



**Research Report**

**No. 2006-4**

Observational  
Timing Study  
on the SAT  
Reasoning Test™  
for Test-Takers  
with Learning  
Disabilities and/or  
AD/HD

**Cara Cahalan-Laitusis, Teresa C. King,  
Frederick Cline, and Brent Bridgeman**



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# Abstract

The purpose of this study is to provide information on actual time used by students with disabilities on the new SAT®. This study observed students with learning disabilities (LD) and/or attention deficit/hyperactivity disorder (AD/HD) as they took SAT items under strict time limits and recorded the amount of time taken for each item. The study is a replication of study 2 in Bridgeman, Cahalan, and Cline (2003), which observed students without disabilities completing the same test items that are included in this study. Comparisons of the results from this study to the results of Bridgeman et al. are made and recommendations on appropriate extended-time limits for most students with disabilities are provided.

## Background

Currently all major testing organizations that administer admissions tests provide testing accommodations for students with disabilities. The accommodations provided on college admissions tests are usually a carryover from the accommodations a student has been previously provided on standardized state or in-school assessments. In the K–12 arena, most testing accommodation decisions are made by an Individualized Education Program (IEP) team. For state assessments, the IEP team uses information about the student, instructional accommodations, and the test, along with guidelines provided by the state department of education, to make a decision regarding the accommodation to be provided on the state assessment. Extra testing time is the most commonly requested and provided accommodation for students with learning disabilities and/or attention deficit/hyperactivity disorder (AD/HD); however, states are increasingly moving toward allowing extra time for all students regardless of disability classification. In many cases the accommodation decisions made for state assessments are carried over to college admissions tests. Presently the most widely used accommodation on the SAT Reasoning Test™ is extra time (i.e., 50 percent more time than the standard timing for the test).

Anecdotal reports from test proctors and prior research conducted by the College Board (Mandinach, Bridgeman, Cahalan, and Trapani, 2005) indicate that time and a half on the SAT may be excessive for many students with learning disabilities and/or AD/HD. In this study many students who received time and a half did not use time and a half. In addition, research on the predictive validity of the SAT indicates that, on average, test scores overpredict college performance (i.e., first-year grade point average) for individuals with learning disabilities who receive extra time accommodations when compared to individuals

without disabilities who do not receive extra time (Cahalan, Mandinach, and Camara, 2002).

The purpose of this study is to provide information on actual time used by students with disabilities on the new SAT Reasoning Test. The new SAT, first administered in March 2005, includes revised critical reading and mathematics sections and a new writing section. The critical reading section is similar to the old verbal section, although it no longer includes analogy items but instead includes a new item type that uses short reading passages. The mathematics section eliminates quantitative comparison items and expands the math content to include third-year college-preparatory math. Finally, the writing section includes multiple-choice items that focus on grammar and usage (similar to the PSAT/NMSQT® writing section) and an essay. With several changes to the critical reading and mathematics sections and the addition of a writing section, it is important to assess the time requirements for all students. Recent research included a series of studies on the time needed on the revised SAT for most students without disabilities (Bridgeman, Cahalan, and Cline, 2003). The results of these studies were used to determine the number of items of each item type to be included per section and the overall section time limits on the new SAT.

One of the timing-related studies of the new SAT (included in Bridgeman et al., 2003) used observational methods to examine the amount of time students actually used on individual test items. The study described in this report is a replication of that observational timing study (same methodology and test booklets) with three exceptions: (1) the study participants had a learning disability and/or attention deficit disorder with or without hyperactivity (AD/HD) instead of having no disability, (2) the study participants received extra-time accommodations on a prior College Board test, and (3) time limits were extended to allow adequate time for most participants to complete all of the test items. This replication of the prior study has allowed us to make comparisons between individuals with and without disabilities on the same test items. It should be noted, however, that at the time the Bridgeman et al. (2003) study was conducted the new SAT Reasoning Test was not yet operational and neither the exact number of items nor the section timing had been determined. Consequently, the forms used and the timing allowed, for this study and the Bridgeman et al. 2003 study, do not match exactly with current test specifications.

## Method

### Participants

High school juniors and seniors, from the greater Trenton/Princeton, New Jersey, area, who were approved

**Table 1**

Total Sample of Test-Takers by Disability Groups	
Students with No Disability*	72
Any Disability†	50
AD/HD	27
Reading-based LD	22
Mathematics-based LD	14
Writing-based LD	19
Other LD	3

\*The sample of students without a disability is from Bridgeman, Cahalan, and Cline, 2003.

†Some students had multiple disabilities so the total sample across disability subtypes is greater than the total number of students with any disability.

to take any College Board test with an extra-time accommodation and no other testing accommodation (e.g., large print, frequent breaks), were recruited to participate in this study. Letters were sent to potential subjects explaining that they would be tested with items from the new SAT for 90 minutes and that they would be compensated with a \$50 American Express gift certificate for their participation.

Approximately 200 students were contacted to participate, and of the 56 who scheduled appointments, 50 participated. The final sample was evenly distributed between high school juniors and seniors, but included slightly more males (62 percent), which is consistent with the population of students with learning disabilities and AD/HD. The total sample by disability subtype are included in Table 1. Twenty-seven students reported having AD/HD. Twenty-two reported having a learning disability affecting reading abilities, 19 reported having a learning disability affecting writing abilities, and 14 reported having a learning disability affecting math abilities. The four groups were not mutually exclusive and several students selected more than one group.

Since students took only two of the three subtests, the samples by subtest are smaller than the overall sample. Table 2 displays the sample sizes used for analyses and are broken down by subgroups and subtests completed. The last row of the table includes the number of students with a subject-specific learning disability (but not AD/HD) followed by the number of students with a subject-specific learning disability (e.g., 12 students with a reading-based learning disability and no AD/HD took the critical reading subtest).

**Table 2**

Sample Size by Disability Subgroup and Subtest Taken	Subtest Taken		
	Reading	Mathematics	Writing
Students without a disability*	46	48	50
Students with any disability	33	33	34
Students with AD/HD and no subject-specific LD	11	20	15
Students with a subject-specific LD and no AD/HD	12	5	8

\*The sample of students without a disability is from Bridgeman, Cahalan, and Cline, 2003.

## Test Forms

The test materials in this study consisted of the same forms of the critical reading, mathematics, and writing sections used in the Bridgeman et al. (2003) study. The critical reading and mathematics sections were specifically designed for the previous study to emulate the proposed makeup of the new SAT, while the writing multiple-choice section was derived from a disclosed PSAT/NMSQT. Each section was made into two forms that switched the order of the item-type blocks to eliminate the chance that the timing data for a specific item type would be impacted by the order of presentation of the test item.

The critical reading subtest included nine sentence completion items, two short (100-word) reading passages with five items per passage (for a total of 10 items), and two long (650-word) reading passages with nine items per passage (for a total of 18 items). The order for Form A was sentence completion items, short passages, and long passages; for Form B it was short passages, long passages, and sentence completion items.

The mathematics subtest included 15 multiple-choice items and 10 student-produced response (SPR) items. The content of the mathematics subtest reflected the revised SAT by including four multiple-choice items with more advanced algebra content. The order of the two subtests alternated in each form of the test; Form A had the multiple-choice items first, and Form B had the student-produced response items first.

The writing multiple-choice subtest included 19 items on identifying sentence errors, 14 items on improving sentences, and 6 items on improving paragraphs. The order for Form A was identifying sentence errors, improving sentences, and improving paragraphs; for Form B it was improving paragraphs, improving sentences, and identifying sentence errors. The essay portion was *not* included in this study.

