Models for Using Student Growth Measures in School Accountability

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Presentation at the “Brain Trust” on Value-added Models
Sponsored by the Council of Chief State School Officers
Washington, DC November 15-16, 2004

Caveats

- Essential elements – not discussed here
  - Meaningful interpretation (e.g., scales, constructs)
    - Issues about vertical scales, “vertical” developmental content standards
  - Good assessments (e.g., valid for full range of performance levels, cognitive complexity)
- Models and my understanding still developing

Policy Decisions

- Whom do you want to hold accountable: schools, teachers, students?
- Do you want to measure growth
  - In relation to your performance standards
  - In relation to comparison groups?
- How much growth is “good enough”? Will you establish growth targets:
  - Linked to achieving performance standards
  - Based on historical patterns
  - Relative to others in comparison group
- How much do you value growth (in relation to status and improvement)?

Student Growth/Value-added Questions

1. “It’s much more important to me to know how much each student is learning – how much they are improving – than ‘how high’ they are. Continuous improvement should be expected of every student.”
2. “It only makes sense to hold a school accountable by tracking individual student progress, because the ‘good class, bad class’ effect of successive groups is so large it’s like comparing apples and oranges.”

Growth/VAM Questions – 2

3. “Our school serves students who come in disadvantaged and behind. We help them learn a significant amount each year. We’d like credit for that, even if they don’t all reach ‘proficient’ that year.”
4. “We serve a significantly disadvantaged population – poor, minority, mobile. It’s not fair to expect these kids to learn as much in a year as rich, suburban schools. We’d like to be compared with schools with similar challenges.”

Growth/VAM Questions – 3

5. “Most of how much kids learn is out of the control of my school/me as a teacher. Innate ability and motivation, home influences, stuff from their previous teachers all determine how much I can help. Just hold me accountable for how much I contribute on top of that.”
6. “We (the legislature) would like to be assured that for every additional dollar being put into education, we’re getting a fair return in learning.”

Growth/VAM Questions - 4

7. “I’d like to be able to track my students’ progress as they learn during the year. I’d especially like to know if they didn’t know something so I could help them learn it better.”
8. “My state identified way too many schools last year under NCLB. I believe NCLB is flawed. I’m hoping that using student growth would help me identify more schools as ‘good’ and fewer (and different) schools as ‘in need of improvement.’”

Exercise

- "Statements about student growth" worksheet
  - How much do you (or significant stakeholders in your state) agree with each statement?
  - Is the statement based on common standards for all students in the state?
  - Does the statement reflect "expected growth" based on common standards, historical projections, or comparison groups?
  - Now that you've thought about standards and expected growth, how much do you agree with each statement?

Definitions

- Growth vs. Value-added
  - Growth: student change over time
  - Value-added: change attributed to specific time, agent, or experience (e.g., program)
- “Predicted Growth” vs. “Required Growth”
- Assessment vs. Accountability vs. Program Evaluation vs. Research
- School Accountability vs. Other Units
  - District, department, grade, teacher, or student

Why Use Student Growth for School Accountability

- Another natural unit
  - Same student learning over time ("How much did student learn this year?")
  - Complements other "natural units": class, grades, schools, districts
- Attribution and program evaluation
  - Amount "under school's/teacher's control"
  - Teacher evaluation
  - Relative (comparable) performance
  - Output per input
  - On-going assessment

Key Presentation Topics

- Design purposes: School Accountability
- Performance views: Status, Improvement, Student growth
- Setting student growth targets for accountability
- Overview of growth/VAM models
- Accountability and analysis: multiple layers
- Student growth accountability and NCLB
- Implementing student growth in accountability

Design Purposes: Accountability

- Accountability: Designed to influence behavior
  - Reflects shared values: important indicators, outcomes, etc.
  - Embodies clear, attainable targets and goals, known before action
  - Provides useful feedback
  - Has meaningful incentives aligned with desired behaviors/outcomes
  - Actors (students, educators, state) have appropriate control (e.g., “I can influence/what I do matters,” “System will respond,” “Rules are fair”)
- Insufficient on its own to bring about reform

Design: Related purposes - 2

- Assessment – What?
  - "Was student proficient?" "How many students in school were proficient?" "How much did students improve?"
- Accountability – Enough? & So what?
  - "Schools will receive zero points for students who don't participate." "Were *enough* students in the school proficient?" "If not, what should happen?"
- Program Evaluation – Why? Who? (attribution)
  - "Do students in Class A learn more than students in Class B, all other things being equal?" "How much of learning was due to program/person X?"
- Research "truth" – How? & Invariance
  - "How did instructional program Y help students learn math concepts A, B, & C?" "How did student solve problem Z?" "How true would this be for all other students/teachers?"

Accountable for What?

- Three views of performance:
  - Status
  - Progress
    - Improvement (successive groups)
    - Student longitudinal growth

