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University of Arkansas

**Harming the Best:  
How Schools Affect the  
Black-White Achievement Gap**

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Eric Hanushek

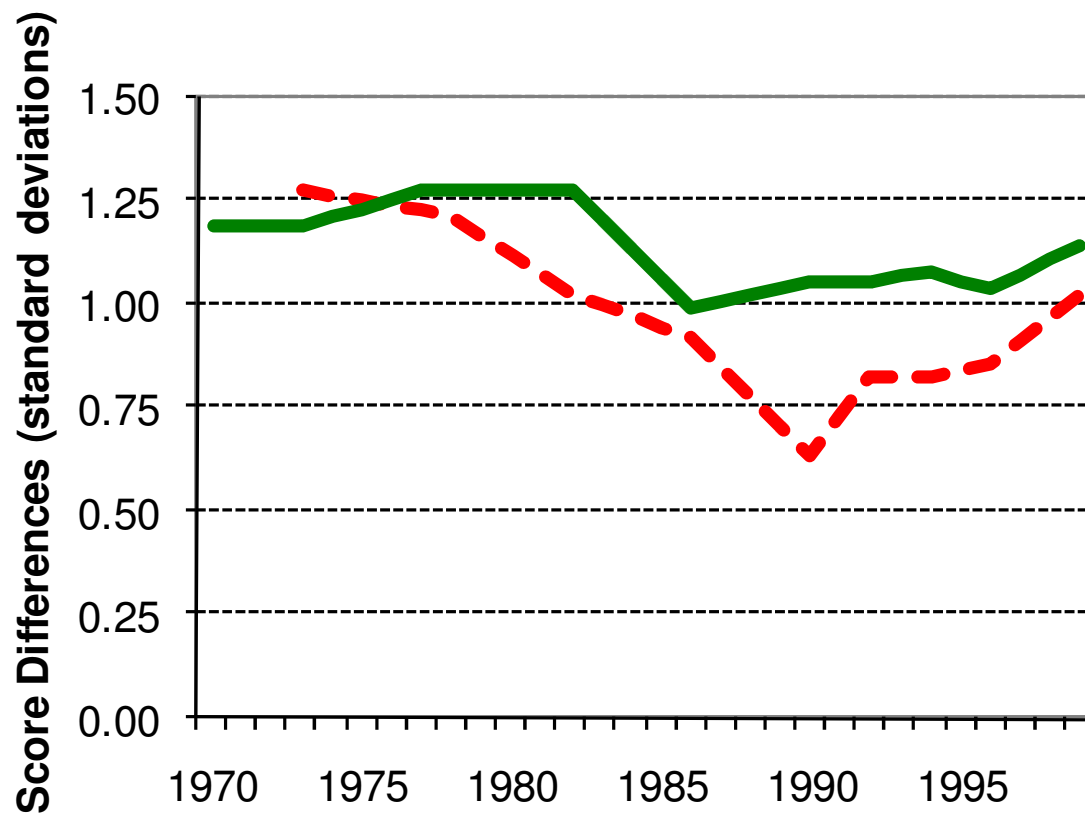
Steven Rivkin

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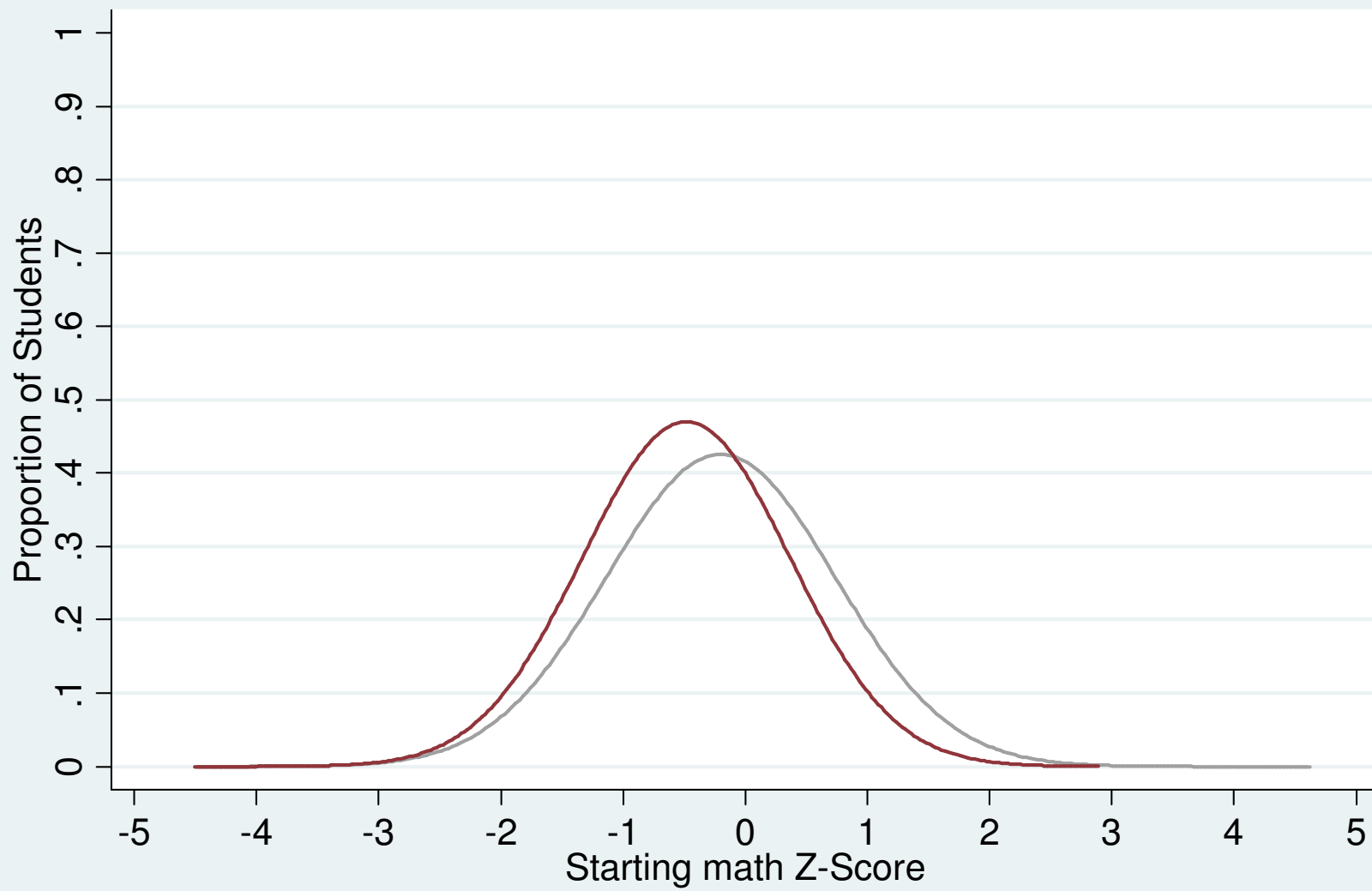
# Motivation