## Procedure

Testing was administered at the ETS Rosedale campus research lab, which consists of two testing rooms connected via two-way mirrors to an observation room. A maximum of three students per room were randomly seated at a table facing the two-way mirror. Three

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binders, each containing a single form of one of the critical reading, mathematics, or writing subtests, were placed on each table.

Students were told not to open the binder in front of them until all instructions were given. The standard instructions for the old SAT were used, except that the students were told they would have time and a half for each subtest, equal to a total of 45 minutes, based on the timing of 30 minutes per subtest that was standard on the SAT at the time. In practice the observers allowed up to 2 additional minutes per subtest for a maximum of 47 minutes if students were still working. The students were told they were being observed from behind a two-way mirror and were asked to begin their session when the lights in the observation room were shut off and to stop each subtest when the lights were turned back on. Researchers observed students from the observation room and only entered the testing room if students indicated that they had a question and at the end of each test section.

Once testing began, the observers recorded the time spent, in seconds, by the student on each item. Observers also recorded the time spent on instructions and on revisits to each item after the initial look. Each test item was printed on an individual page with large item numbers, so the observers could easily identify which item the test-taker was working on from the observation room. This format changed on the critical reading subtest, where items related to a reading passage were printed on the same page with the passage, and not on individual pages. Since separating the time spent reading a passage from the time spent answering a specific item about the passage was not possible, items related to the reading passages were timed per passage and not per item. Each observer recorded time information for up to two students during each testing session while video recordings were made of any students that could not be observed in real time.

Each student took two subtests. Upon completion of the first subtest, students were given the option to take a short break. At the start of the second subtest the students passed the binder they had used for the first subtest to their left. Students completed an exit survey and a background questionnaire at the completion of the testing.

## Results

The mean time per item type was calculated using the number of items actually seen by the test-taker as the denominator in the calculation, not the number of items in the subtest. In a few instances, test-takers ran out of time before starting the final item type in the form. Items on which a student spent less than 10 seconds to answer were not included in the mean item time computations.

This method eliminated items a student did not reach as well as items that a student did not take the time to truly consider, usually in both instances at the end of the test section due to time constraints. This was the same method used in the Bridgeman et al. (2003) study. For further explanation, please refer to that study.

The data was first analyzed to look for differences in mean time spent per item type between the students with any disability (AD/HD and/or LD) who required extra time and the students without a disability in the Bridgeman et al. (2003) study. Students in the disability group were further identified as having (a) a subject-specific learning disability, (b) AD/HD, or (c) both LD and AD/HD. Students with AD/HD (but not a learning disability) were compared to students with a subject-specific learning disability (but not AD/HD) to look for differences in time by item type. Students classified with both AD/HD and a subject-specific learning disability were excluded from the comparison to avoid confounding the results. These analyses were conducted using T-tests with significant differences set at  $p < .05$ . Descriptive statistics (mean, standard deviation, and sample size) as well as T-test results for all item types are reported in the Appendix.

### Critical Reading

There were 33 students with a disability (i.e., LD and/or AD/HD) from this study and an additional 46 students without any disability from the Bridgeman et al. (2003) study who were given the critical reading subtest. The mean time spent on the entire subtest was 35 minutes for the sample of students with a disability, approximately 8 percent longer than the mean time spent of 33 minutes by students without a disability. Overall, 26 of the 33 students with a disability took more than 30 minutes to work on the subtest. Four of these students were stopped after 47 minutes, before completing the form. When asked about the timing of the section (i.e., time and a half or 45 minutes), 11 students stated that they needed 5 to 10 more minutes, 6 students reported that they had sufficient time, and 16 students reported that they finished the reading subtest 5 to 10 minutes early.

Analysis of the time spent on the three critical reading item-type subtests follows, with the 650-word passages reported separately for Passage 1 and Passage 2. All passage-related items (i.e., 100-word passages and two 650-word passages) were computed by dividing the total time spent on the passage and items by the total number of items associated with the passage.

### Sentence completion

No timing information is available for five students (one student with a disability and four students without a disability) who ran out of time prior to the sentence

completion items. The students with and without a disability spent approximately the same amount of time on the sentence completion items ( $t [72] = -0.185, p = 0.854$ ). The mean time per sentence completion item was 40.7 seconds ( $SD = 11.7, N = 32$ ) for the students with disabilities. The students without a disability had a mean time of 40.2 seconds ( $SD = 9.8, N = 42$ ) for the same section. See Figure 1 for the distributions of the mean time per item in 10-second intervals.

Within the sample of students with a disability, students with AD/HD (and no learning disability) had a mean time per sentence completion item of 38.7 seconds ( $SD = 13.3, N = 11$ ), while students with a reading-based learning disability (and no AD/HD) had a mean time of 42.9 seconds ( $SD = 11.9, N = 12$ ). This difference was not significant ( $t [21] = 0.800, p = 0.433$ ).

### Short (100-word) passages

The mean time per 100-word passage items for the students with any disability (AD/HD or any LD) was 63.8 seconds ( $SD = 16.5, N = 33$ ). The students without a disability had a mean time of 56.0 seconds ( $SD = 15.0, N = 46$ ). The students with a disability took significantly more time for the critical reading subtest ( $t [77] = -2.205, p = 0.030$ ). See Figure 2 for the distributions of the mean time per item.

Within the sample of students with a disability, the students with AD/HD (and no learning disability) had

a mean time per critical reading item of 55.5 seconds ( $SD = 11.7, N = 11$ ), while the students with a reading-based learning disability (and no AD/HD) had a mean time of 68.1 seconds ( $SD = 18.8, N = 12$ ). This difference was not significant ( $t [21] = 1.912, p = 0.070$ ); however, on a five-item critical reading passage the difference is equivalent to one minute.

