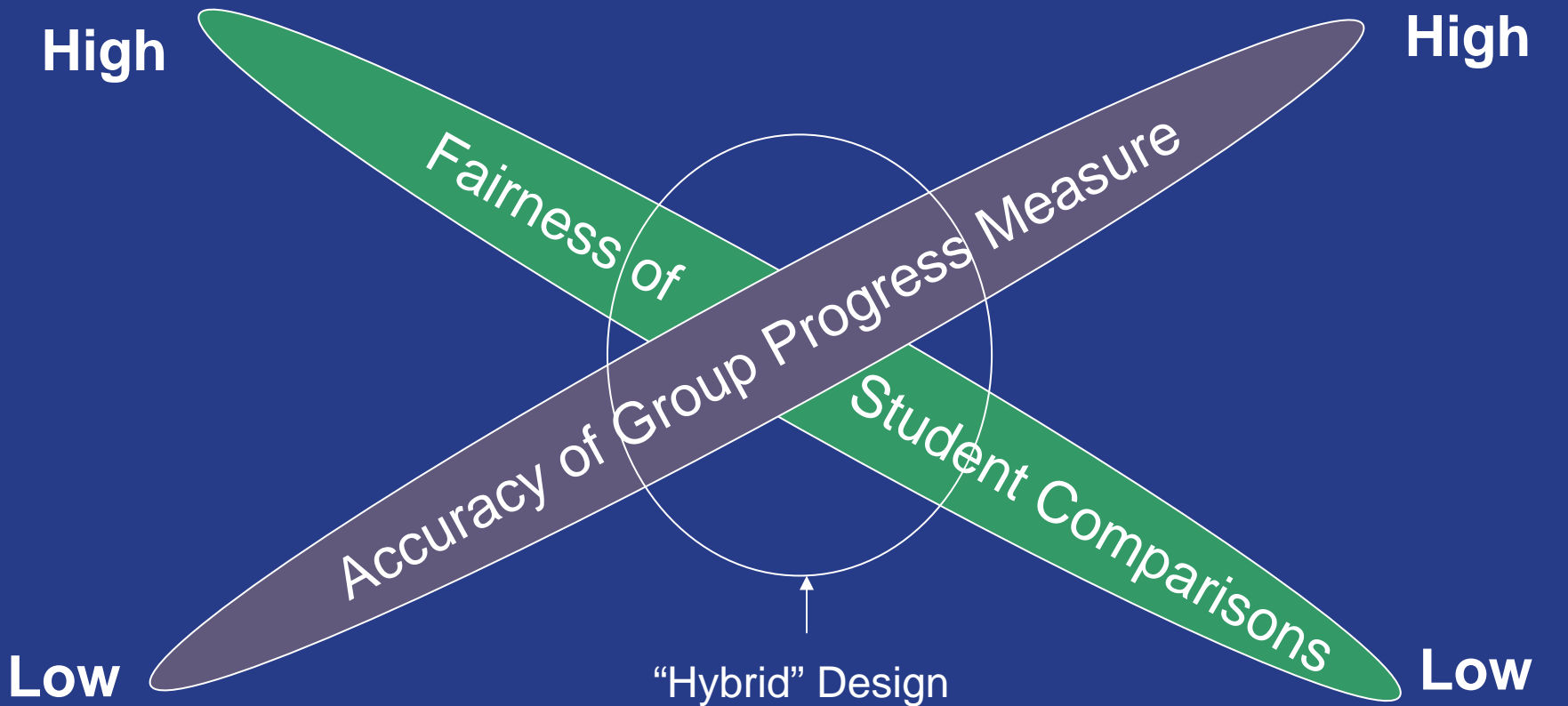
Common Form

- Reliable, comparable scores for students, schools
- Released immediately with scoring rules (e.g., Raw-score-to-performance-level)
- Linked, not equated to domain, last year's common form
- May purposefully wander through domain over years
 - In conjunction with multi-year professional development program

Configuring other building blocks

- Test items
 - MC+CR
 - Many instances of items from item templates possible
- Measurement models
 - Best fitting
- Scaling and equating procedures
 - Pre-link common form
 - Provides immediate reporting
- Standard setting
 - Bookmark better for BIB
 - Annual review of common-form cutpoints, interpretations
- Scoring and Reporting
 - Simple, interpretable rules for common form
 - Best available technical solution for anchor, trends

Breadth vs. Uniformity



Same Form All Students

NCLB Statewide Assessments
Student, school, ..., state scores

Different form Each Student

NAEP
TIMMS
No student scores

Limitations of Design

- Student comparisons on common form only
- Common form, matrixed form present different picture of achievement
 - Use both in accountability system
 - One immediate; one refined
- Common form does not support year-to-year comparisons
 - Use matrixed anchor for this
- Small schools can be problematic
- Domain interpretations have technical challenges
- Matrixed anchor could grow stale
- Large anchor, multiple forms, add expense

Building an Assessment: Required Expertise

- English-language development domain knowledge
- Psychometrics
- Item development
- Policy experience
- Communication
- Project Management

Discussion

- Design challenge is significant
 - Goals and constraints need refinements
- Building blocks are flexible, configurable
- Priorities of reliability, validity, efficiency, cost affect design
- Any design balances priorities
- Resources are available to help

Discussion (continued)

- English language proficiency tests need to reflect the complexity of the domain.
- Sampled items and item types need to be representative of the domain.
- Good test development procedures will lead to rich information, valid results and interpretations.
- Technology is a key enabler for large-scale assessment of English language proficiency