- Expanding earnings distribution within education class
    - Cognitive skills increasingly important
  - Black-white convergence (education and earnings) has stopped
  - Retreat on policies of *Brown*
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## White-Black Differences in NAEP Scores, 17-year-olds



--- Mathematics    — Science



— All — Black

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# Objectives

- Describe evolution of test score gap across grades
  - Assess importance of gap across the achievement distribution
  - Evaluate role of schools in growth of gap
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# Findings

- Gap grows significantly across grades
  - Both growth and impact of schools strongest for highest achieving blacks
  - Much if not all of the growth explained by school and peer factors
    - Inexperienced teachers
    - Racial concentration in schools
  - Policy implications unclear
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# Existing Research

- Coleman et al. (1966)/ USCCR (1967)
    - Families, peers
  - Neal (2006)
    - Convergence stopped
    - Not schools
  - Fryer and Levitt (2004, 2005)
    - Gap large but explicable at K
    - Growth not explained
    - Growth largely within school
  - Murnane, Willett, Bub, McCartney (2005)
    - Unclear whether gap grows
    - Not well explained (SES concentration? Time?)
  - Clotfelter, Ladd, and Vigdor (2005)
    - Large gap at grade 3
    - Does not grow
  - Fordham and Ogbu (1986)/McWhorter (2000)
    - Greatest impact on higher achieving
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# Data sources

## Texas Schools Project

- ❑ Four cohorts: grades 3-8
  - ❑ TAAS math testing
  - ❑ All Texas public schools
  - Exclude:
    - ❑ Retained in grade
    - ❑ Missing grade-appropriate test information (special education)
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# Grade Progression and Test Taking Status for Boys in Texas

	blacks			whites		
	3	5	8	3	5	8
Has score	85.4%	82.2%	78.3%	92.2%	91.9%	89%
Test Missing						
in special education	<b>12.0%</b>	<b>15.0%</b>	<b>13.1%</b>	<b>6.1%</b>	<b>6.1%</b>	<b>6.3%</b>
absent during testing	1.2%	0.7%	1.0%	1.1%	0.9%	1.0%
Other	0.6%	0.2%	2.9%	0.3%	0.1%	1.4%
Off grade sequence	<b>0.7%</b>	<b>1.9%</b>	<b>4.8%</b>	<b>0.3%</b>	<b>1.1%</b>	<b>2.7%</b>

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# Changes by initial achievement

- Measurement error induced regression to the mean
    - Raises achievement gap with same initial scores
  - Insensitivity at top end
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# Test Measurement and Placing Students in Distribution

- All tests contain error
  - Complicates distributional issues
  - Assume true black and white distributions have minimal overlap
    - Two categories: high and low
    - Observed equals true with error
    - Black observed high more likely because of error
    - White observed low more likely because of error
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# Effect of Test Measurement Error