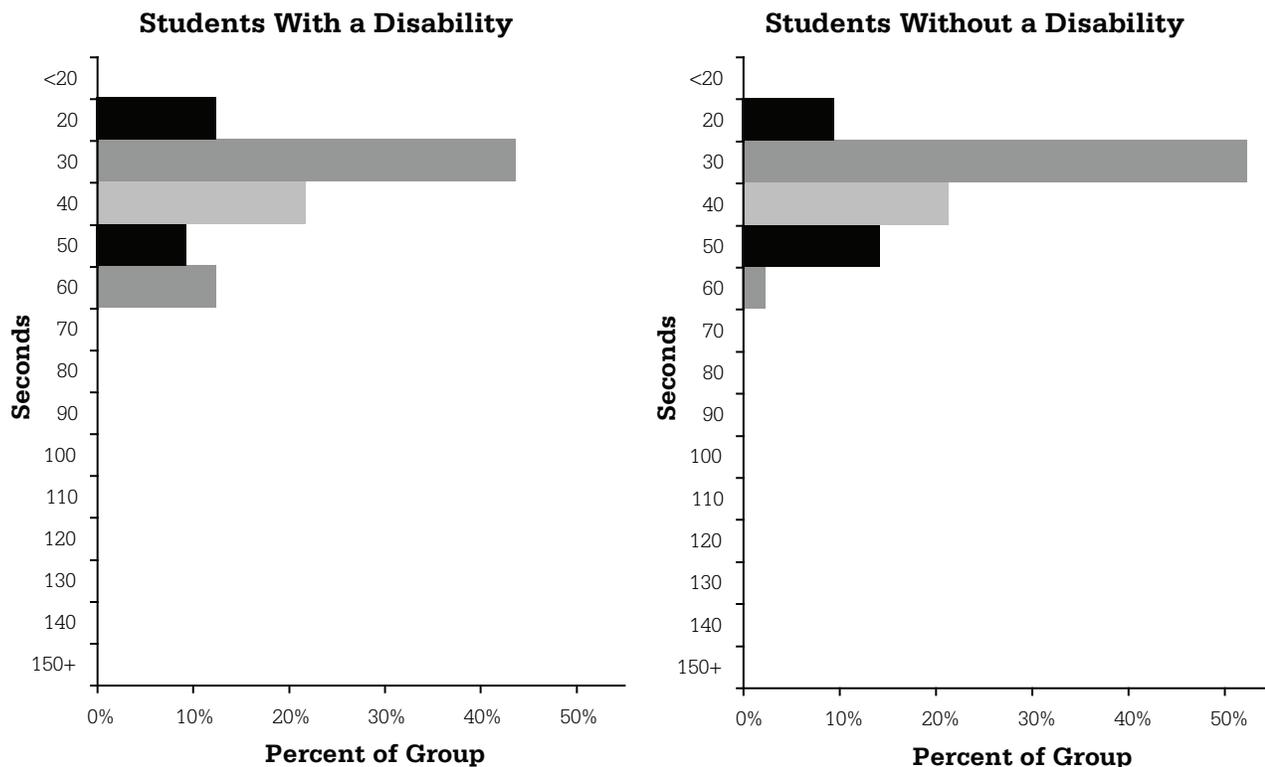
### Long (650-word) passages

Students completed two different 650-word passages. For both Passage 1 and Passage 2, some students did not complete the subtest so their times are not reported.

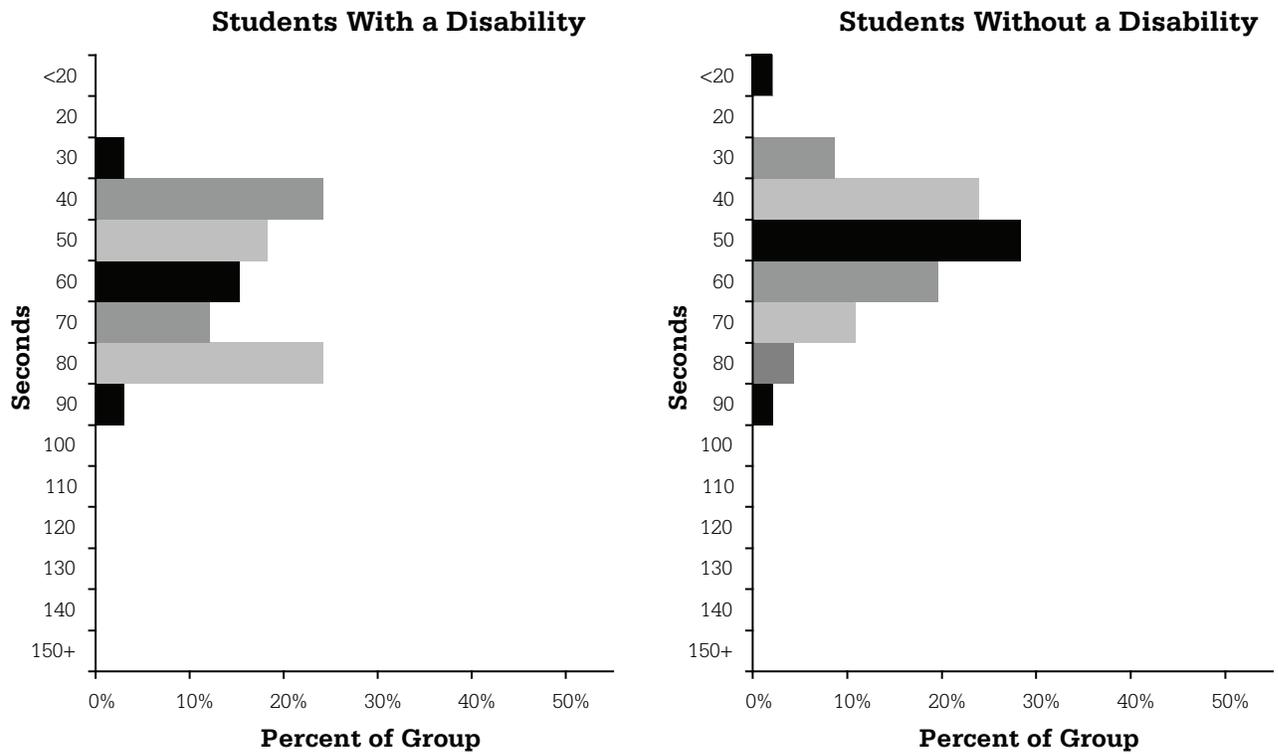
#### Passage 1

The mean time per item for the first 650-word passage was not significantly different by group ( $t [71] = -1.209, p = 0.230$ ). For the combined sample of students with a disability (AD/HD and/or any LD), the mean time per item was 68.0 seconds ( $SD = 27.0, N = 32$ ). The students without a disability had a mean time of 62.2 seconds ( $SD = 12.9, N = 41$ ). See Figure 3 for the distribution of the mean time per item.

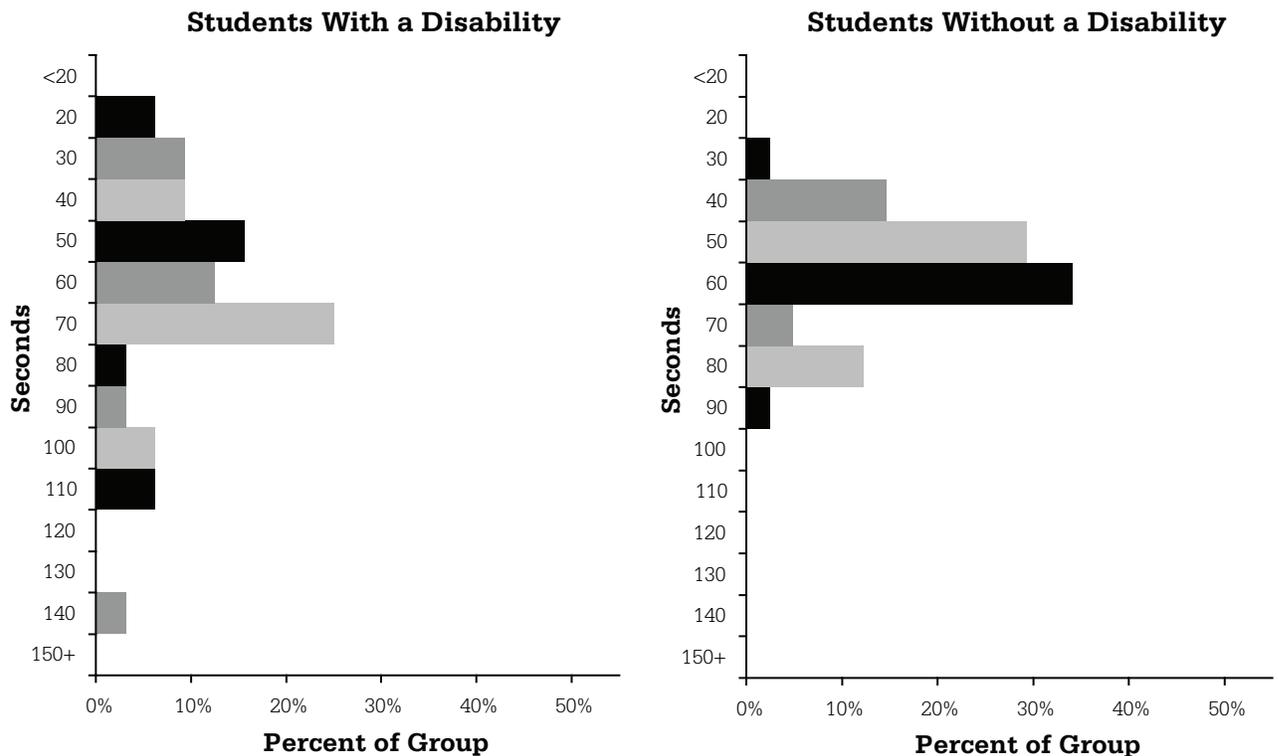
Within the sample of students with a disability, the students with AD/HD (and no LD) had a mean time per item on Passage 1 of 54.9 seconds ( $SD = 18.2, N = 11$ ), while the students with a reading-based learning disability (and no AD/HD) had a mean time of 75.0 seconds ( $SD = 29.4, N = 11$ ). This difference was not significant ( $t [20] = 1.924, p = 0.069$ ); however, on a nine-item



