



Understanding Cognitive Growth in an Era of High Stakes Assessment

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MetaMetrics.
LINKING ASSESSMENT WITH INSTRUCTION

Problem

High stakes and budgetary constraints in education may tempt educational policymakers to establish student academic growth requirements without attending to psychometric pre-requisites for the measurement of growth.



Purposes of Presentation

- Remind: some pre-requisites for understanding growth
- Describe: growth with appropriate measurement scales and models for developmental growth
- Propose: a rational approach to growth standards using longitudinal panel data
- Offer other insights, time permitting



Pre-requisites for Understanding Growth

- A developmental (growth curve) approach
- Longitudinal panel data
- An enduring measurement construct
- Continuous, equal-interval, vertical scales
- Well-defined and maintained unit size



What Growth Norms Should Do

- Take a life-span perspective
- Reference historical reality
- Provide a context for growth
- Suggest what growth *should* be
- Tailor the standard based on prior performance (conditional growth expectations)



How to Create a Growth Standard



Strategies

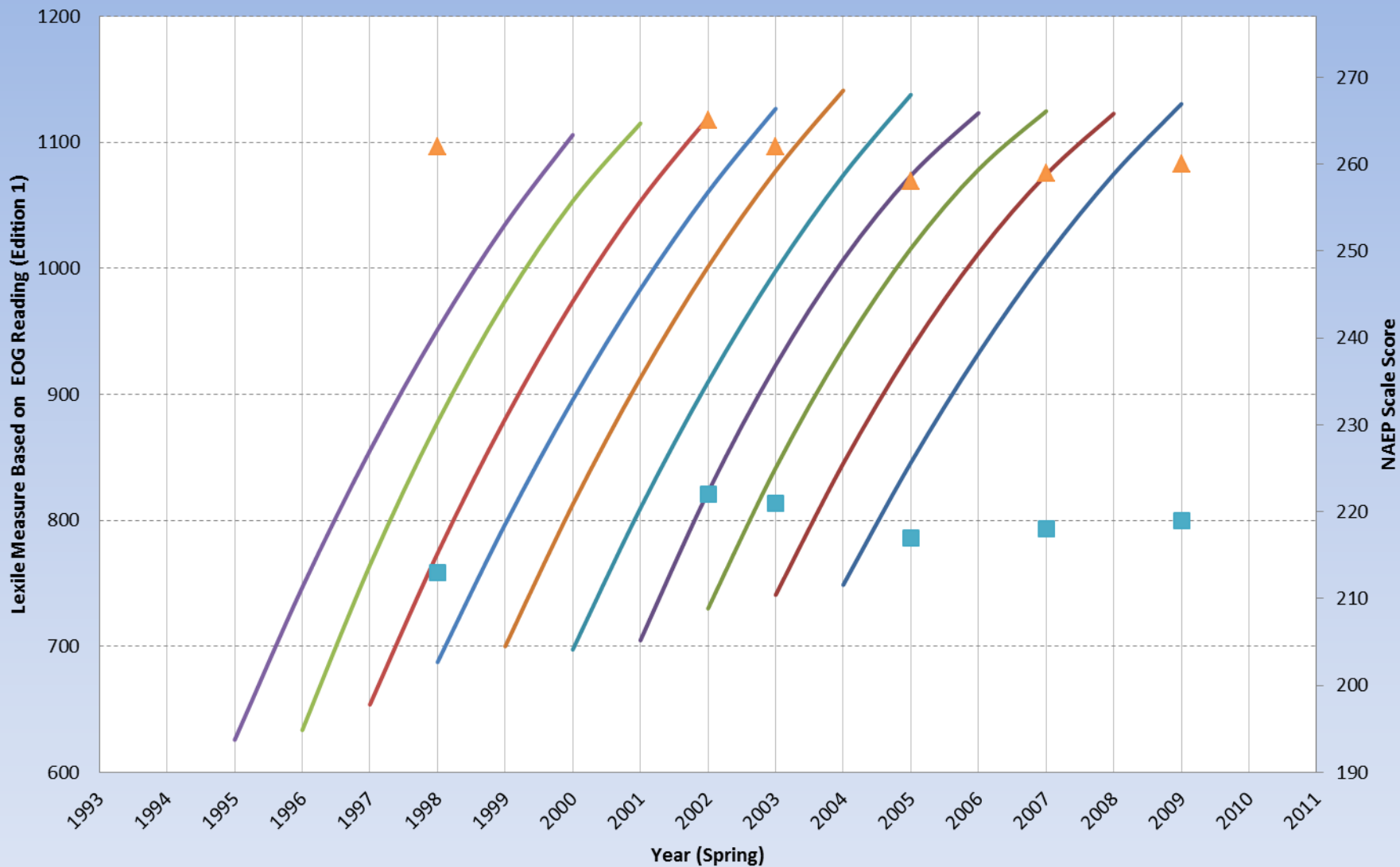
- Normative
- Criterion-Referenced
- Judgmental