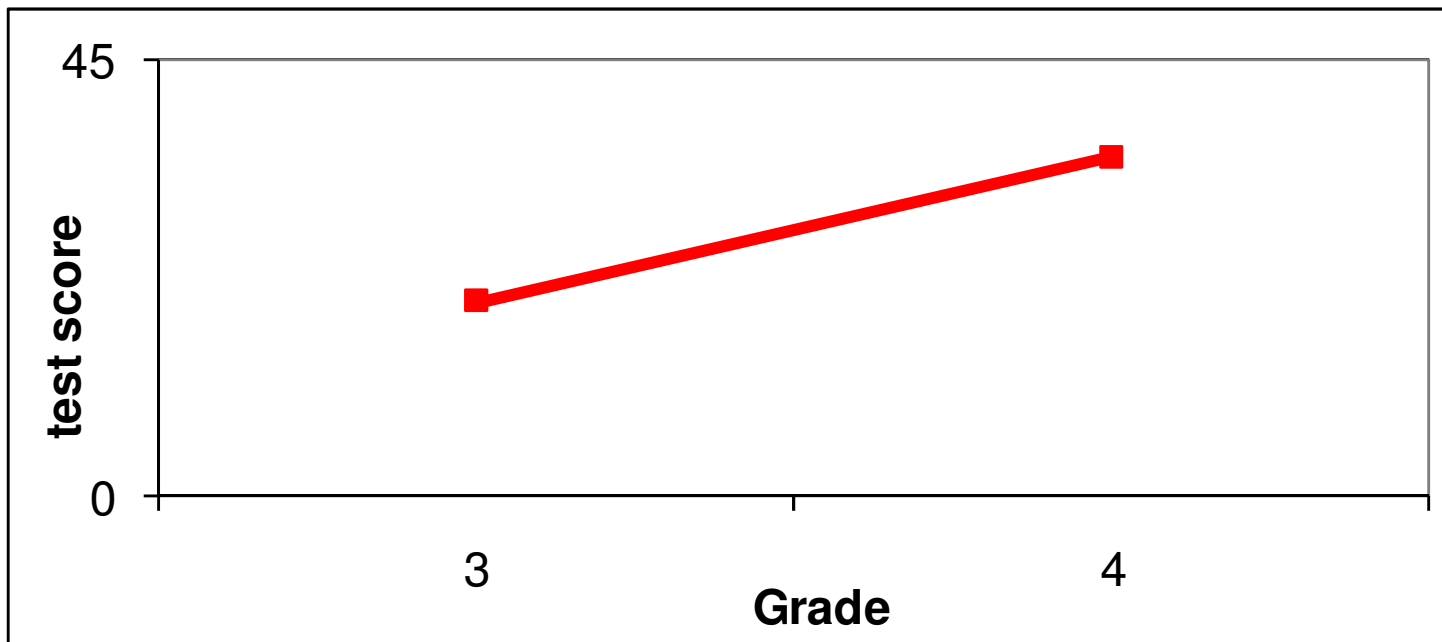
<b>Skill Category</b>	<b>Blacks</b>	<b>Whites</b>
	<b>Actual Distributions of Initial Skills</b>	
Low	0.6	0.4
High	0.4	0.6

# Effect of Test Measurement Error

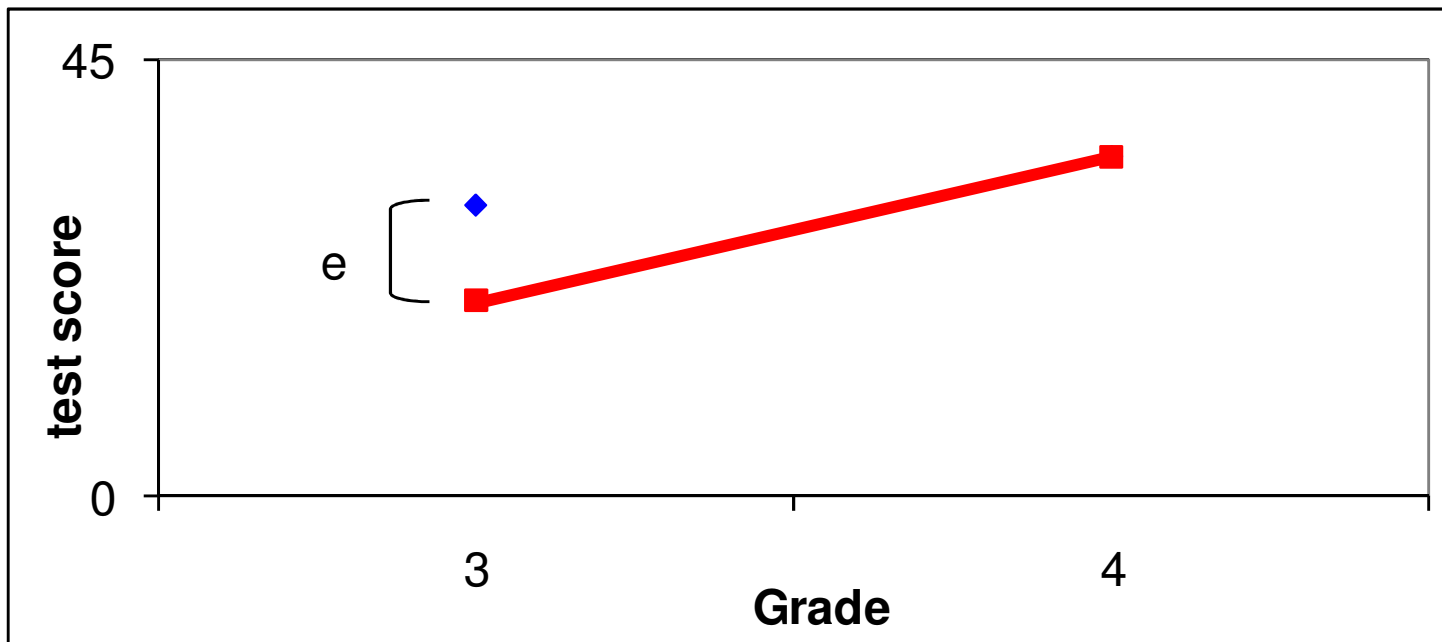
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	<b>Actual Distributions of Initial Skills</b>	
Low	0.6	0.4
High	0.4	0.6
	<b>Observed Test Distribution With Measurement Error</b>	
Low	$0.6 * P_{LL} + 0.4 * P_{HL}$	$0.4 * P_{LL} + 0.6 * P_{HL}$
High	$0.6 * P_{LH} + 0.4 * P_{HH}$	$0.4 * P_{LH} + 0.6 * P_{HH}$