**Figure 1.** Mean time per sentence completion item in 10-second intervals for students with and without a disability.



**Figure 2.** Mean time per critical reading (100-word passage) item in 10-second intervals for students with and without a disability.



**Figure 3.** Mean time per 650-word Passage 1 item in 10-second intervals for students with and without a disability.

reading passage the difference is equivalent to three minutes.

**Passage 2**

The second 650-word passage had a mean time of 55.2 seconds ( $SD = 29.0, N = 33$ ) for the students with a disability (AD/HD and/or any LD) and 62.0 seconds ( $SD = 16.7, N = 41$ ) for the students without a disability. This was not a significant difference in mean time for the two groups ( $t [72] = 1.263, p = 0.211$ ). See Figure 4 for the distribution of the mean time per item.

Within the sample of test-takers with a disability, the students with AD/HD (and no LD) had a mean time per item on Passage 2 of 57.0 seconds ( $SD = 32.6, N = 11$ ), while the students with a reading-based learning disability (and no AD/HD) had a mean time of 49.9 seconds ( $SD = 25.4, N = 12$ ). This difference was not significant ( $t [21] = -0.832, p = 0.415$ ).

While the time spent on Passage 1 and Passage 2 was fairly consistent for the sample of students without a disability, the students with a disability spent less time on Passage 2. This difference was due to a drop of 28 seconds per item from Passage 1 to Passage 2 for the students with a reading-based learning disability (and no AD/HD).

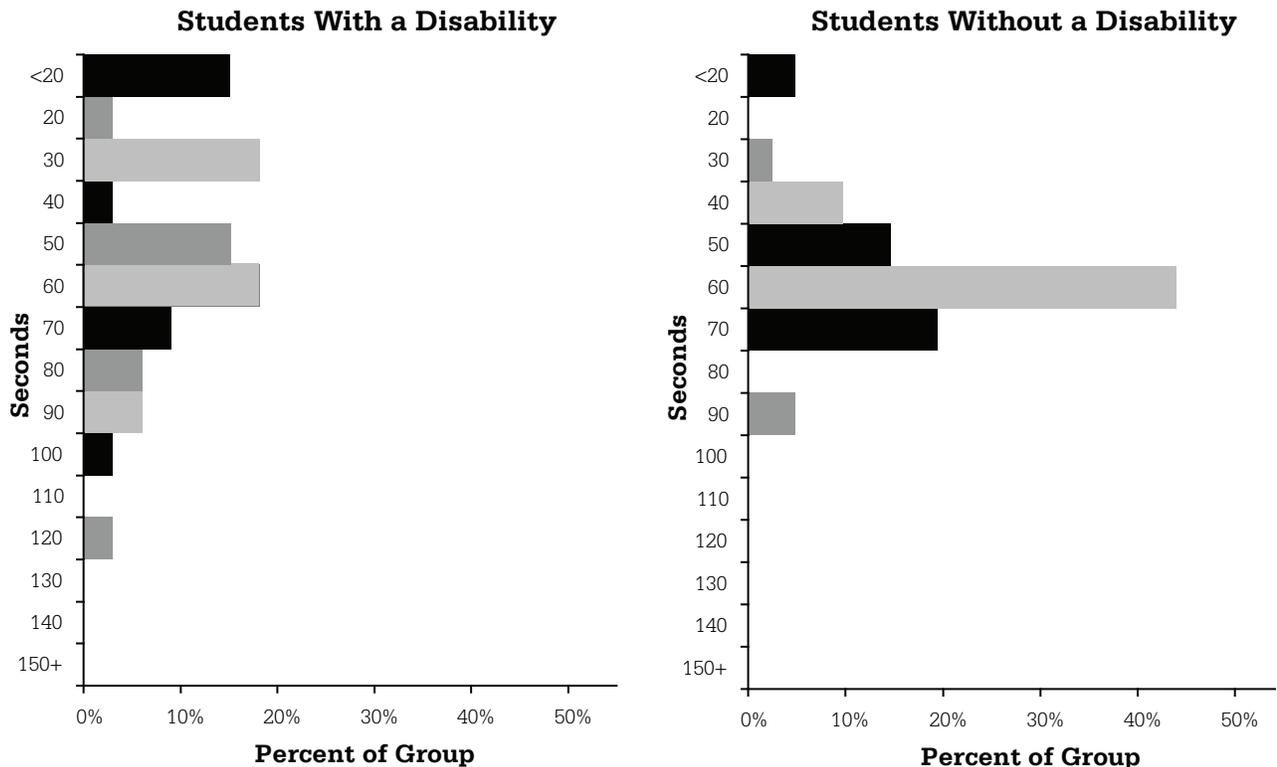
**Mathematics**

There were 33 students with a disability (i.e., AD/HD and/or any LD) who completed the mathematics subtest. In addition, 48 students without disabilities completed the mathematics subtest in the Bridgeman et al. (2003) study. The mean time spent on the entire mathematics subtest was 38 minutes for the combined disability group, approximately 14 percent longer than the mean time of 33 minutes spent by the students without a disability. Overall, 28 of the 33 students with a disability took more than regular time (30 minutes) to complete the mathematics subtest. When students with a disability were asked about the adequacy of the time provided for this subtest (45 minutes), 7 students stated that they needed 5 to 10 more minutes, 8 students said they had sufficient time, and 18 students reported that they finished the mathematics subtest 5 to 10 minutes early.

Analysis of the time spent on the two mathematics item-types follows.

**Multiple choice**

The mean time per multiple-choice item for the combined sample of students with a disability (AD/HD and/or any LD) was 81.0 seconds ( $SD = 23.2, N = 33$ ), while the mean time for the students without a disability was 70.0 seconds ( $SD = 12.3, N = 48$ ). The students with a disability took significantly more time per item to answer the multiple-



**Figure 4.** Mean time per 650-word Passage 2 item in 10-second intervals for students with and without a disability.

choice items than did the students without a disability ( $t [79] = 2.780, p = 0.007$ ). See Figure 5 for the distribution of the mean time per item.

Students with a math-based learning disability and no AD/HD spent 82.1 ( $SD = 13.6, N = 5$ ) seconds per item, about the same ( $t [23] = 0.325, p = 0.748$ ) as students with AD/HD (and no LD) at 78.2 seconds ( $SD = 25.5, N = 20$ ).

### Student-produced response

There were no significant differences on the student-produced response items ( $t [79] = 1.345, p = 0.182$ ). The students with a disability (AD/HD and/or any LD) had a mean time of 108.25 seconds ( $SD = 25.54, N = 33$ ) per item, while the students without a disability had a mean time of 101.04 seconds ( $SD = 27.39, N = 48$ ). See Figure 6 for the distribution of the mean time per item.