Normative Approach to Establishing a Growth Standard

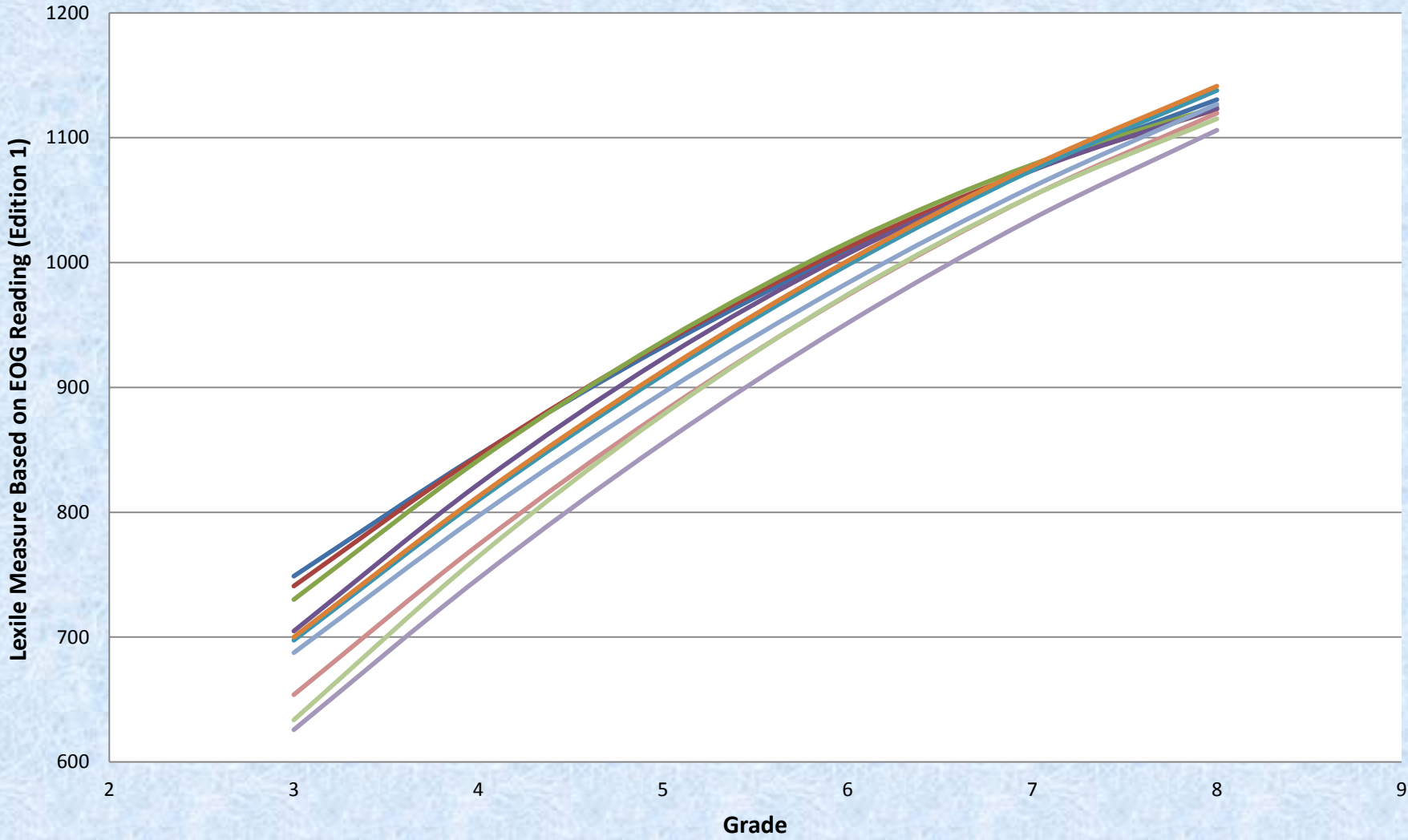


NC Six-Wave Growth Curves for Grades 3-8 Arranged by Years



— 2004-2009 — 2003-2008 — 2002-2007 — 2001-2006 — 2000-2005 — 1999-2004
— 1998-2003 — 1997-2002 — 1996-2001 — 1995-2000 ■ NAEP-4 ▲ NAEP-8

NC EOG Reading Growth in Lexiles for Ten Panels

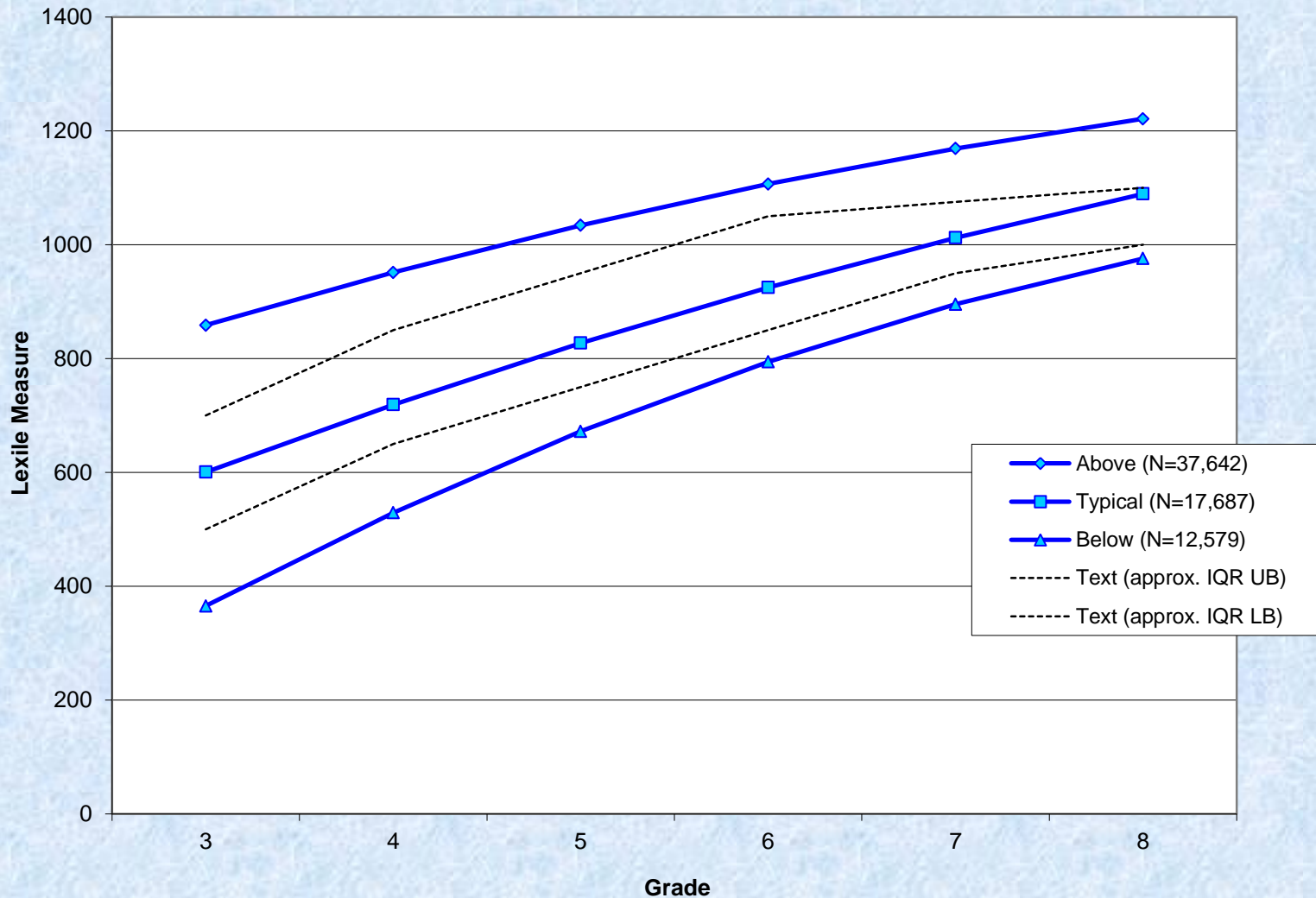


- 2004-2009
- 2003-2008
- 2002-2007
- 2001-2006
- 2000-2005
- 1999-2004
- 1998-2003
- 1997-2002
- 1996-2001
- 1995-2000