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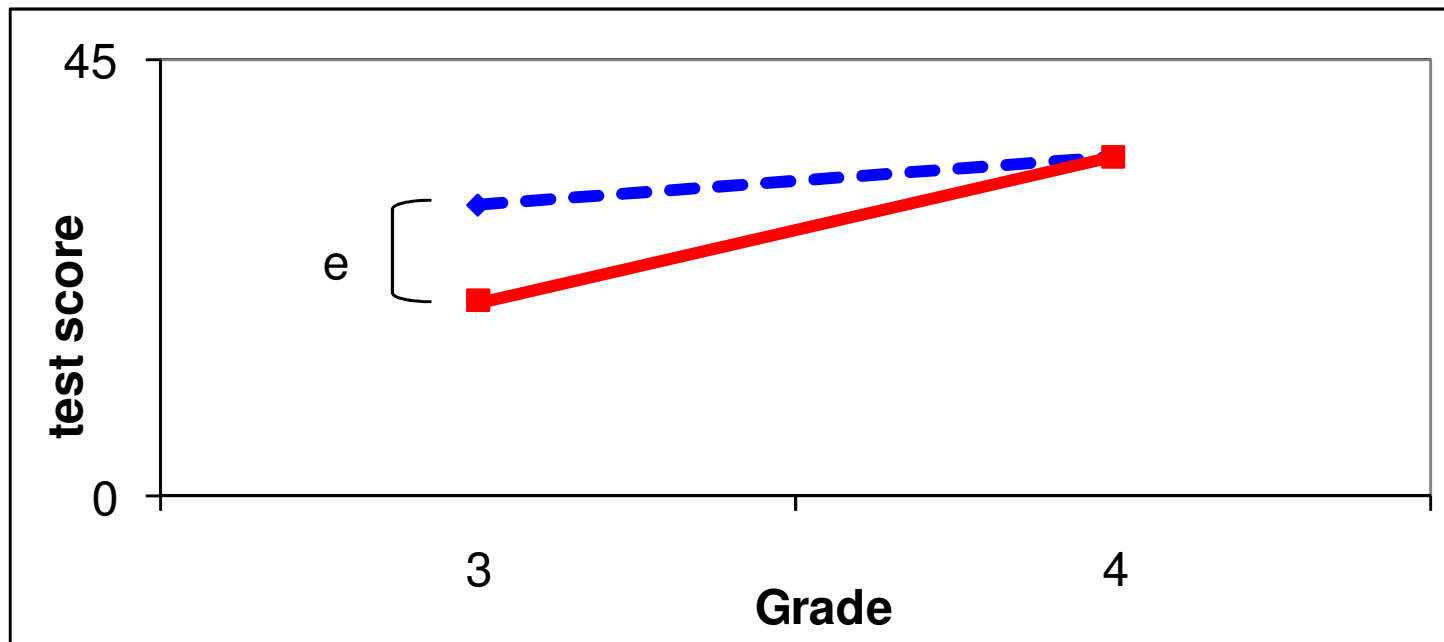
# Growth at Top