Within the sample of students with a disability, students with AD/HD (and no LD) had a mean time on the student-produced response items of 115.6 seconds ( $SD = 28.4, N = 20$ ), while the students with a math-based learning disability (and no AD/HD) had a mean time of 103.4 seconds ( $SD = 16.6, N = 5$ ). This difference was not significant ( $t [23] = -0.911, p = 0.372$ ).

## Writing

There were 34 students with a disability (AD/HD and/or any LD) who completed the writing subtest. In addition, 50 students without a disability completed the writing subtest in the Bridgeman et al. (2003) study. The mean time spent on the entire writing multiple-choice subtest was 31 minutes for the combined disability group, approximately 4 percent longer than the mean time spent of 30 minutes by the students without a disability. Overall, 18 of the 34 students with a disability took more than 30 minutes to work on the subtest. When asked about the timing of the subtest, 5 students stated that they needed 5 to 10 more minutes, 5 students stated that they had sufficient time, and 24 students reported that they finished the writing subtest 5 to 10 minutes early.

Analysis of the time spent on the three writing item-types follows.

### Identifying sentence errors

The students with and without a disability did not spend significantly different amounts of time on the identifying sentence errors items ( $t [82] = 0.805, p = 0.423$ ). See Figure 7 for the distribution of the mean time per item.

Students with a writing-based learning disability (and no AD/HD) spent 37.3 seconds ( $SD = 11.0, N = 15$ ) per item, nearly identical ( $t [21] = 0.133, p = 0.896$ ) to the

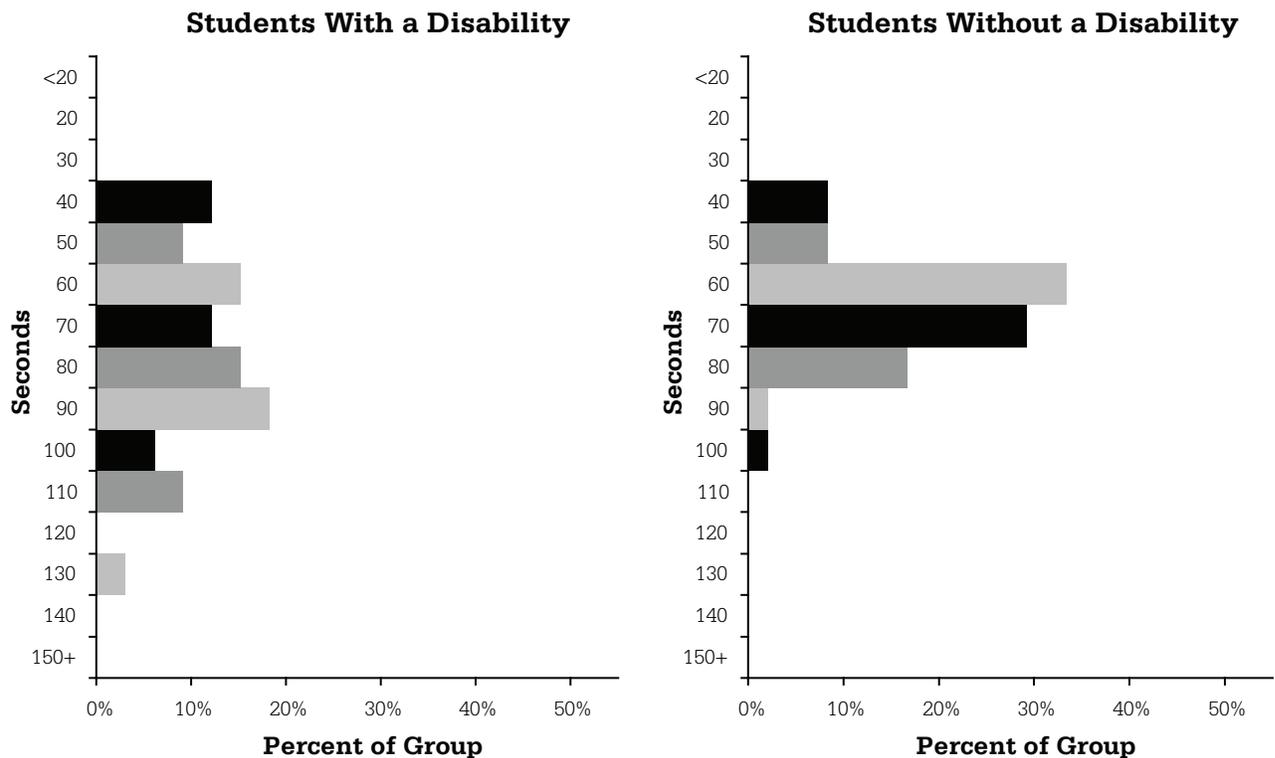
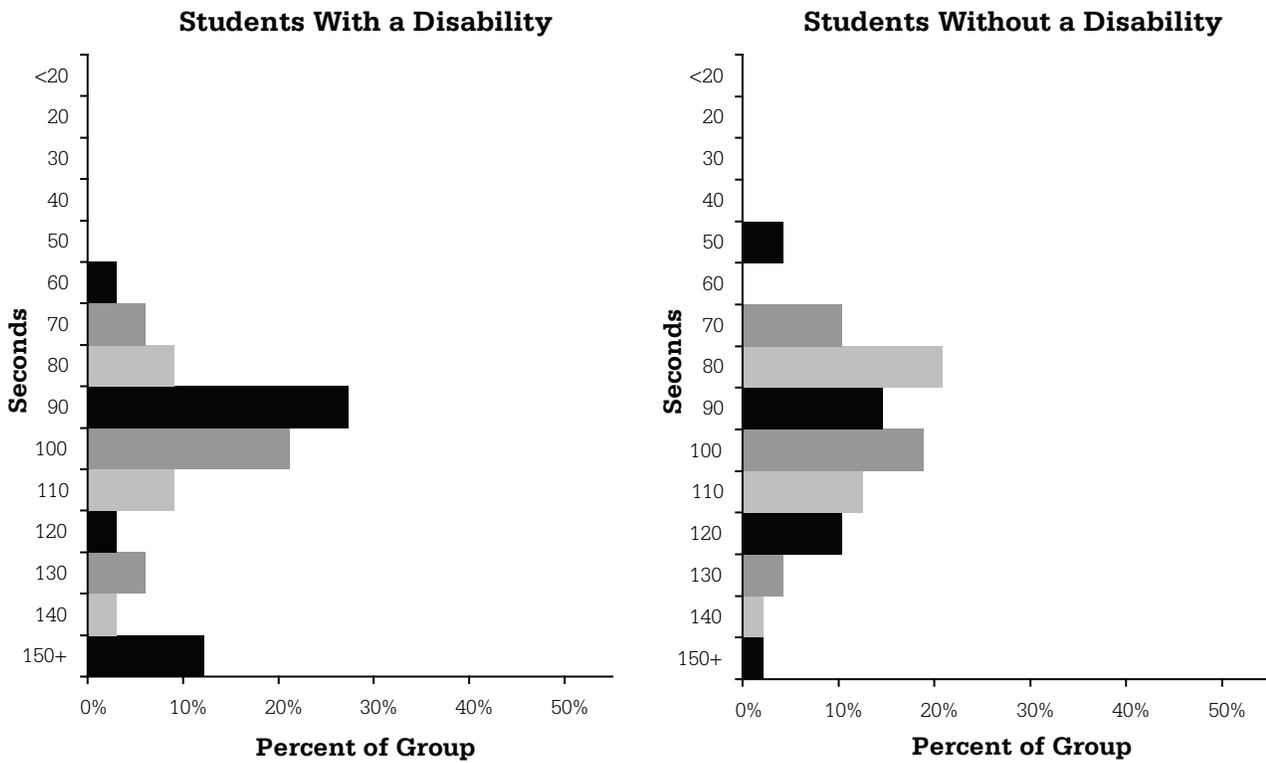
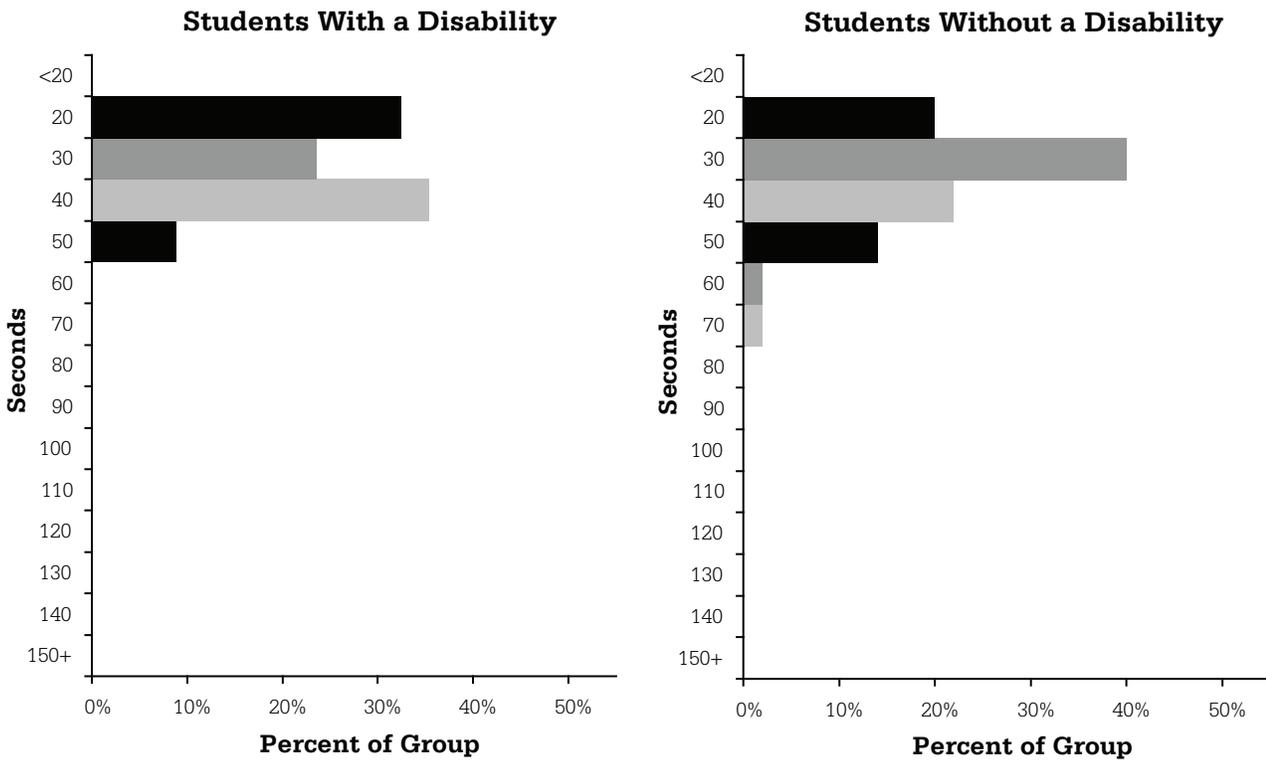