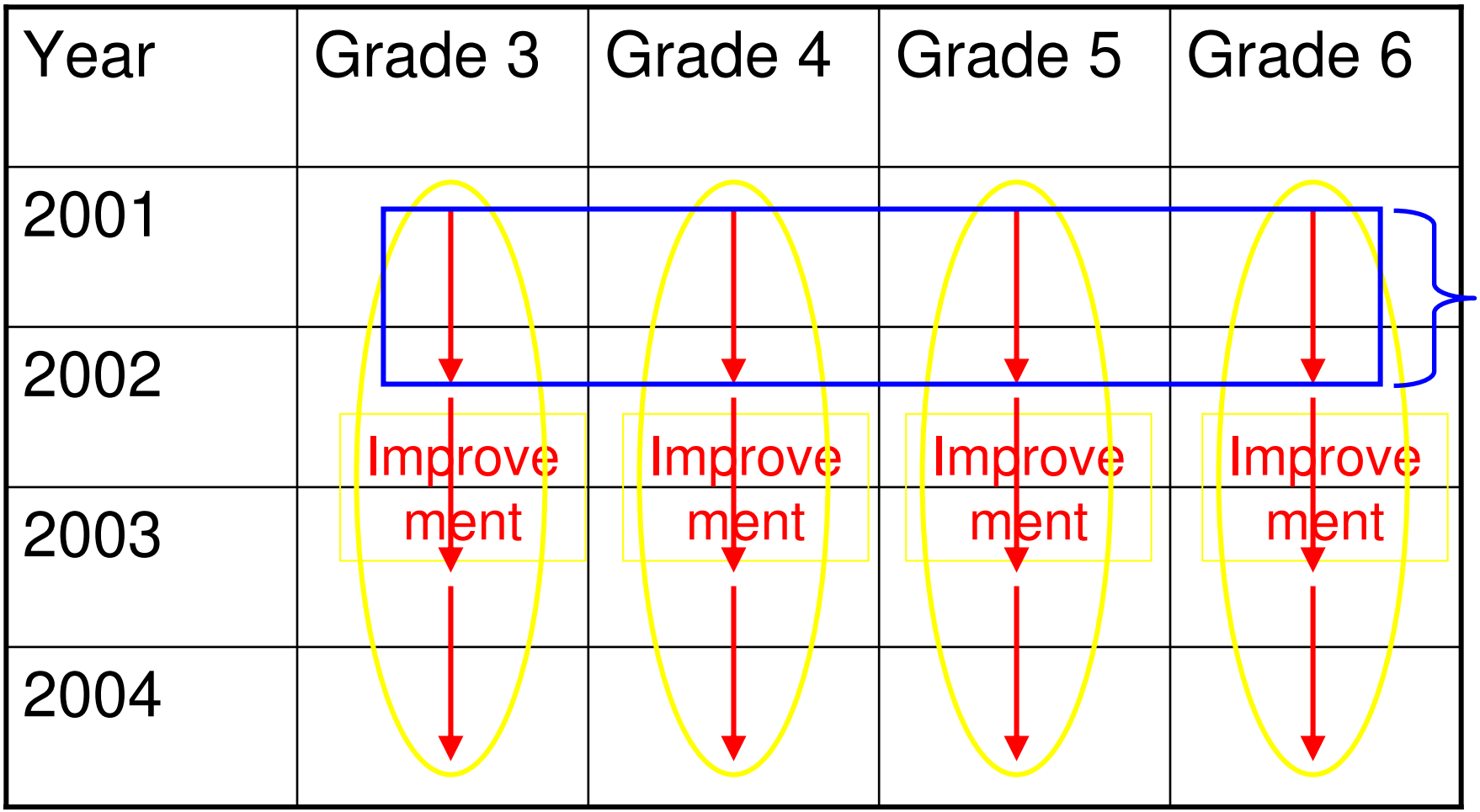
Focus of Three Views

- Status
  - How high do students score on state assessments? What percentage of students were proficient?
- Improvement (Successive groups)
  - Is the school improving, or increasing the performance of classes of students over time (e.g., grade 3 this year higher than grade 3 last year)? Is the percentage of students meeting the state standards increasing each year?
- Student growth
  - Are students learning as they progress through the grades? Are individual students making expected/comparable progress from grade to grade?

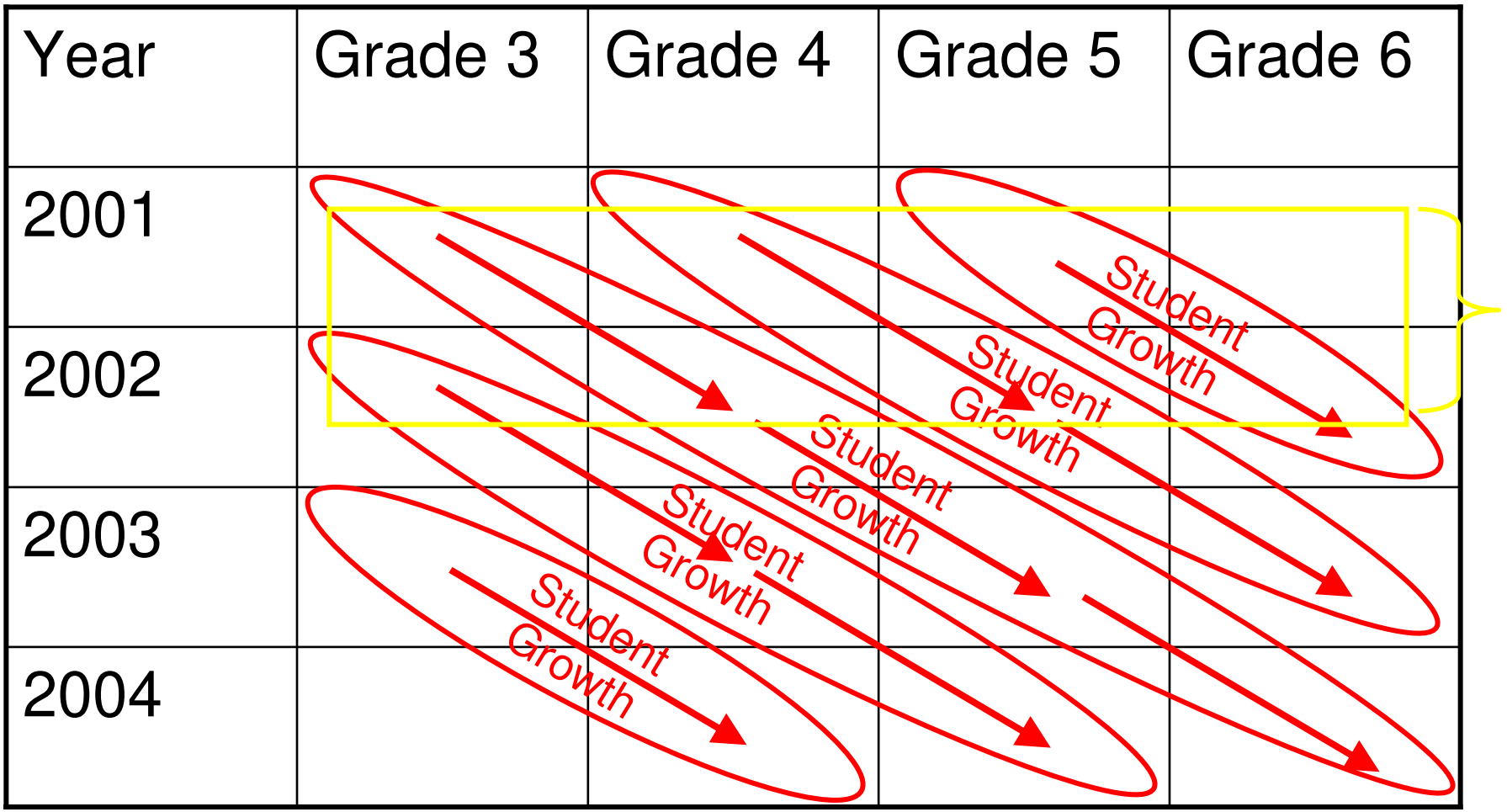
Calculating Status

Year	Grade 3	Grade 4	Grade 5	Grade 6
2001	Status => Count or Avg. across grades			
2002	Status			
2003	Status			
2004				

Calculating Improvement



Calculating Student Growth



Three Views – Data Needs

- Status
  - Annual assessment, representative group (not every grade)
- Improvement (Successive Groups)
  - Annual assessment; representative group, comparable across years; consistent performance standards; “headroom” or accountability system that allows for ceiling effect; two years’ data minimum
- Student Growth
  - Annual assessment, successive grades; means to track individuals across time and schools (unless quasi-longitudinal); consistent performance standards/interpretation of growth; assessment that is sensitive to growth; “vertical” scale(s) and/or vertically aligned performance standards; two years’ data minimum (at least three for more complex models); student background data (including teacher, school assignments) if conditioning is used