# Growth at Top

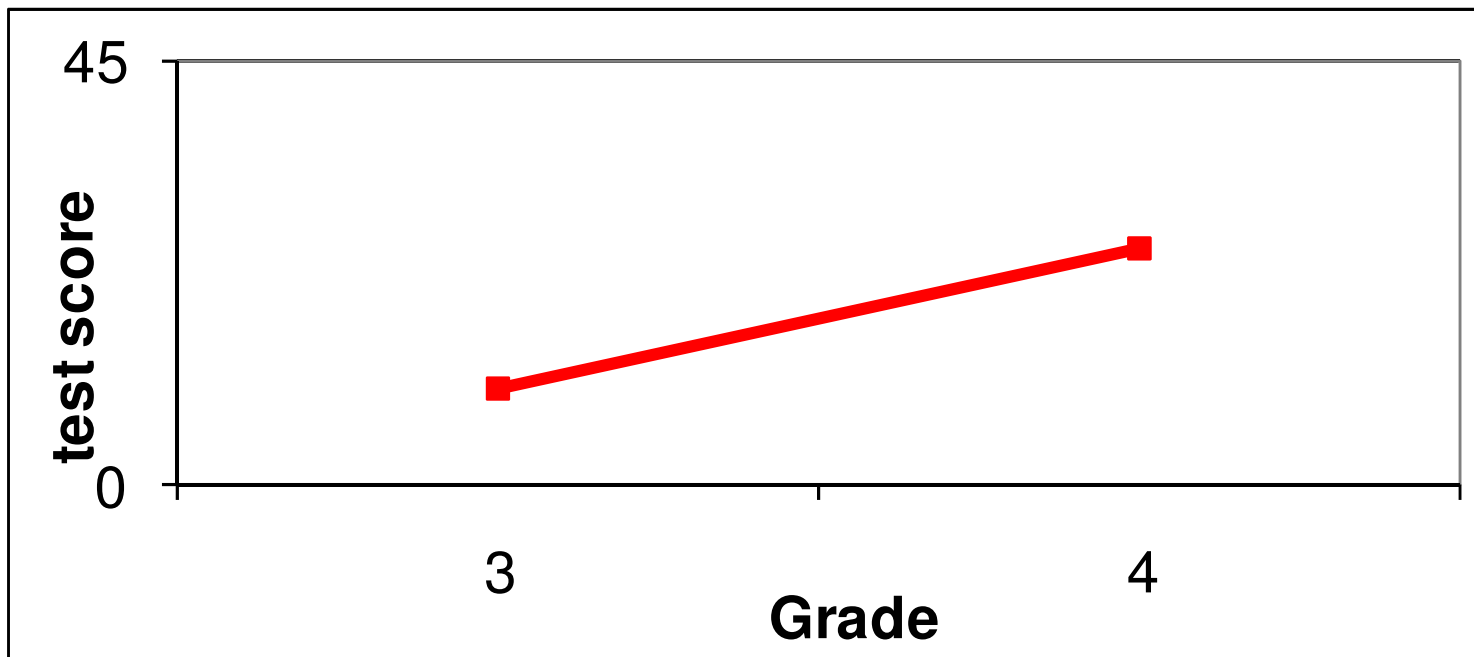


# Growth at Top

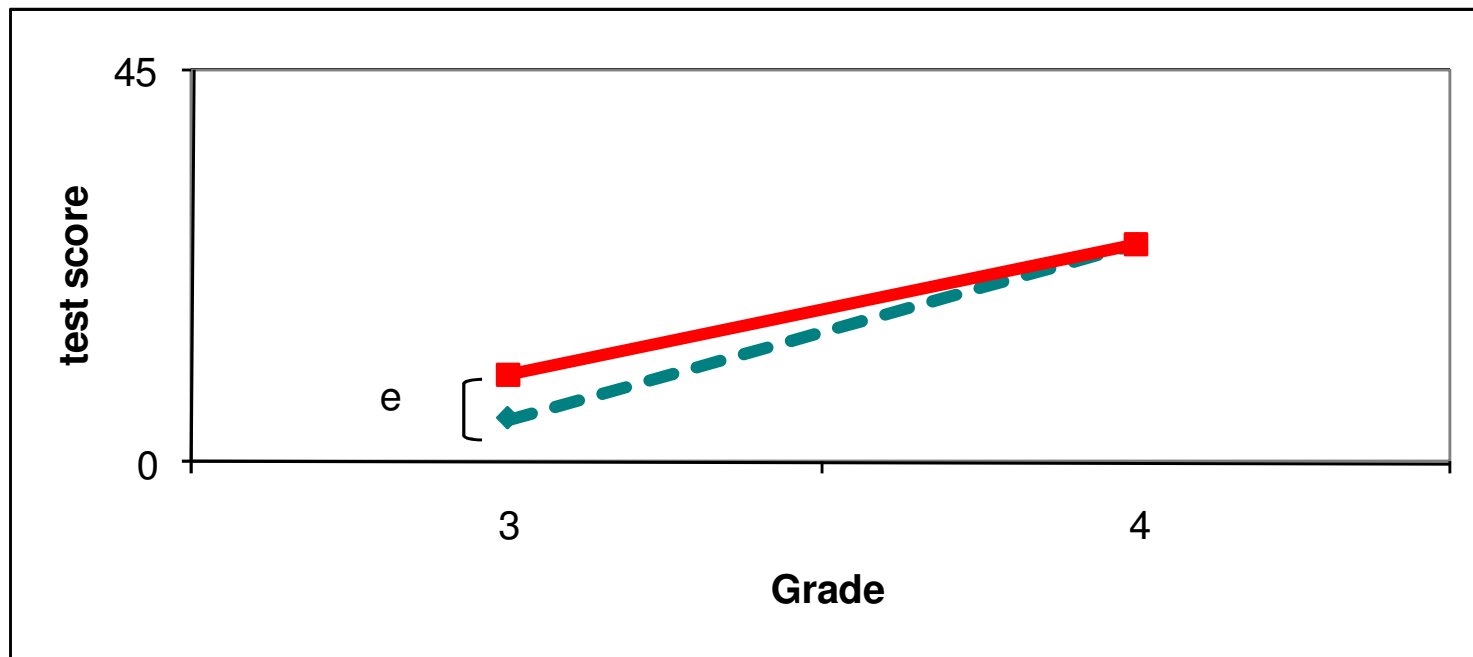


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# Growth at Bottom



# Growth at Bottom



# Defining Distribution by Reading Scores

	3	4	5	8
Overall gap	0.59	0.62	0.65	0.70
<i>Third Grade <u>Reading</u> quartile</i>				
lowest	0.49	0.52	0.57	0.54
2nd	0.31	0.38	0.42	0.46
3rd	0.23	0.34	0.36	0.45
highest	0.20	0.34	0.38	0.48