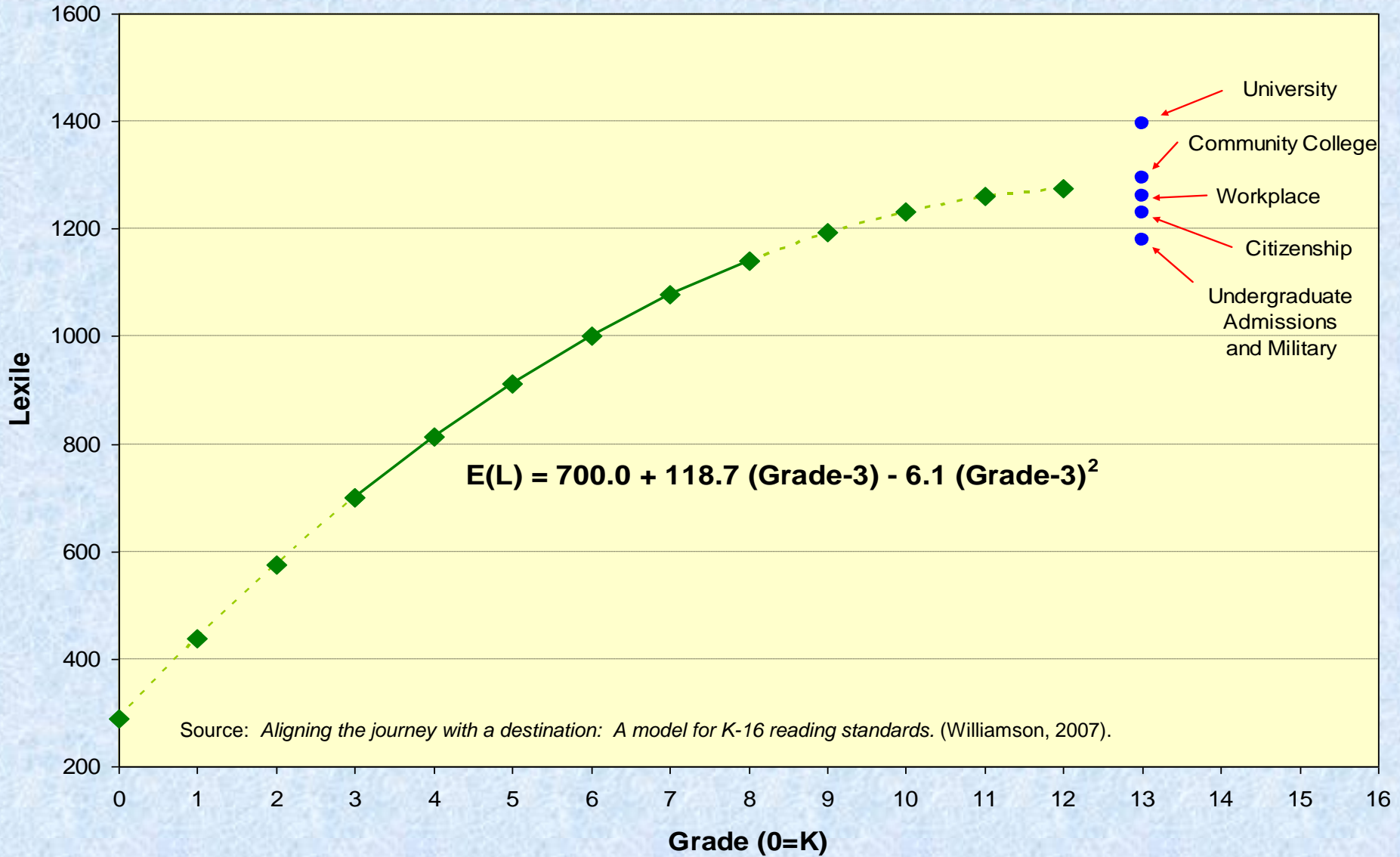
Criterion-referenced Context for Growth



1999-2004 Growth Curves for Three Groups of Students Relative to Grade Level Text Demand