Three Views – Analysis Needs

- Status
  - Easy analysis; but challenging bookkeeping: Account for each student (by subgroup); special cases (e.g., FAY, 95% participation unless n <= 40, subgroup minimum-n; alternate assessment achievement levels)
- Improvement (Successive Groups)
  - More complex analysis but transparent (can do with four function calculator): index, school growth targets, etc.; bookkeeping magnified by multiple year issues (but no tracking of individual students)
- Student Growth
  - Ranges from simple to highly complex; requires special analyses to set up “baselines” for all but the simplest growth models; most require specialized software and personnel; may not be easily auditable; data needs may be much more extensive; analyses and reports complicated by dealing with missing data; substantially more time to process data (?) and produce reports

Accountability Influences Behavior

Since an accountability system should influence behavior constructively:

- Each model (Status, Improvement, Student Growth) should:
  - Allow students/educators to have appropriate control (e.g., "I can influence," "System will respond," "Rules are fair")
  - Reflect shared values of important indicators, outcomes, etc.
  - Embody clear and attainable targets and goals, known before action
  - Provide useful feedback (reports, etc.)
  - Offer incentives aligned with desired behaviors and outcomes

Evaluating Student Growth

- Measure: Time 1, Time 2, (Time 3, etc.)
- Calculate Change (Time 1, Time 2)
- Compare to some “growth target”

Measuring Change

- Vertical scale
- Pseudo-vertical scales
- Vertically aligned content and performance standards

- Analyzing change
- Classification and covariance information

Two Sources to Inform "Growth Targets"

- Data-driven estimates of "historical" growth (what is or what has been – *"predicted growth"*)
  - Comparison/reference group

- Policy-driven growth targets (what should be – *"required growth"*)
  - Which students (all? SPED?)

Data-driven Estimates for Growth Targets

- Use measurement of past performance to estimate where student should perform in the present or future
  - Or to attribute growth between two points to certain variables
- May use more simple to more complex models
- All address future in terms of past performance
  - What HAS been
  - NOT necessarily what CAN or SHOULD be
- Should be sensitive to context and time
- Reflects current disparities in performance between groups (what is)

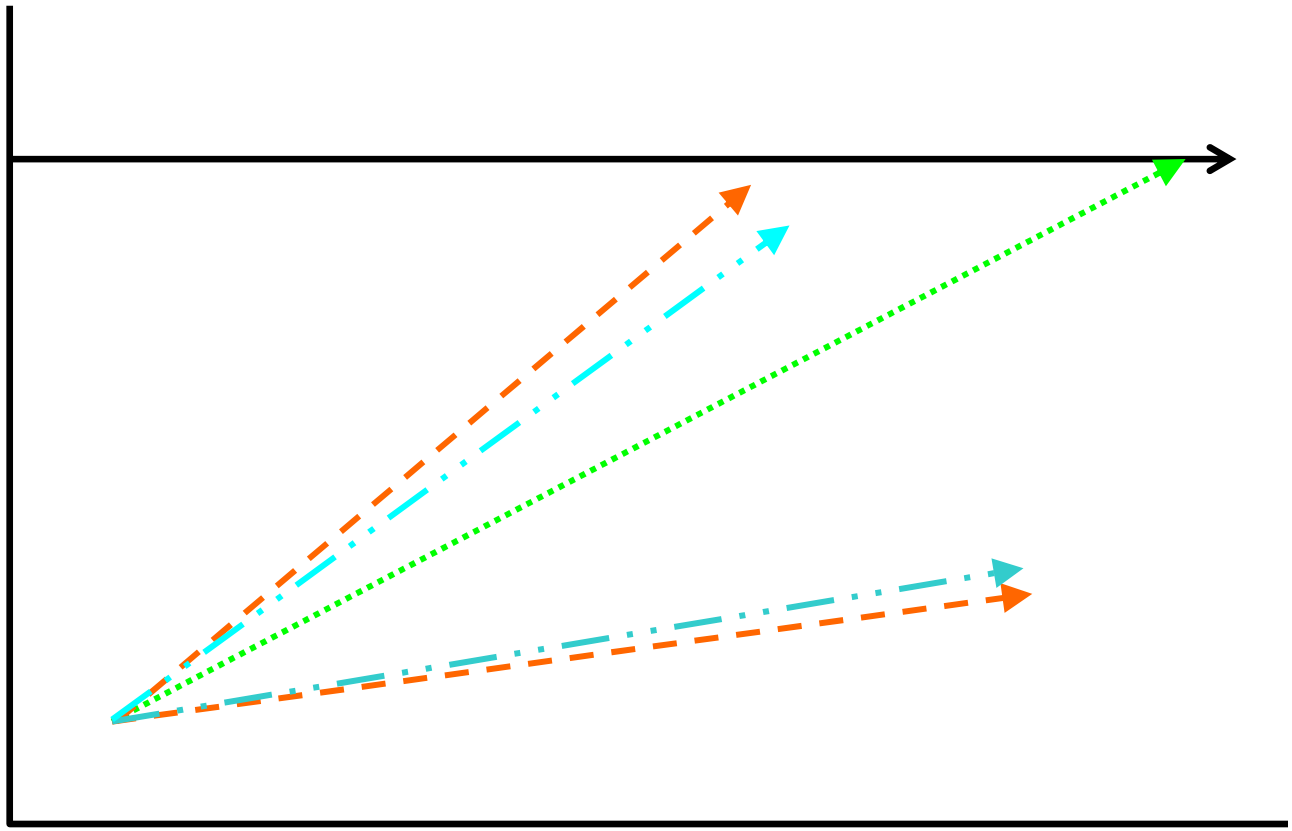
Examples of data-driven estimates of growth targets

- National/state trend line over time
- Selected subpopulation trend line
- Regression line (statistical pattern smoothing)
- Regression line, conditioned on variable(s) (VAM)
- Norms (e.g., “one year’s ‘normal growth’ for reference group”)