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# Complications

- Some hard to measure factors differ across schools and time
    - Neighborhood choice
    - District policies, leadership, funding
    - Transitional neighborhoods, local economics
  - Some differ by specific grade in each school
    - Curriculum
    - Testing policies
    - Grade retention policies
  - Each student has different history
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# Statistical Approach

- Focus on gains in achievement
  - Look within school and grade (compare cohorts)
  - Allow for individual mobility
  
  - Consider specific school factors
    - Racial composition
    - Rookie teachers
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# Empirical model

- Educational production function

$$A_{iGsy} = \alpha_{iGy} + \beta X_{iGsy} + \lambda P_{iGsy} + \delta S_{iGsy} + e_{iGsy}$$

- P, S likely correlated with  $e$ ,  $\alpha$
  - Fixed effects
    - School x year
    - School x grade
    - Year x grade
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# Heterogeneity

$$\alpha_{iGsy} = \beta \sum_{g=1}^{G-1} \theta^{G-g} X_{igy} + \delta \sum_{g=1}^{G-1} \theta^{G-g} S_{igy} + \lambda \sum_{g=1}^{G-1} \theta^{G-g} P_{igy} + (\gamma_i + \sum_{g=1}^{G-1} \theta^{G-g} \gamma_i)$$

$$A_{iGy} = \theta A_{iG-1y-1} + \beta X_{iGsy} + \lambda P_{iGsy} + \delta S_{iGsy} + e_{iGsy}$$

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# Racial Composition: black elementary school

Campus x year	No	Yes
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Campus x grade	Yes	yes
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<i>bottom quartile</i>	<b>-.12</b>	<b>-.01</b>
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<i>second quartile</i>	<b>.10</b>	<b>-.08</b>
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<i>third quartile</i>	<b>-.15</b>	<b>-.12</b>
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<i>top quartile</i>	<b>-.24</b>	<b>-.20</b>
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# Racial Composition: white elementary school

Campus x year	No	Yes
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Campus x grade	Yes	yes
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<i>bottom quartile</i>	<b>-.13</b>	<b>-.11</b>
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<i>second quartile</i>	<b>-.03</b>	<b>-.00</b>
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<i>third quartile</i>	<b>.01</b>	<b>.04</b>
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<i>top quartile</i>	<b>.04</b>	<b>.07</b>
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# Racial Composition: black middle school

Campus x year	No	Yes
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Campus x grade	Yes	yes
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<i>bottom quartile</i>	<b>-.28</b>	<b>-.24</b>
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<i>second quartile</i>	<b>-.26</b>	<b>-.23</b>
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<i>third quartile</i>	<b>-.27</b>	<b>-.23</b>
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<i>top quartile</i>	<b>-.38</b>	<b>-.35</b>
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# Racial Composition: white middle school

Campus x year	No	Yes
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Campus x grade	Yes	yes
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<i>bottom quartile</i>	<b>-.23</b>	<b>-.21</b>
------------------------	-------------	-------------

<i>second quartile</i>	<b>-.23</b>	<b>-.21</b>
------------------------	-------------	-------------