Figure 5. Mean time per multiple-choice item in 10-second intervals for students with and without a disability.



**Figure 6.** Mean time per student-produced response item in 10-second intervals for students with and without a disability.



**Figure 7.** Mean time per identifying sentence errors item in 10-second intervals for students with and without a disability.

students with AD/HD (and no LD) who spent an average of 37.9 seconds ( $SD = 9.6, N = 8$ ).

### Improving sentences

The two groups also had similar mean times on the improving sentences items ( $t [82] = -0.656, p = 0.514$ ). For the students with a disability (AD/HD and/or any LD), the mean time was 50.5 seconds ( $SD = 13.1, N = 34$ ). The mean time for the students without a disability was 48.9 seconds ( $SD = 9.9, N = 50$ ). See Figure 8 for the distribution of the mean time per item.

There were also no significant differences by disability type ( $t [21] = -0.727, p = 0.476$ ). Students with a writing-based learning disability (and no AD/HD) spent 51.3 seconds ( $SD = 16.2, N = 15$ ) per item, while students with AD/HD (and no LD) spent slightly less time at 46.8 seconds ( $SD = 9.7, N = 8$ ) per item.

### Improving paragraphs

As with the previous writing item type, there were no differences between the two groups on the improving paragraphs items ( $t [82] = 0.167, p = 0.868$ ). The mean time per item for the students with a disability was 62.9 seconds ( $SD = 17.2, N = 34$ ), while the mean time per item for students without a disability was 63.5 seconds ( $SD = 16.8, N = 50$ ). See Figure 9 for the distribution of the mean time per item.

There were also no significant differences by disability type ( $t [21] = 0.044, p = 0.965$ ), as the students with

a writing-based learning disability (and no AD/HD) took 60.3 seconds ( $SD = 18.1, N = 15$ ) per item, almost exactly what the students with AD/HD (and no LD) took at 60.6 seconds ( $SD = 13.8, N = 8$ ) per item.

## Projected Timing

Using the average time by item type from the previous sections, we have projected the amount of time required for the majority of students with a disability in our sample to complete the operational new SAT by test section. The new SAT critical reading section contains 19 sentence completion items, 8 items related to the short critical reading passages, and 40 items related to long passages of 500, 650, or 800 words. The section is broken into three subtests, two timed at 25 minutes and one timed at 20 minutes. Using the time spent per item at the 75th percentile of the observed times for the combined disability sample as a guide, the projected expected time for each subtest can be found in Table 3. Both subtest 1 and subtest 2 are projected to exceed the standard time allowed, but to come in below the time-and-a-half accommodation timing, while subtest 3 comes in at exactly the 20 minutes allowed under standard conditions.