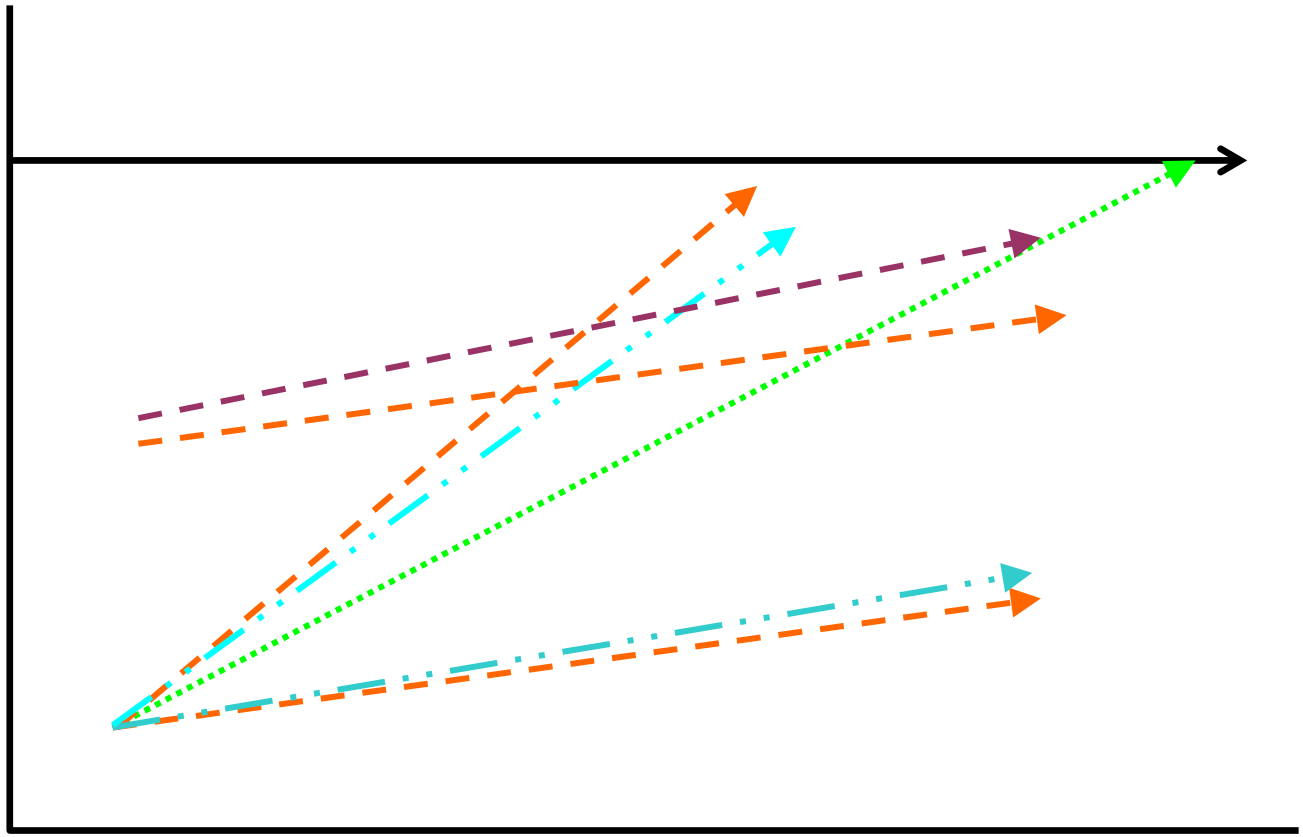
➢ Statistical corrections, e.g. for regression to the mean, sampling error

➢ (Linear vs. non-linear treatments)

Examples of data-driven “Predicted Growth”



Examples, data-driven - 2



Drawbacks of Data-driven Growth Targets

- Metric for measuring growth often not related to achievement levels
- Usually will not get many students to “proficient” over time
- May result in different expectations for different groups (reifies past performance differences)
- Growth metric often a “black box” instructionally

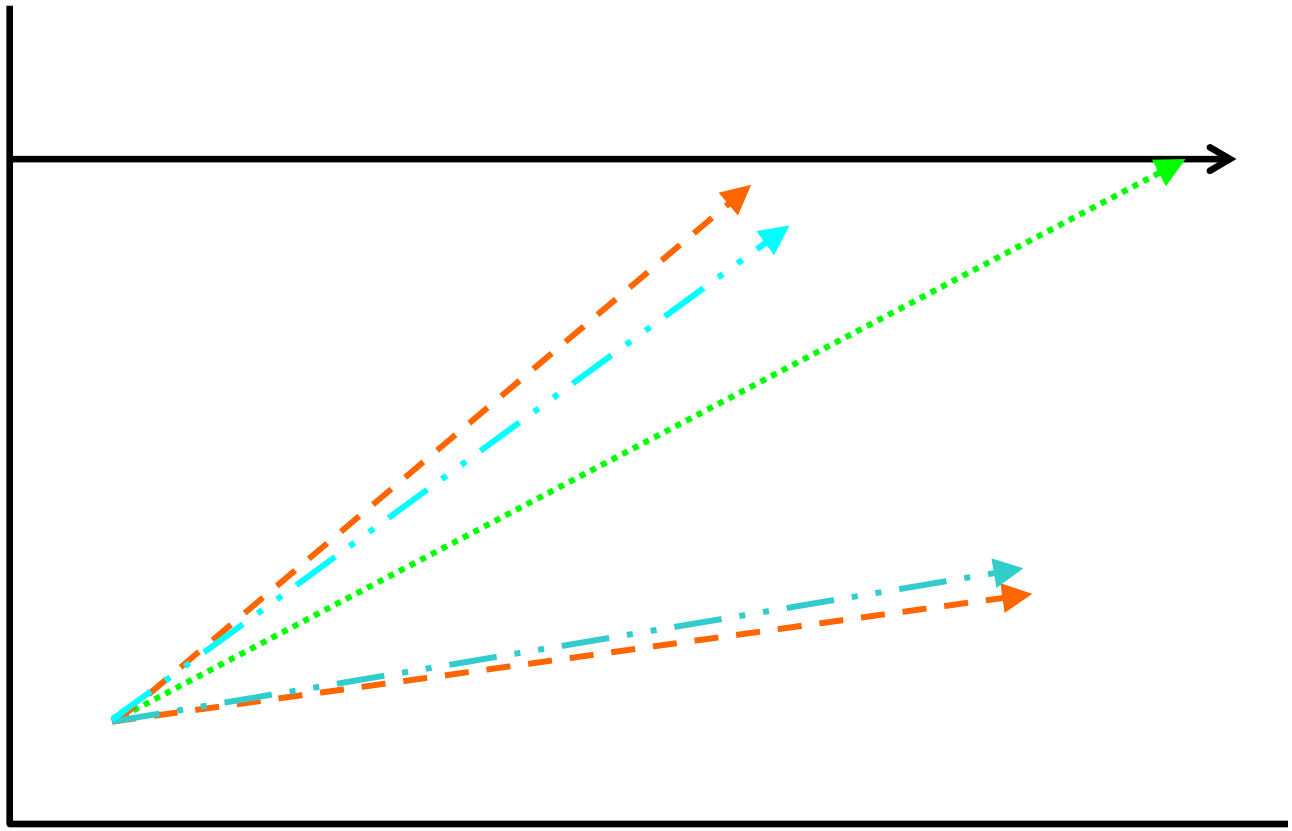
Policy-driven Growth Targets

- Anchored on a long-term goal defined as valuable by beliefs, sustained by social agreement (not inherent)
- Explicitly considered for significant performance units (e.g., subgroups)
- Could be complex; tend to be simple
- (See Hill/Gong/DePascale, Linn, Thum, Doran, NWEA,)