<i>third quartile</i>	<b>-.11</b>	<b>-.09</b>
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<i>top quartile</i>	<b>-.08</b>	<b>-.06</b>
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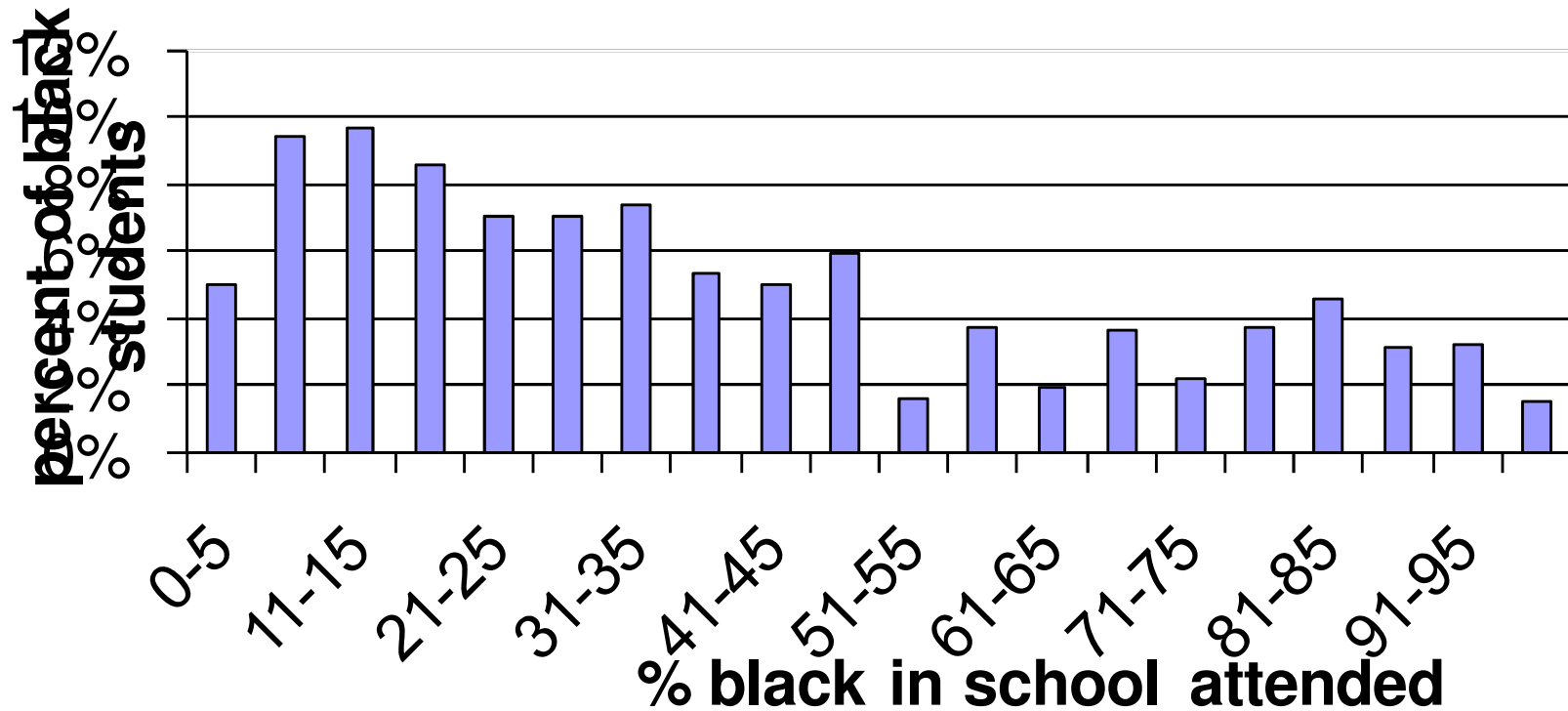
# Characteristics of schools

	Lowest	2 <sup>nd</sup>	3 <sup>rd</sup>	Highest
<b>Blacks</b>				
Black classmates	38.2	37.5	37.4	39.4
0 yr experience	8.6	8.3	8.2	8.3

# Characteristics of schools

	Lowest	2 <sup>nd</sup>	3 <sup>rd</sup>	Highest
<b>Blacks</b>				
Black classmates	38.2	37.5	37.4	39.4
0 yr experience	8.6	8.3	8.2	8.3
<b>Whites</b>				
Black classmates	9.6	9.2	8.9	8.7
0 yr experience	6.6	6.3	6.0	5.8

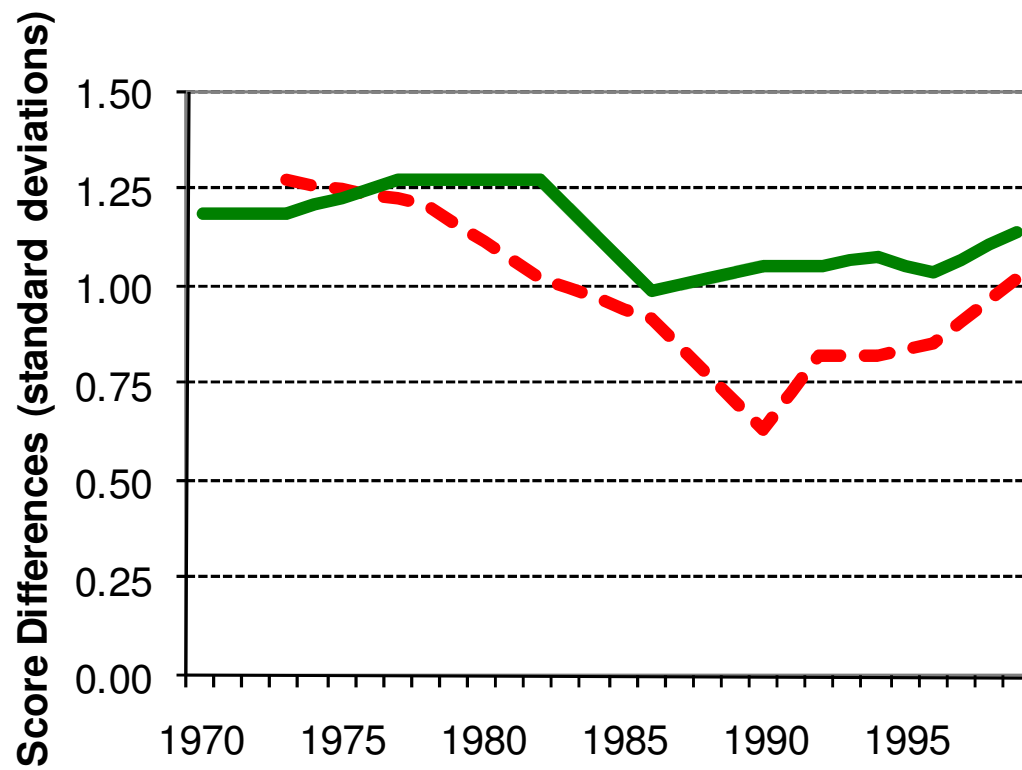
# Distribution of Black Students by Percent Black in School