Extrapolated Growth Curve with Median Postsecondary Text Measures



Judgmental Approach to Setting Growth Standards

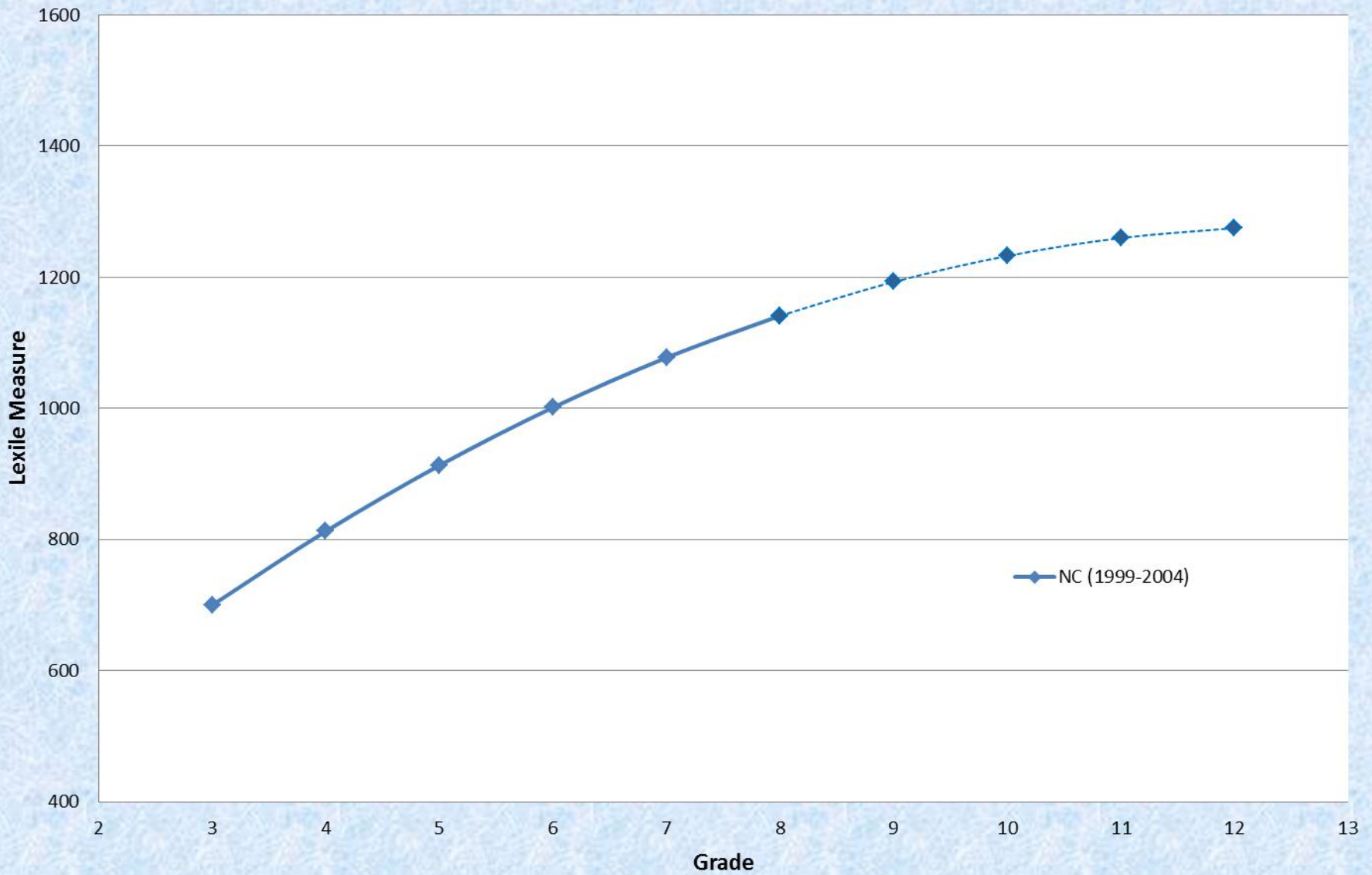


How to Modify an Empirical Growth Standard to Reflect Values

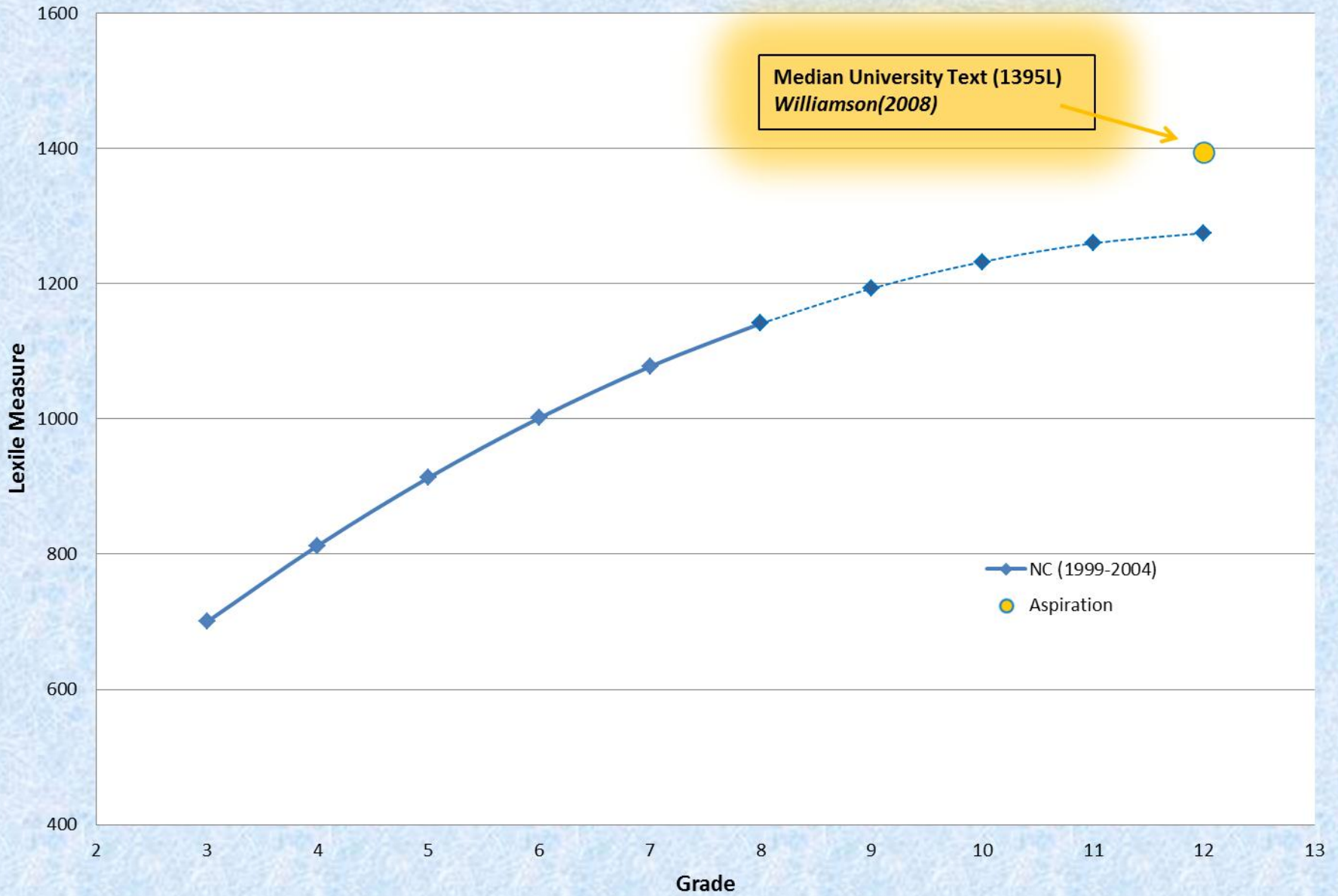
- Start with the (State) average growth curve
- Envision a desired trajectory (or endpoint)
- Change the intercept
- Change the velocity
- Change the acceleration (deceleration)
- Some combination of the above three