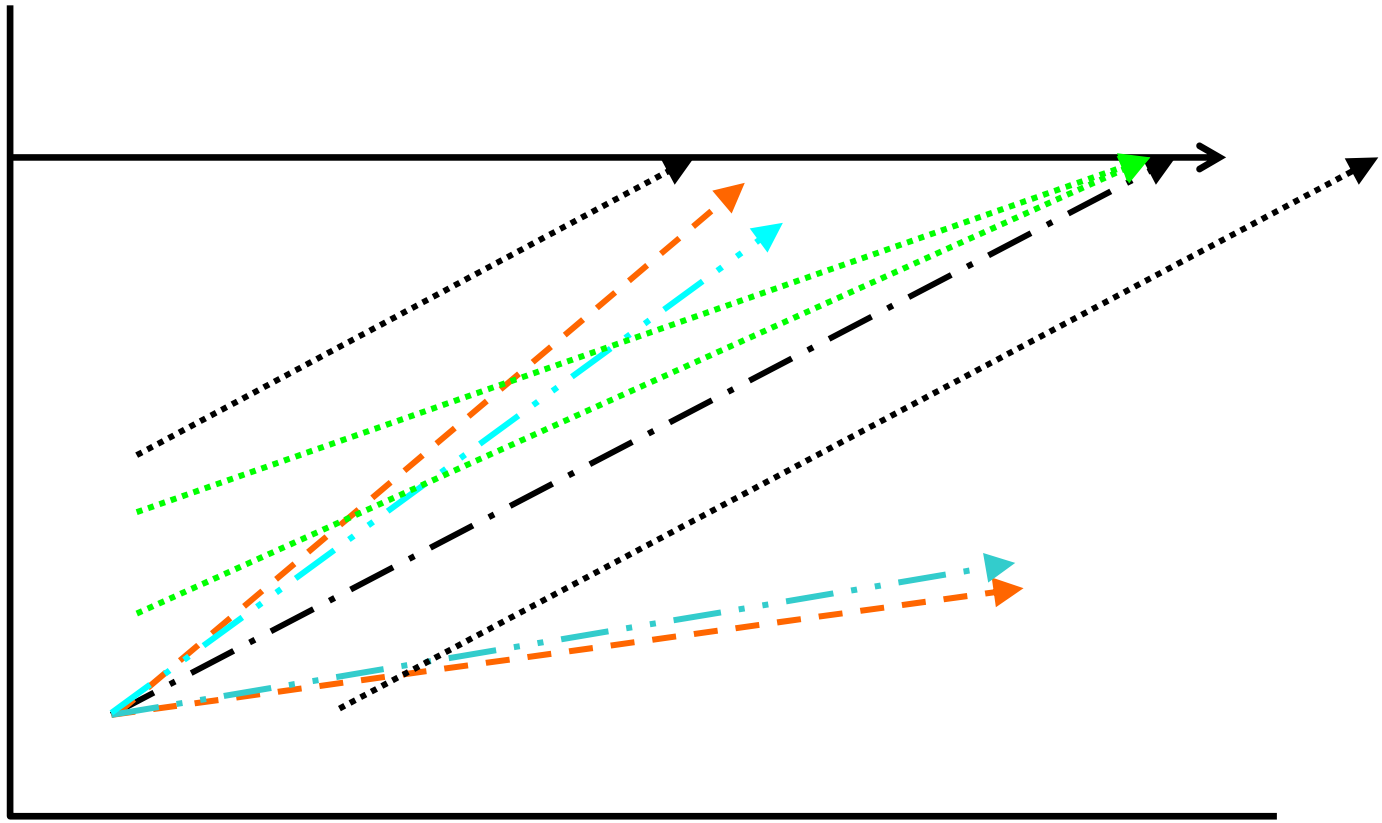
Methods to establish policy-driven student growth targets

- Vertical scale
- Pseudo-vertical scales
- Vertically articulated performance standards

Examples of Policy-driven "Required Growth"



Examples, policy-driven - 2



Policy-driven Expected Growth - 1

"Proficient" by target time or grade (e.g., high school, gr. 8)

- Start from baseline
- Calculate gap, divide by time units
- Set "expected growth" per year
- Metric matters! (Technical, communication, instructional action)

Single vertical scale:

- Start at 220 in grade 4,
- Goal is 460 in grade 10,
- Then need 240 scale score points total over 6 years,
- So expected growth amount is 40 points per year, and yearly growth targets are : 220 in grade 4; 260/grade 5; 300/grade 6; 340/grade 7; 380/grade 8; 420/grade 9; 460/grade 10

Policy-driven Expected Growth - 2

- **Pseudo-vertical/transformed scales:** z-score transformation of state population's scores at a point in time by grade, centered on proficient
  - Grade-level proficient is 370, 470, 570, etc.
  - Start: 320
  - Goal: proficient/on-grade level by grade 8: 870
    - "Keeping pace = 100 points per year"
  - Gap: 50 points (plus yearly growth) over 5 years – 10 points per year
  - Yearly growth targets: 320 in grade 3, 430/grade 4, 540/grade 5, 650/grade 6, 760/grade 7, 870/grade 8
  - Don't need single vertical scale; can mix tests; may need to adjust initial scale for incomplete population

Policy-driven Expected Growth – 3

- **Vertically articulated performance standards** (achievement levels)
  - For individual student
    - Start: grade 3 Below Basic
    - Goal: grade 5 Proficient
    - Expected Growth: two achievement levels
    - Yearly expected growth targets: Below Basic in grade 3, Basic in grade 4, Proficient in grade 5
      - Note: Could create sub-achievement levels (Basic+)
  - For schools: create value tables (see Hill)

Drawbacks of Policy-driven Student Growth Targets

- Usually not reflective of general current practice; higher than empirical
- Feasibility often unknown
- May not be as technically rigorous, or not have (yet) well-known statistical properties
- Systems only now emerging
  - Current state student growth/VA systems generally data-driven (NC, TVAAS, Dallas)

Policy-driven Growth Targets Informed by Data

- Expected growth should reflect
  - Clear, desirable long-term policy goal
  - Informed by data
    - What is possible
      - By whom
      - Under what conditions
        - » E.g., Linn, 75th/25th %ile, “beat the odds”
- Subject to monitoring and modification
- Can do incremental data-driven informed by policy vision

Expected Growth: “On Track” to Target

- Policy-driven growth target: student is “on track” to achieve the target (e.g., proficiency) within defined time
- Has to be extended for proficient+ students
- Different than Status and Successive Groups
  - Student may not be proficient until last (target) year
  - Students’ expected growth may be difficult to relate to standards and instruction (e.g., vertical scale scores)
  - Need individual growth target for each student
  - Student’s growth target may be recalculated annually
    - Issues: multiple time points, error, regression, non-linearity