# Simulations of Equalization (through grade 8)

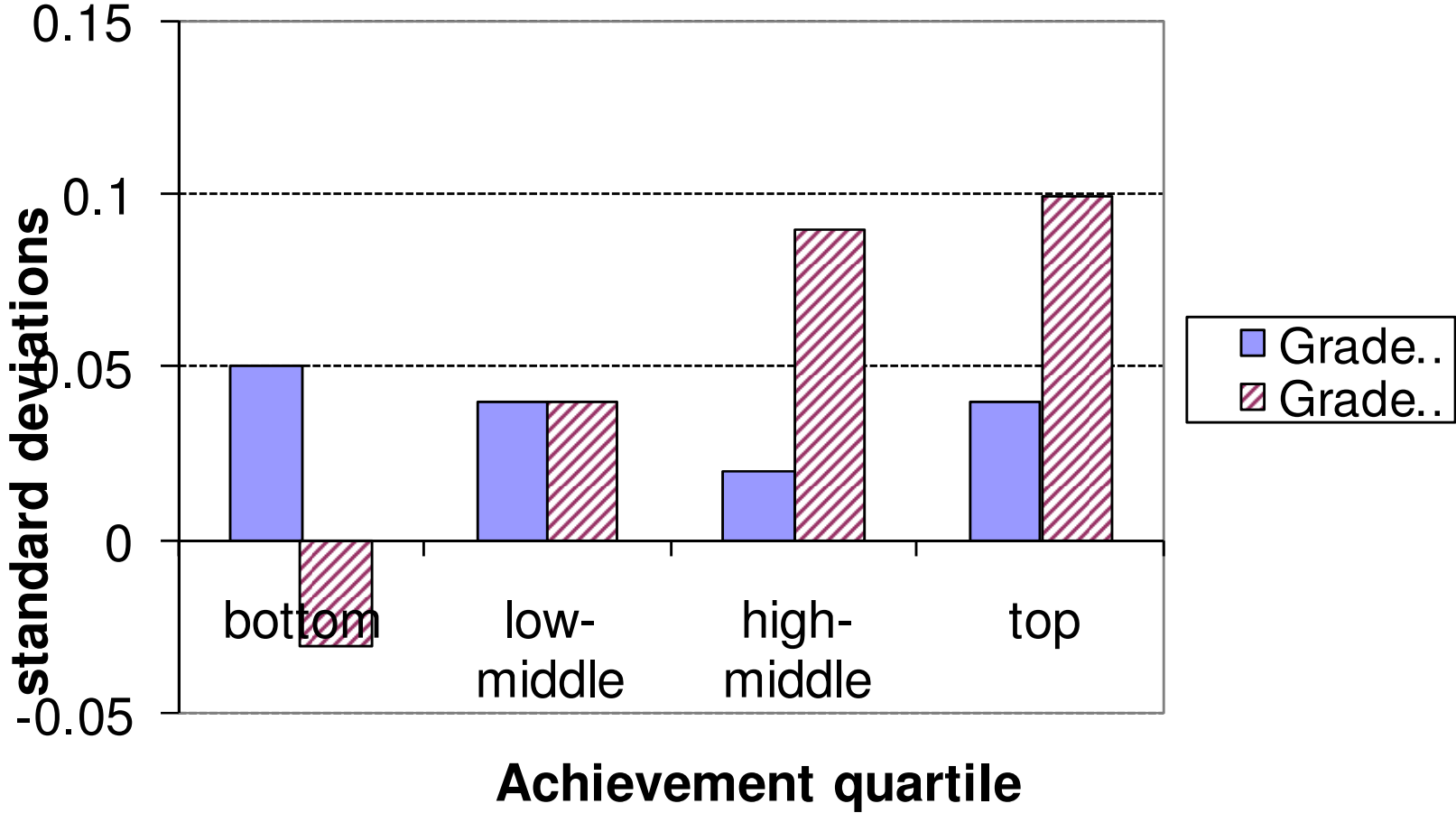
	% black	% 0 years experience	% total
Lowest	.03	.002	150%
Second	.03	.002	38%
Third	.03	.001	27%
Highest	.05	.001	38%

### White-Black Differences in NAEP Scores, 17-year-olds



--- Mathematics    — Science

# Change in Black-White Math Gaps



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# Findings

- Gap grows significantly across grades
  - Both growth and impact of schools strongest for highest achieving blacks
  - Much if not all of the growth explained by school and peer factors
    - Inexperienced teachers
    - Racial concentration in schools
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## Policy Implications are complicated

- Desegregation limited by legal rulings and may alter relationship between achievement and racial composition
  - Teacher preferences regarding working conditions must be considered in efforts to raise teacher quality
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