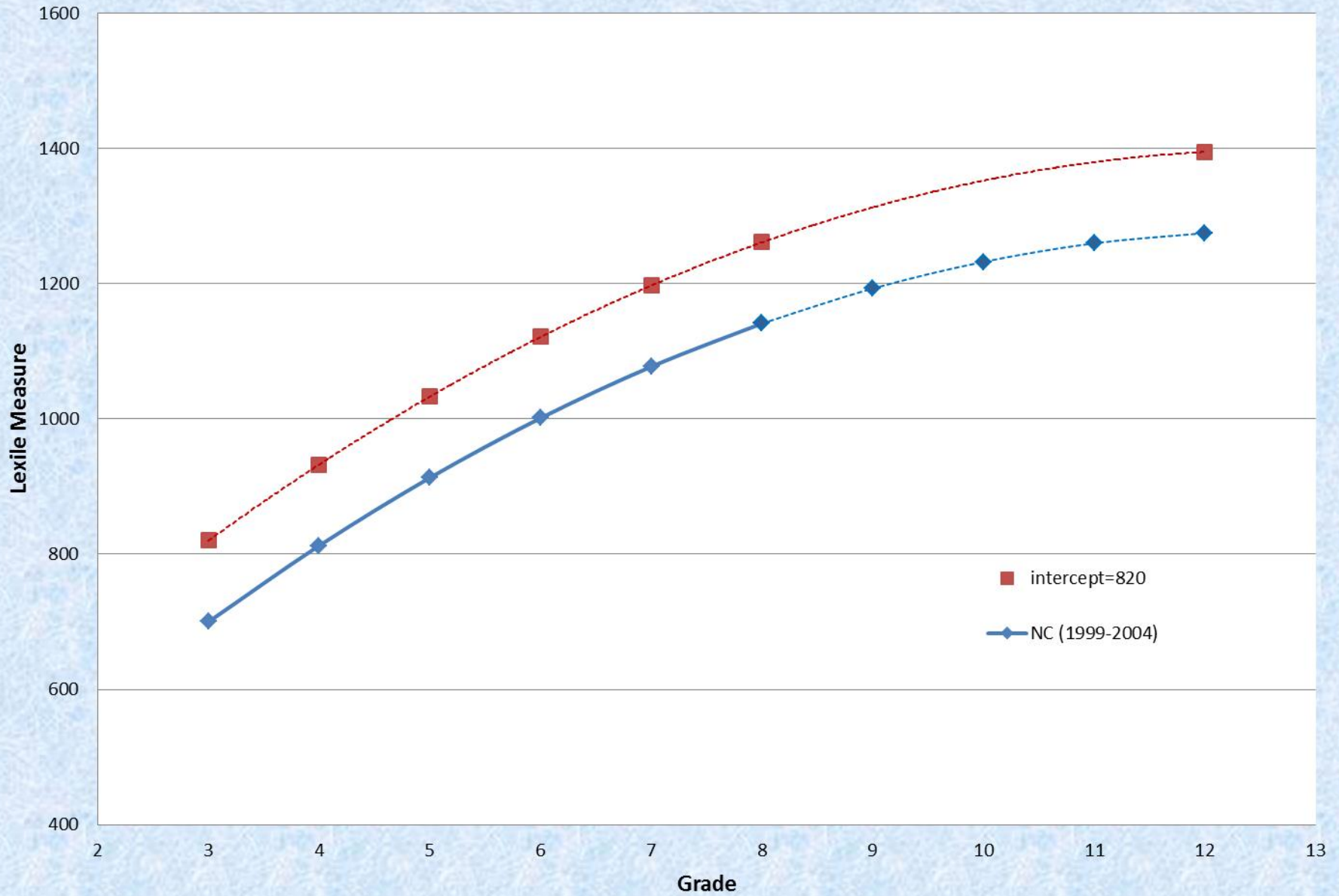
Start with a Reference (Baseline) Growth Curve NC EOG Reading, 1999-2004 (N=67,908)



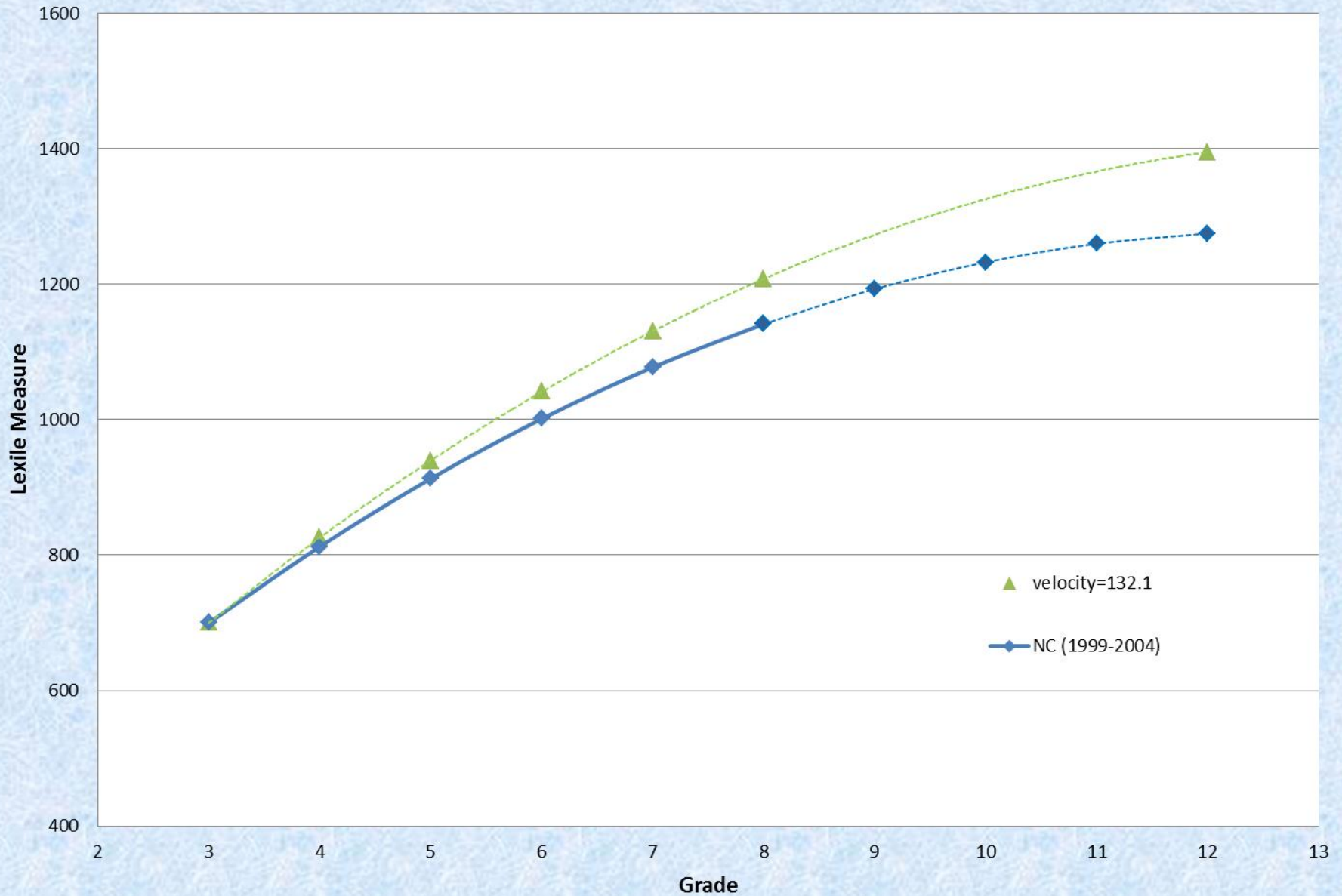
Aspiration: Envision a Desired Trajectory or Status