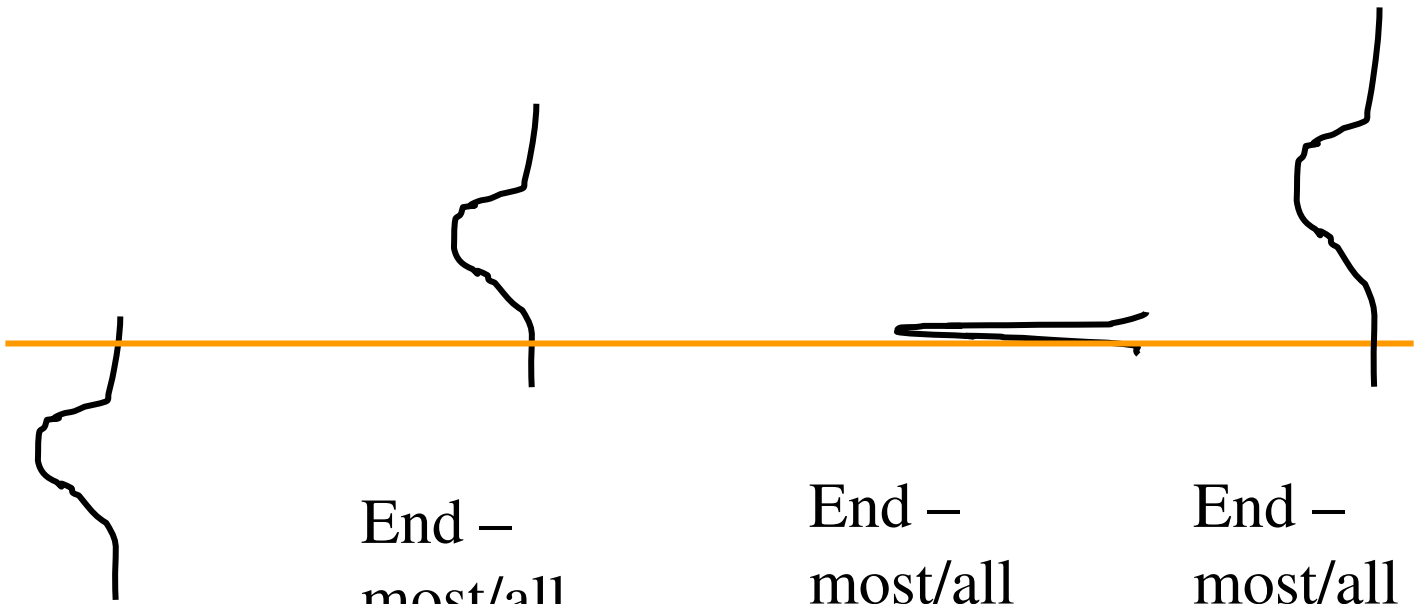
Policy Positions: Growth distributions

- Exercise – beliefs about student growth, instructional goals, and distribution of teacher quality across schools

Expected Growth Targets for Schools

- Growth to goal or continuous (relative) improvement
- “Closing the gap”
  - “All student proficient” vs. “All students at least proficient”
- Relation to distribution of quality teaching within/across schools

What is desired distributions of student scores – for schools; students in classroom?



Start

End – most/all students proficient, variation same as start

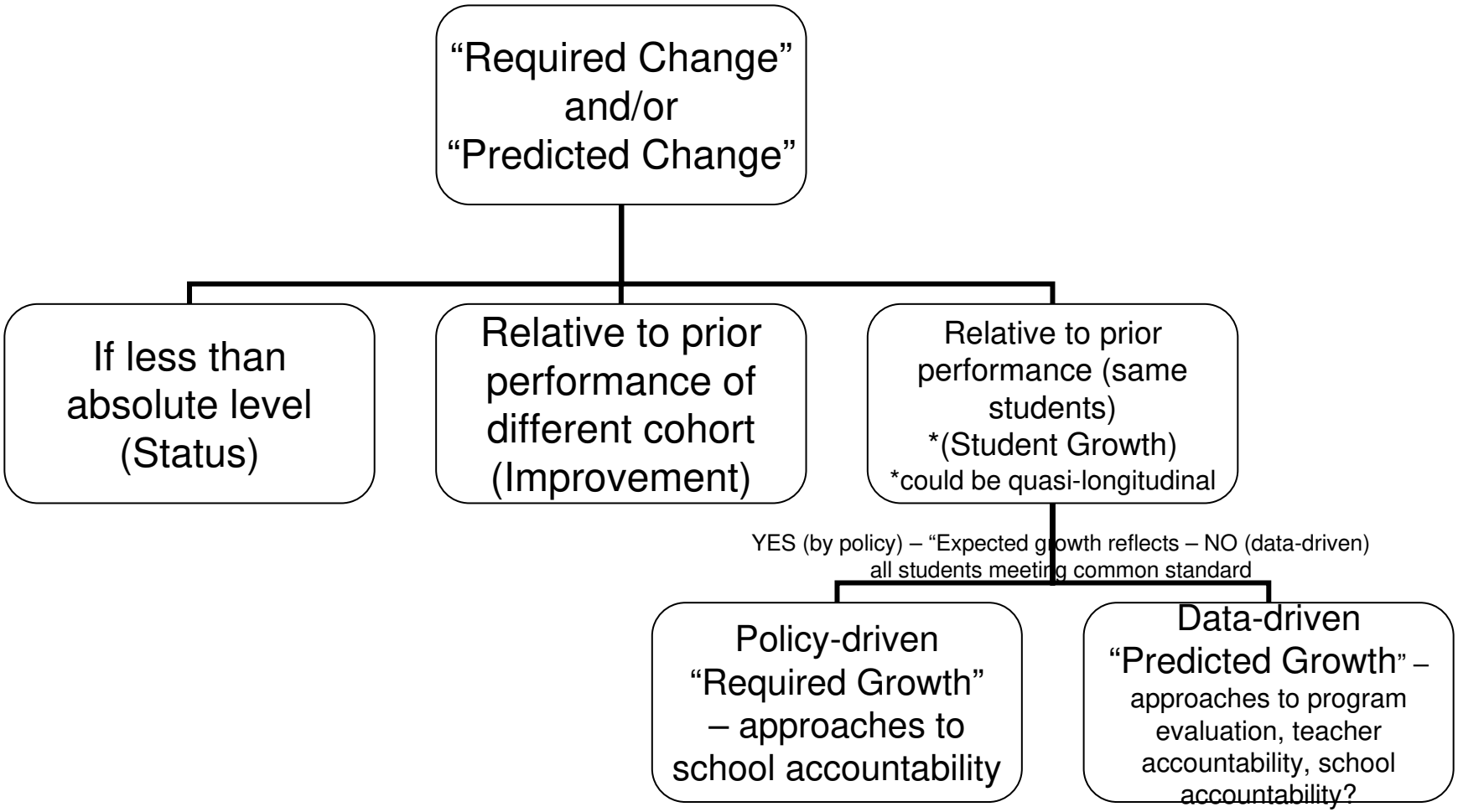
End – most/all students proficient, little variation; equal scores