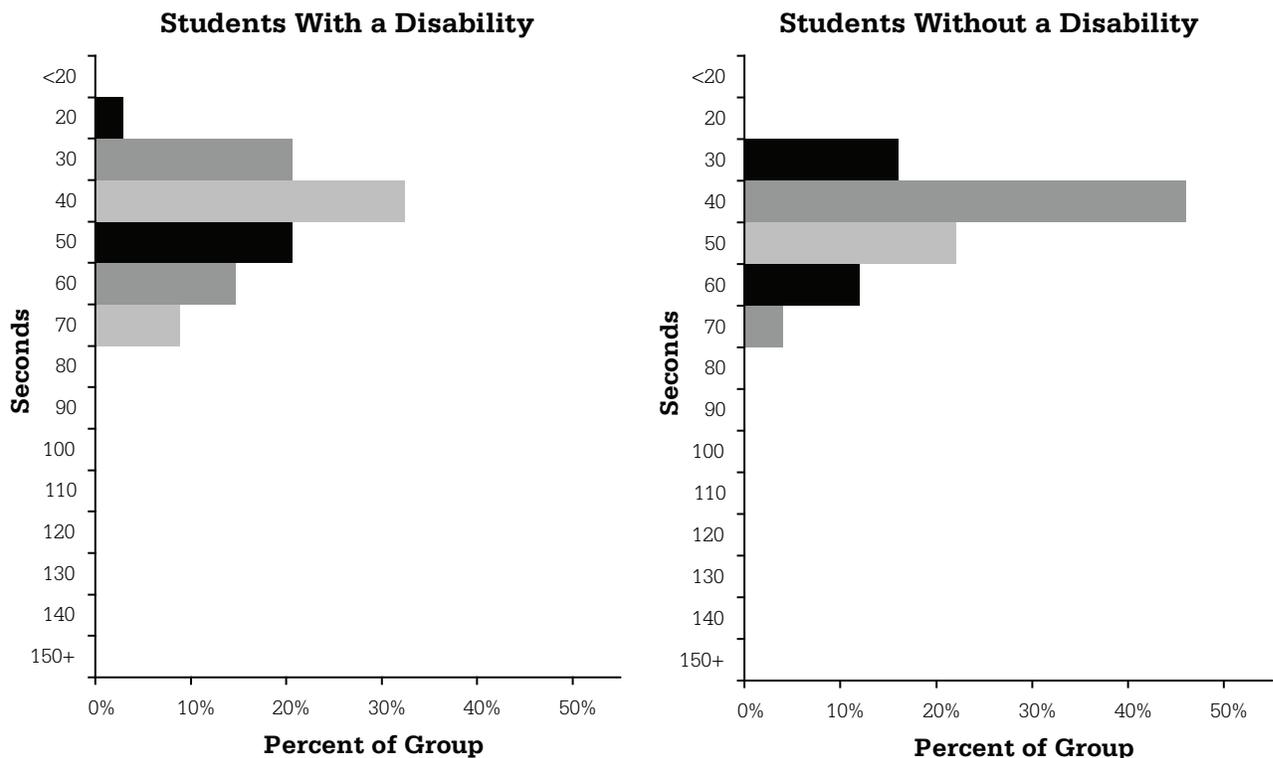
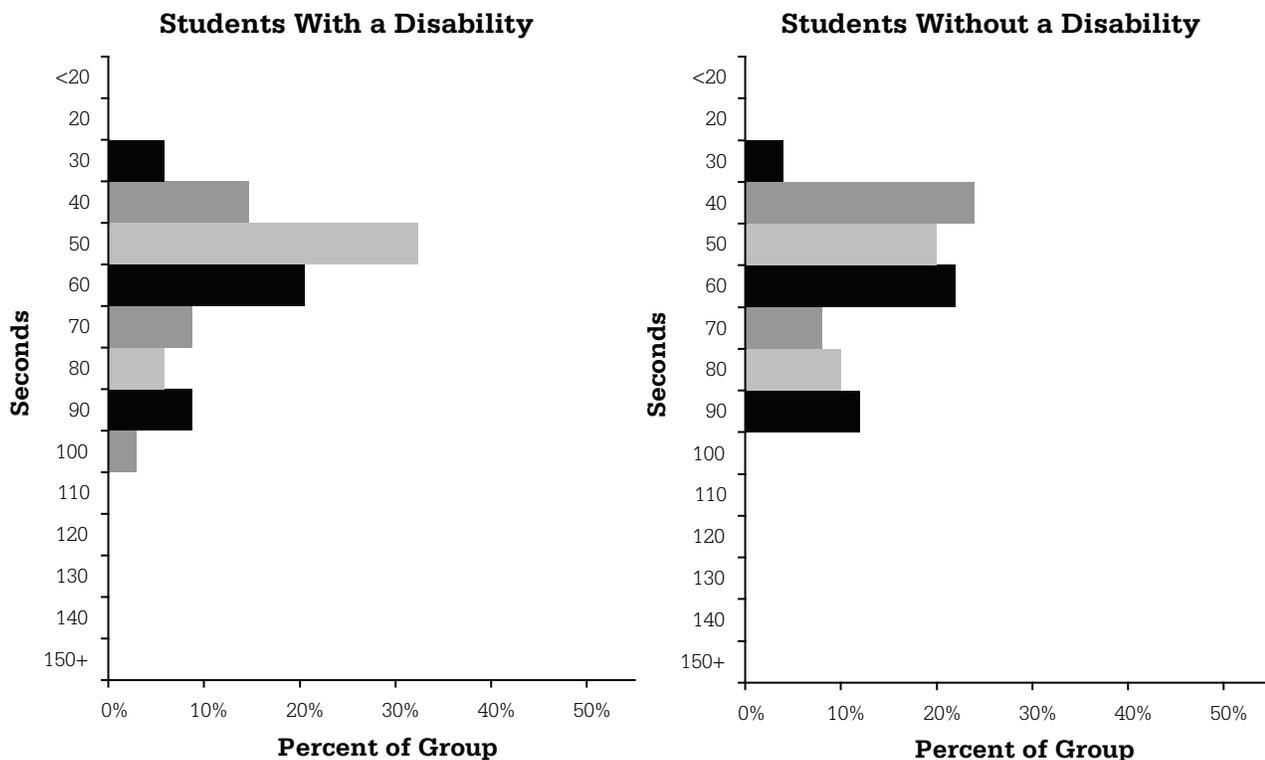


Figure 8. Mean time per improving sentences item in 10-second intervals for students with and without a disability.



**Figure 9.** Mean time per improving paragraphs item in 10-second intervals for students with and without a disability.

The operational revised SAT mathematics section contains 44 multiple-choice items and 10 student-produced response items. The section is broken into three subtests, two timed at 25 minutes and one timed at 20 minutes. Using the time spent per item at the 75th percentile of the observed times for the sample of students with a disability as a guide, the projected time for each subtest can be found in Table 4. All subtests are projected to exceed the standard time allowed, but

come in below the time-and-a-half accommodation timing.

The operational revised SAT multiple-choice writing section contains 18 sentence errors items, 25 improving sentences items, and 6 improving paragraphs items. The section is broken into two subtests, one timed at 25 minutes and the other at 10 minutes (the third subtest is for the written essay). Using the time spent per item at the 75th percentile of the observed times for the sample of students

**Table 3**

Projected Times for Critical Reading for Students with Disabilities				
Critical Reading		Observed time (75th percentile), in seconds	N of Items	Projected time, in minutes
Subtest 1	Sentence Completion	47	8	6
	Critical Reading	80	4	5
	Long Passage	78	12	16
	<b>Total</b> (Standard = 25 min., Time + 1/2 = 37.5 min.)			<b>27</b>
Subtest 2	Sentence Completion	47	5	4
	Critical Reading	80	4	5
	Long Passage	78	16	21
	<b>Total</b> (Standard = 25 min., Time + 1/2 = 37.5 min.)			<b>30</b>
Subtest 3	Sentence Completion	47	6	5
	Critical Reading	80	0	0
	Long Passage	78	12	16
	<b>Total</b> (Standard = 20 min., Time + 1/2 = 30 min.)			<b>20</b>

**Table 4**

Projected Times for Mathematics for Students with Disabilities

<b>Mathematics</b>		<i>Observed time (75th percentile), in seconds</i>	<i>N of Items</i>	<i>Projected time, in minutes</i>
Subtest 1	Multiple Choice	94	20	31
	Student-Produced Response	114	0	0
	<b>Total (Standard = 25 min., Time + 1/2 = 37.5 min.)</b>			<b>31</b>
Subtest 2	Multiple Choice	94	8	13
	Student-Produced Response	114	10	19
	<b>Total (Standard = 25 min., Time + 1/2 = 37.5 min.)</b>			<b>32</b>
Subtest 3	Multiple Choice	94	16	25
	Student-Produced Response	114	0	0
	<b>Total (Standard = 20 min., Time + 1/2 = 30 min.)</b>			<b>25</b>

with a disability as a guide, the projected time for each subtest can be found in Table 5. Subtests 1 and 2 are both projected to exceed the standard time allowed, but come in below the time-and-a-half accommodation timing. Of the two subtests, the projected timing for subtest 2 comes closest to the accommodated time limit for the subtest, at one minute less than the allotted time.