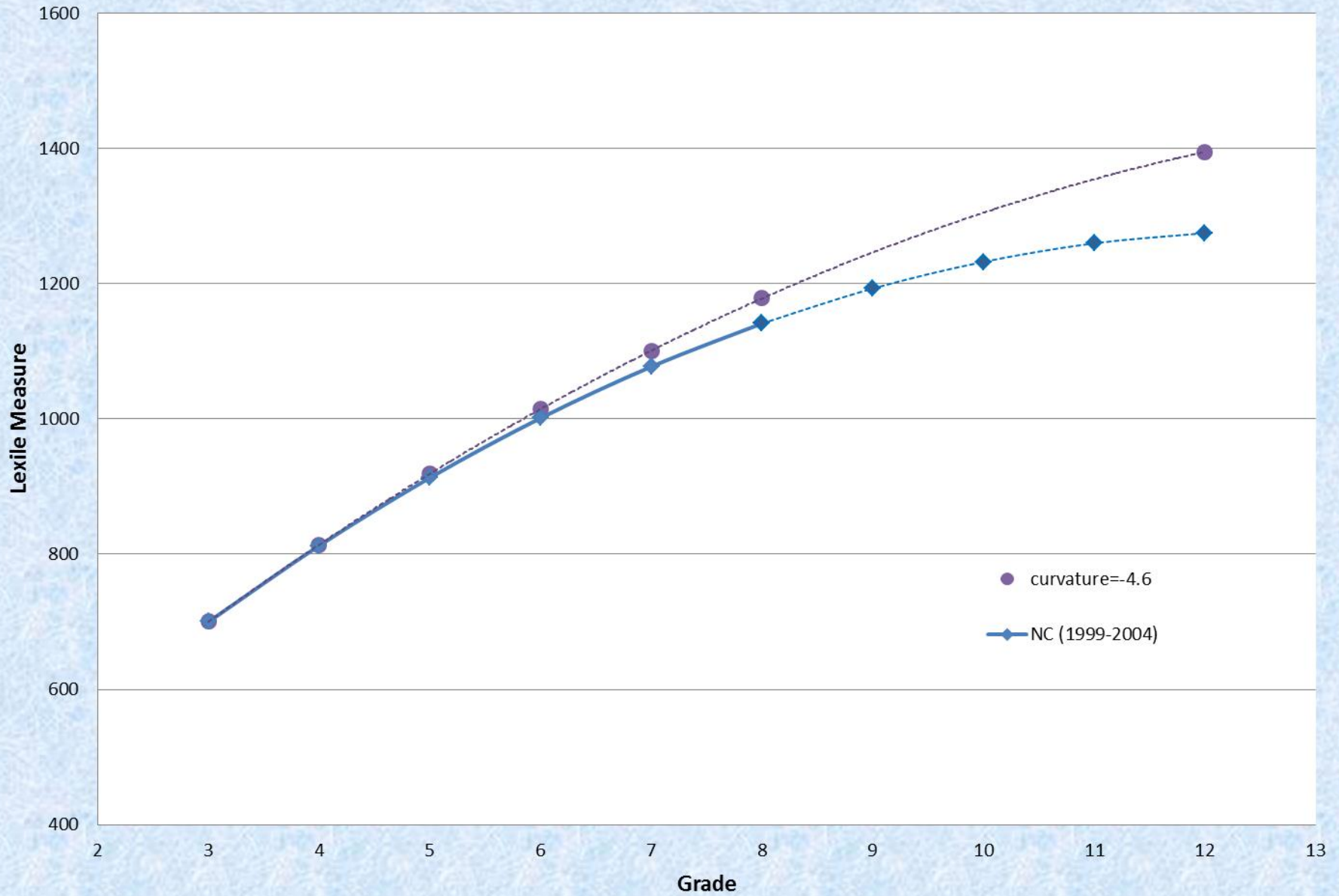
Strategic Paths to 1395L: Modify Intercept



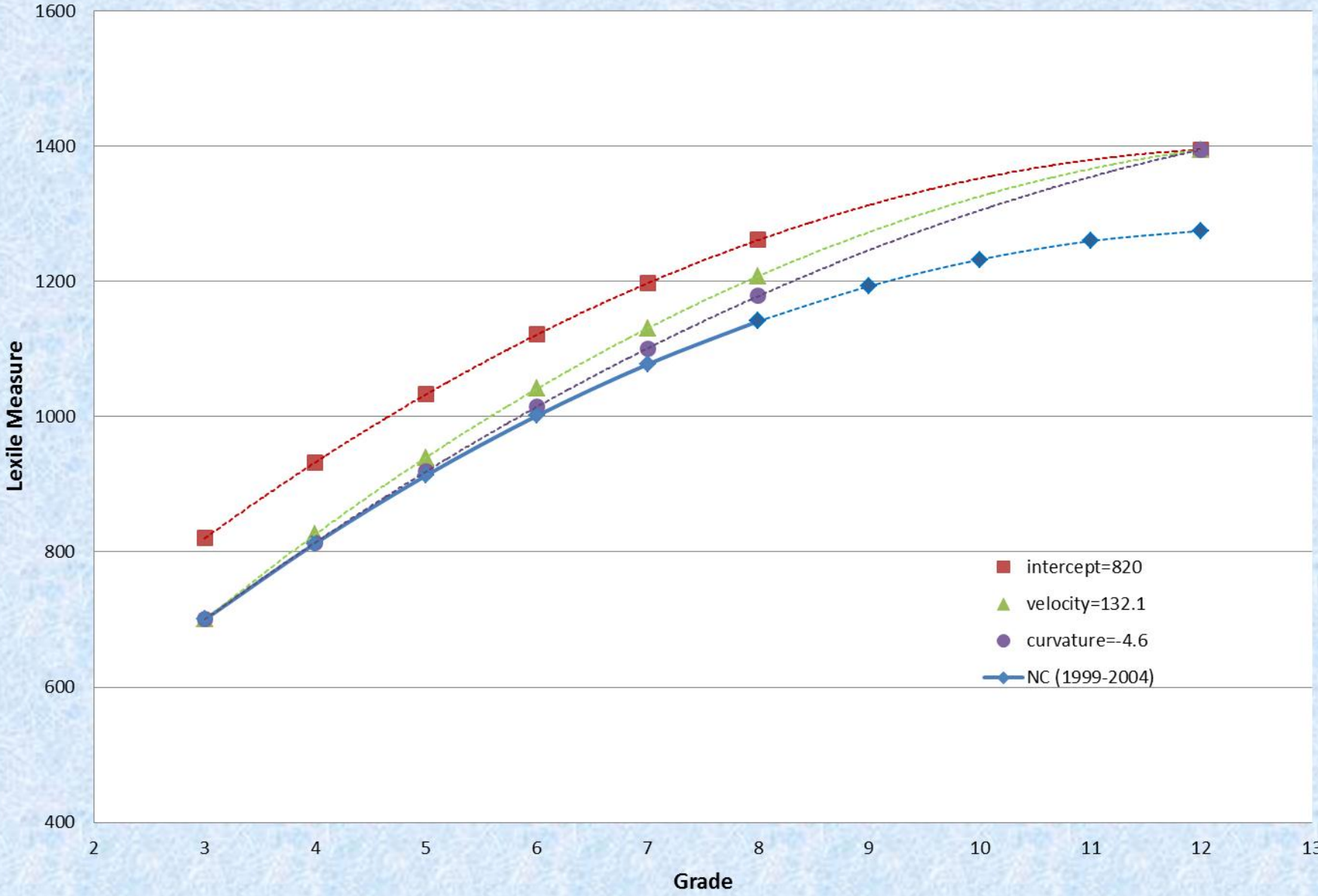
Strategic Paths to 1395L: Modify Initial Velocity