End – most/all students proficient, more variation

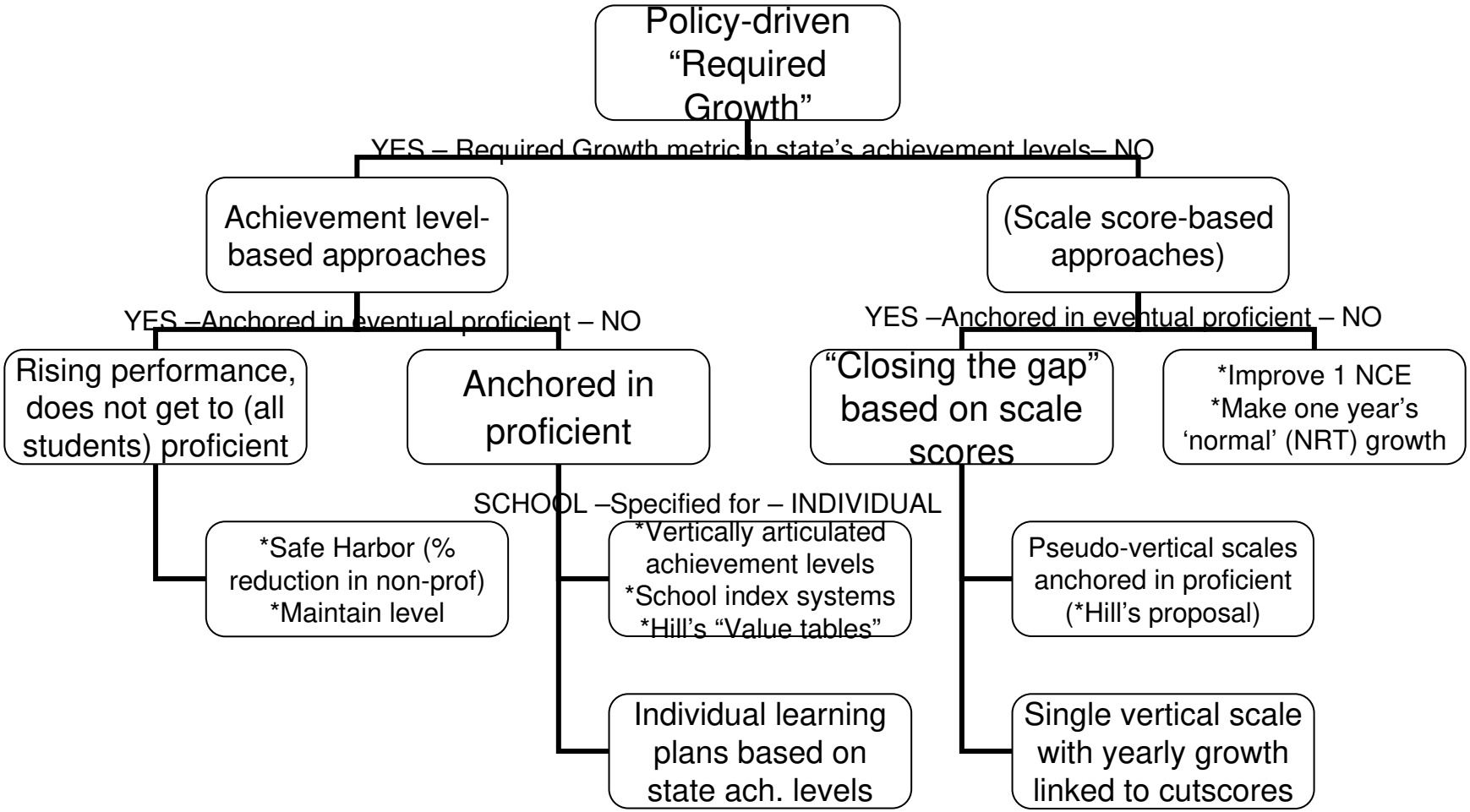
Overview of Student Growth/VAM Models

- Conditioned: No / Yes
- Multi-level modeling: No / Yes
- Metric related to state achievement levels: No / Yes
- Expected growth related to state achievement levels: No / Yes
- Used to hold schools accountable: No / Yes