## Discussion

Overall, the sample of students with a disability (AD/HD and/or any LD) testing under time-and-a-half conditions did use more time per section than the students without a disability testing under standard timing conditions. But the additional time used only ranged from 4 to 14 percent more per section for the combined disability sample and in only a few cases did students use the entire 47 minutes. In addition, the projected times based on current test specifications ranged from 0 to 40 percent additional time required at the 75th percentile of observed times. This suggests that while full time-and-a-half accommodations may not be needed to complete the test section for the vast majority of students in

our sample, some additional time is required for the majority of test-takers to avoid speededness (i.e., the degree to which test time limits impact test scores).

Students with only AD/HD and no learning disability generally did not take more time than the students without a disability. The need for additional time was most noticeable on the critical reading and mathematics item types, while the time spent per item by the students with and without a disability on the writing item types was virtually identical.

The critical reading subtest was the only subtest where some learning disabled and AD/HD students did not finish even given the additional time. The students with a reading-based learning disability often got into major time issues on the reading passages, taking, on average, 25 percent longer to answer those items than the students without a disability, and in some instances taking 15 to 20 minutes for the first passage alone, which represented only one-quarter of the items on the test. One consequence of using that much time on the first passage was not having sufficient time for the final items, either the sentence completion items on one form (which a few students did not even start) or the second reading passage on the other form. Given the drop in average time from Passage 1 to Passage 2 for the students with a reading-

**Table 5**

Projected Times for Writing for Students with Disabilities

<b>Writing</b>		<i>Observed time (75th percentile), in seconds</i>	<i>N of Items</i>	<i>Projected time, in minutes</i>
Subtest 1	Sentence Errors	43	18	13
	Improving Sentences	58	11	11
	Improving Paragraphs	70	6	7
	<b>Total (Standard = 25 min., Time + 1/2 = 37.5 min.)</b>			<b>31</b>
Subtest 2	Sentence Errors	43	0	0
	Improving Sentences	58	14	14
	Improving Paragraphs	70	0	0
	<b>Total (Standard = 10 min., Time + 1/2 = 15 min.)</b>			<b>14</b>

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based learning disability, it is clear many were under time pressure to get through the subtest, to the point where the observed times for that passage are suspect for that group. Since time spent reading cannot be separated from the time spent answering the items related to the passages in this study, it is hard to attribute these longer times to the time required by those students to read the passage, but it is not an unreasonable conclusion that longer reading passages require significantly more time for the students with reading disabilities to actually read. This also makes it hard to extrapolate to the long reading passages of various word counts: when compared to a 650-word, nine-item passage, would a 500-word, six-item passage take about 25 percent less time given the word count or 33 percent less time given the item count?

There were several limitations to this study, which included the use of experimental rather than operational timing observations, and inconsistent time limits (regular time for students without a disability and time and a half for students with a disability) between test administrations for students with and without disabilities. Even with these limitations this study provides valuable information on the actual time used (by item type) for students with learning disabilities and/or AD/HD who received extra time on the SAT Reasoning Test and those who did not.

Future research may wish to examine time used by students with and without disabilities during an operational administration to determine if they are different from those observed in this research study. In addition, researchers may wish to examine the impact of reducing extended-time limits to time and a quarter for some students with a disability.

## References

- Bridgeman, B., Cahalan, C., & Cline, F. (2003). *Time requirements for the different item types proposed for use in the revised SAT*. Report submitted to the College Board.
- Cahalan, C., Mandinach, E. B., & Camara, W. J. (2002). *Predictive validity of SAT I: Reasoning Test for test-takers with learning disabilities and extended time accommodations*. (College Board Research Report No. 2002-5). New York: The College Board.
- Mandinach, E. B., Bridgeman, B., Cahalan, C., & Trapani, C. (2005). *The impact of extended time on SAT test performance*. (College Board Research Report No. 2005-8). New York: The College Board.

# Appendix

**Table A1**

Critical Reading: Average Time by Item Type and Disability Group, with T-Test Results

	<i>Time per Item, in Seconds</i>						<i>T-Test</i>		
	Mean	SD	N	Mean	SD	N			
	Without a disability			With a disability			<i>t</i>	<i>df</i>	<i>Sig.</i>
<b>Reading</b>									
Sentence Completion Items	40.2	9.8	42	40.7	11.7	32	-.19	72	.854
100-Word Passage Items	56.0	15.0	46	63.8	16.5	33	-2.21	77	.030
650-Word Passage 1 Items	62.2	12.9	41	68.0	27.0	32	-1.21	71	.230
650-Word Passage 2 Items	62.0	16.7	41	55.2	29.0	33	1.26	72	.211
	RLD w/o AD/HD			AD/HD w/o LD					
Sentence Completion Items	42.9	11.9	12	38.7	13.3	11	.80	21	.433
100-Word Passage Items	68.1	18.8	12	55.5	11.7	11	1.91	21	.070
650-Word Passage 1 Items	75.0	29.4	11	54.9	18.2	11	1.92	20	.069
650-Word Passage 2 Items	46.9	25.4	12	57.0	32.6	11	-.83	21	.415

Note: RLD = Learning disability that impacts reading.

**Table A2**

Mathematics: Average Time by Item Type and Disability Group, with T-Test Results

	<i>Time per Item, in Seconds</i>						<i>T-Test</i>		
	Mean	SD	N	Mean	SD	N			
	Without a disability			With a disability			<i>t</i>	<i>df</i>	<i>Sig.</i>
<b>Mathematics</b>									
Multiple-Choice Items	70.0	12.3	48	81.0	23.2	33	2.78	79	.007
Student-Produced Response Items	101.0	22.4	48	108.3	25.5	33	1.35	79	.182
	MLD w/o AD/HD			AD/HD w/o LD					
Multiple-Choice Items	82.1	13.6	5	78.2	25.5	20	.33	23	.748
Student-Produced Response Items	103.4	16.6	5	115.6	28.4	20	-.91	23	.372

Note: MLD = Learning disability that impacts mathematics.

**Table A3**

Writing: Average Time by Item Type and Disability Group, with T-Test Results

	<i>Time per Item, in Seconds</i>						<i>T-Test</i>		
	Mean	SD	N	Mean	SD	N			
	Without a disability			With a disability			<i>t</i>	<i>df</i>	<i>Sig.</i>
<b>Writing</b>									
Identifying Sentence Errors Items	38.8	11.0	50	37.0	9.1	34	.81	82	.423
Improving Sentences Items	48.8	9.9	50	50.5	13.1	34	-.66	82	.514
Improving Paragraphs Items	63.5	16.8	50	62.9	17.2	34	.17	82	.868
	WLD w/o AD/HD			AD/HD w/o LD					
Identifying Sentence Errors Items	37.9	9.6	8	37.3	11.0	15	.13	21	.896
Improving Sentences Items	46.8	9.7	8	51.3	16.2	15	-.73	21	.476
Improving Paragraphs Items	60.6	13.8	8	60.3	18.1	15	.04	21	.965

Note: WLD = Learning disability that impacts writing.