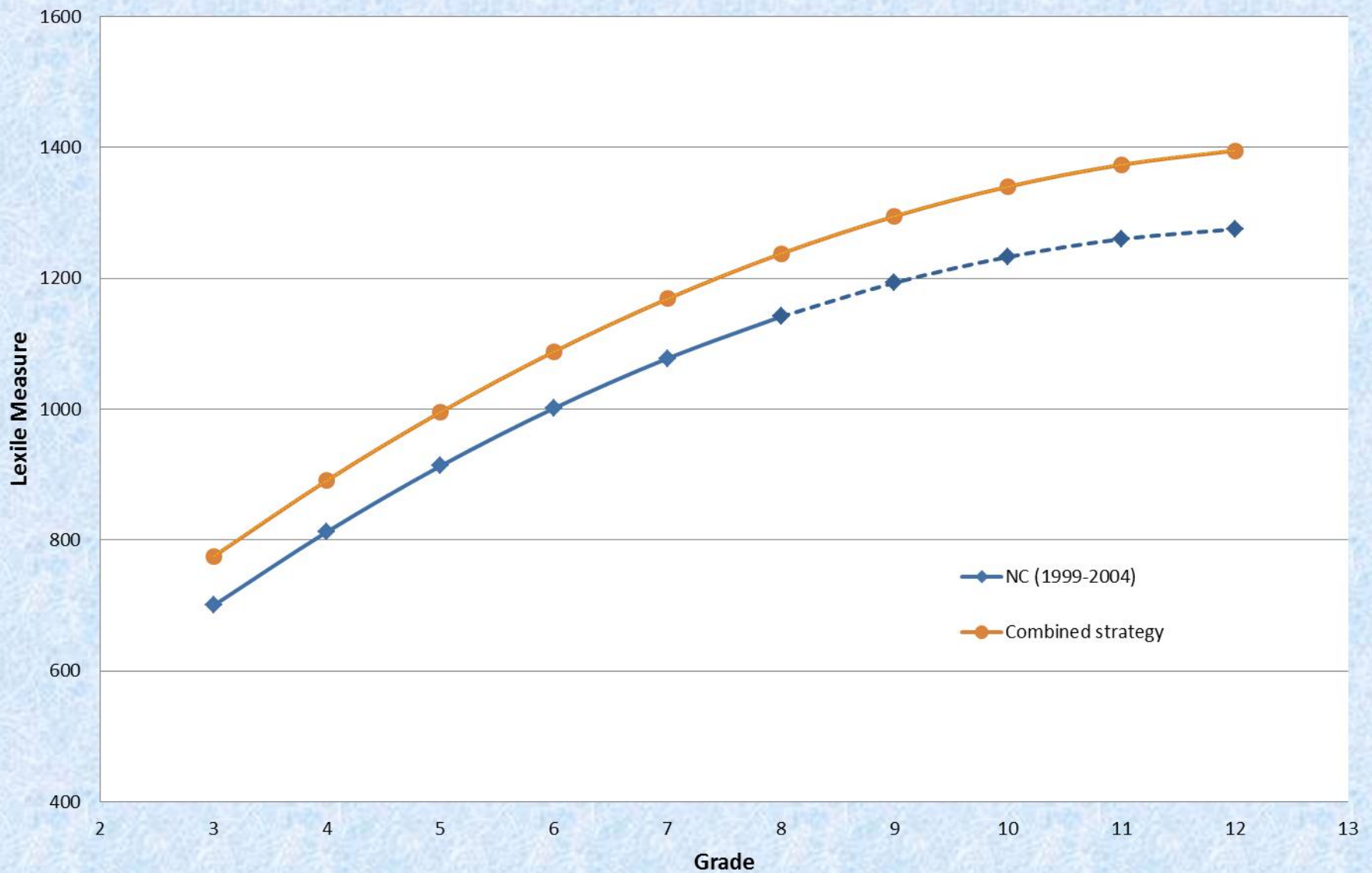
Strategic Paths to 1395L: Modify Curvature (Acceleration)



Strategic Paths to 1395L



Judgmental Modification to Reach 1395L based on the 1999-2004 NC Average Growth Curve (N=67,908)



Numerical Comparison of the Four Strategies

Parameters (in Lexiles)	NC	Higher Intercept	Higher Velocity	Lower Deceleration	Combination Strategy
Intercept	700.0	820.0	700.0	700.0	775.0
Initial velocity	118.7	118.7	132.1	118.7	122.0
Deceleration	-12.2	-12.2	-12.2	-9.2	-11.8



References

Williamson, G.L. (2008) A Text Readability Continuum for Postsecondary Readiness. *Journal of Advanced Academics*, 19(4), 602-632.