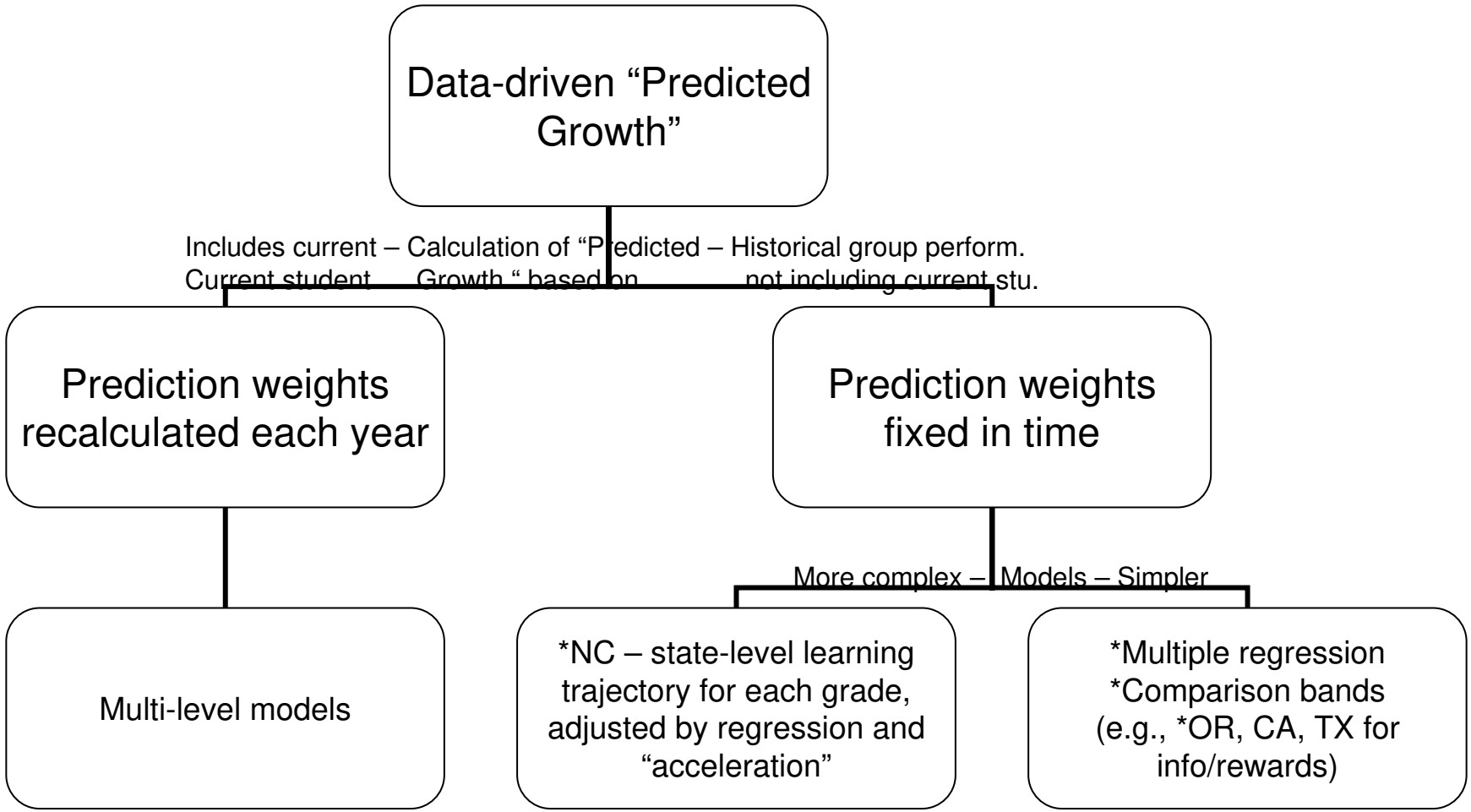
Student Growth Models Tree – 1



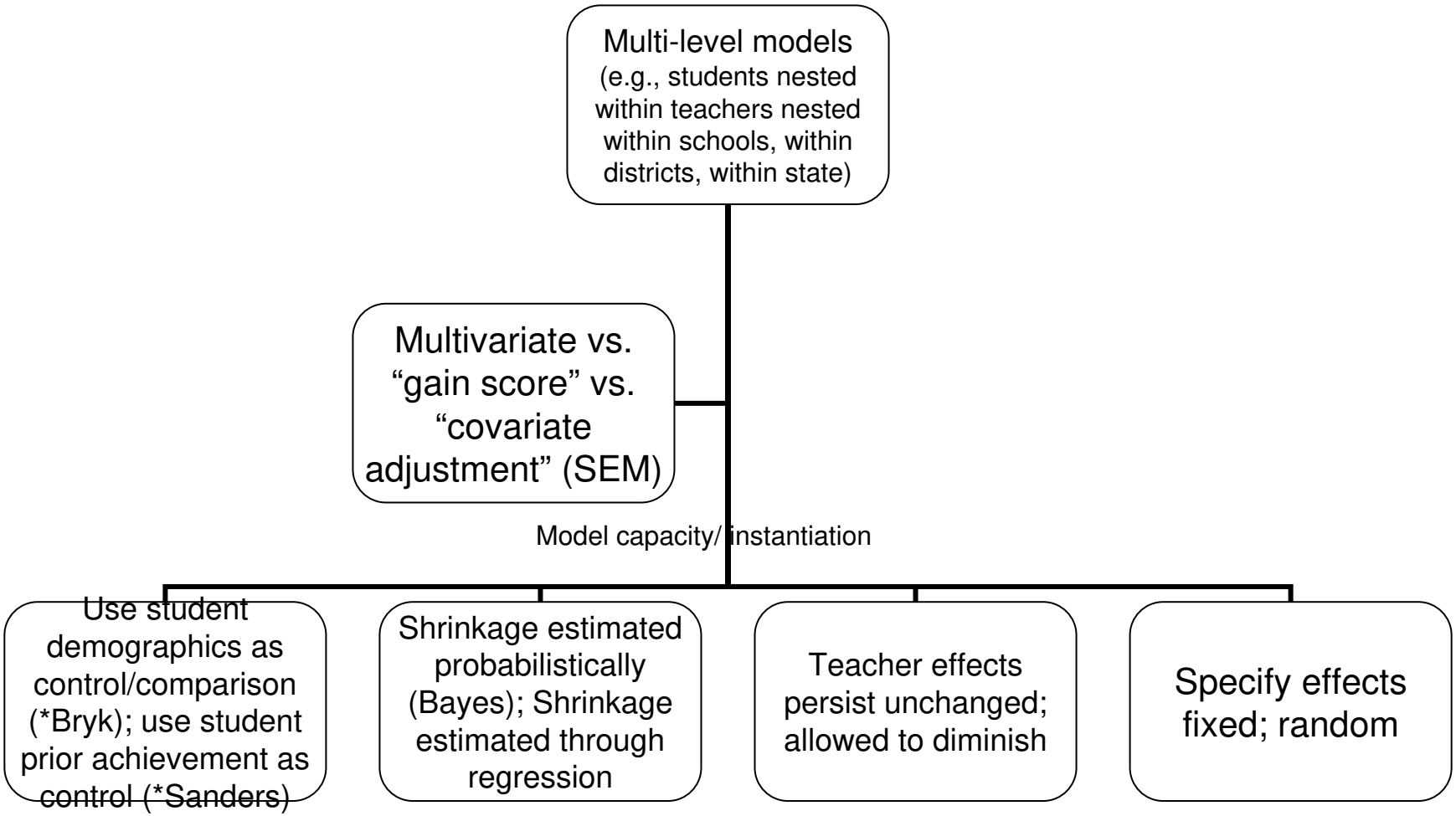
Student Growth Models Tree – 2



Student Growth Models Tree – 3



Student Growth Models Tree - 4



Some examples

- “Comparison band” schools [status or improvement, not student growth] (e.g., OR, CA, TX)

- North Carolina’s state system (historical state average growth by grade established in 1999)
- Tennessee’s school accountability system (student yearly growth measured by Sander’s model aggregated at school level, compared to state average each year)
- Vertically articulated standards’ value tables (Hill)

- McCaffrey
- Sander’s “layered model” (TVAAS)
- Chicago (Bryk et al.)
- Choi, Thum, Others

What's not known about student growth/VAM models

- Validity issues
- Reliability issues
- Implementation issues

“Reasonableness”: Reflects perspective

- The reasonableness of an accountability system (or components, such as growth target) reflects the person’s role in the system
  - For example, “state” and “local” perspectives
    - State: Status report is sufficient; Local: want student growth
    - All agree that “all students should be accounted for,” but state, district, and school may not agree on who is accountable

Accountability Layers

- Most recent accountability in U.S. has focused on state holding schools/districts accountable
  - Most state constitutions; legal entities
- Have always had other layers/models
  - Teachers' grades for students; Principals' evaluations of teachers; school boards' evaluations of superintendents, etc.

Accountability and analysis?

- What is the right level for accountability (by whom, to whom)?
- What is the right level for analysis information?

- Proposal: Most value-added models are appropriate *analysis* to inform principals and teachers, but are inappropriately detailed for *school accountability*.

Levels of Analysis and Accountability

Level	Accountable (up)	Analysis (down)	**Evaluation**
State	To legislature	Are schools/districts on track to meet proficiency goals	What is working?
District	To state	Are schools on track	
School	To district	Are grades on track	
Grade/Dept.	To school	Are teachers on track	
Teacher	To grade/dept.	Are students on track	
Student	To teacher		

Student Growth and NCLB

- “On track” to proficient may be consistent with intent of NCLB, not consistent with statute about Status
- “Safe harbor” statute language does not prohibit student growth models, although would need a change in regulatory interpretation to allow it
- Expected student growth can be made to converge (somewhat) with Status goal, unlike current interpretation of “safe harbor”
- Conditional student growth almost certainly not consistent with intent of NCLB subgroup provisions (but helpful program evaluation)

Student Growth and NCLB – 2

- Could keep Status, Improvement, and Student Growth separate and provide multiple views of schools
- Could merge into overall rating system
- Not strictly compensatory – need different types of assistance

Recommendations

- Simple growth models most appropriate for school accountability
  - One view of several
  - Could be NCLB-compliant with some changes in USED interpretation and in statute
- Should define “expected growth” using policy informed by data
- More complex, “conditioned” value-added models less appropriate as main models for school accountability
  - very useful for program improvement
  - may be useful for supplemental accountability

Policy Decisions

- Whom do you want to hold accountable: schools, teachers, students?
- Do you want to measure growth
  - In relation to your performance standards
  - In relation to comparison groups?
- How much growth is “good enough”? Will you establish growth targets:
  - Linked to achieving performance standards
  - Based on historical patterns
  - Relative to others in comparison group
- How much do you value growth (in relation to status and improvement)?
- How much are you willing to invest to make it happen? (e.g., how simple does it need to be)

For more information:

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