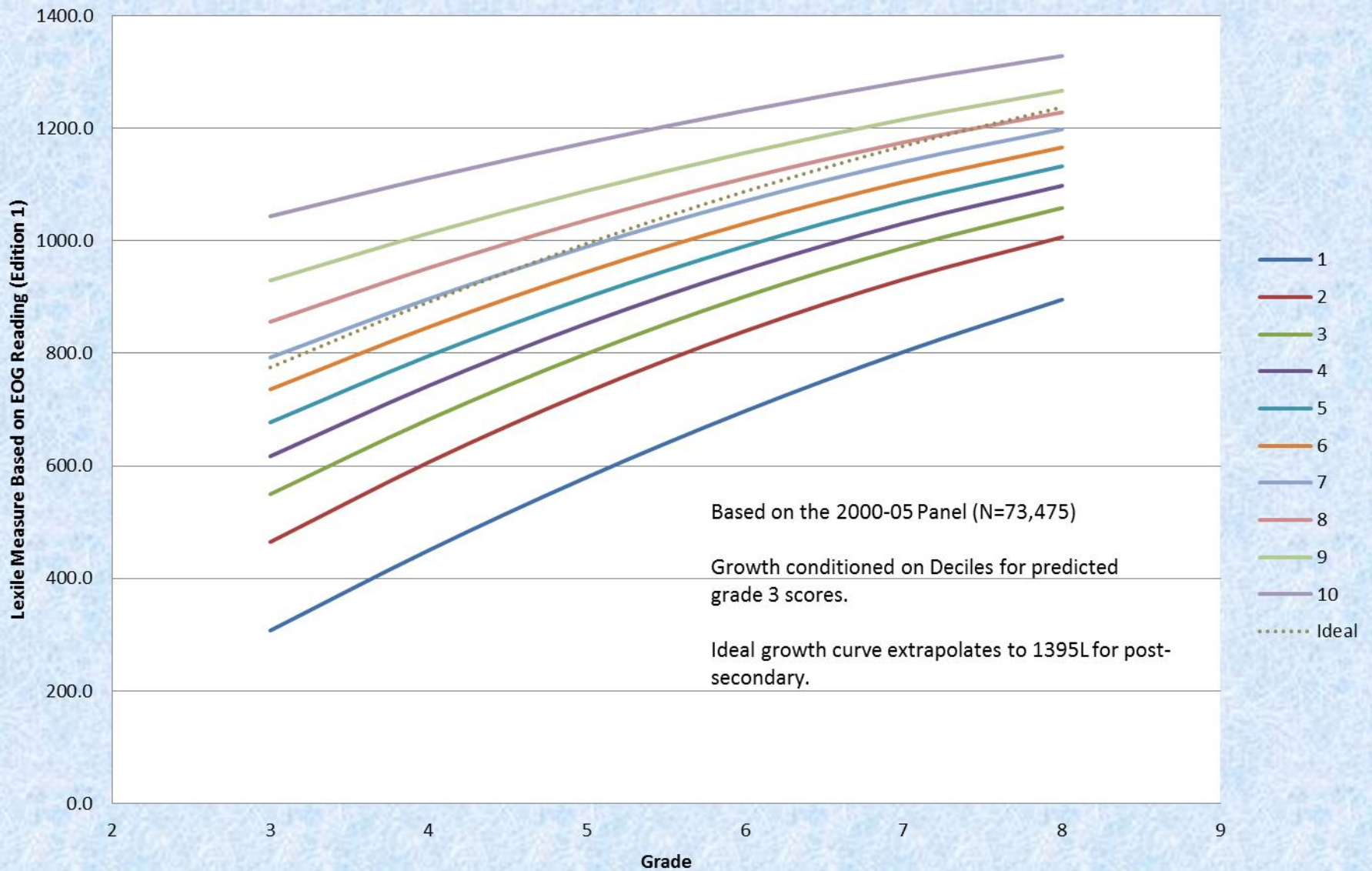
Williamson, G.L. (2007, March). Aligning the journey with a destination: A model for K-16 reading standards. Paper presented at the 2007 Annual Meeting of the North Carolina Association for Research in Education (NCARE). Greensboro, NC.



Growth Conditioned on Initial Performance



NC Growth in Reading by Third Grade Decile with Ideal Growth Curve





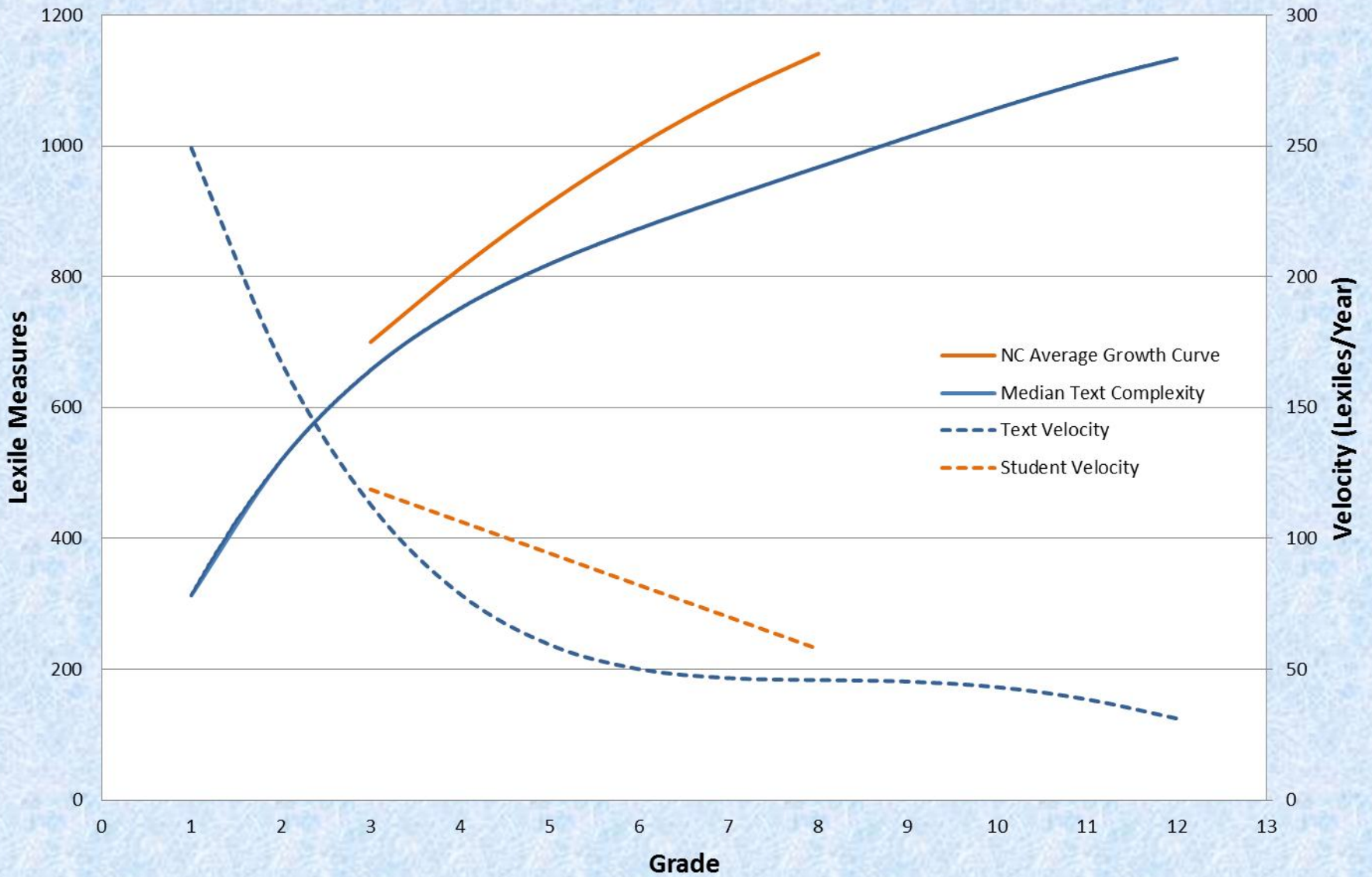
Student Growth and Text Complexity

Growth Curves and Velocity Curves



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Coincident Curves for Reader Ability and Text Complexity and Corresponding Velocity Curves



Discussion



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