Michael K. Smith, “Repugnant Is to Aversion…A Look at ETS and the New SAT I,” *Phi Delta Kappan*, June 1994, pp. 752-757.

For more than a decade, I have been helping high school students prepare for college entrance exams. Together, we have reviewed basic formulas of high school mathematics, struggled with the word problems that appear on the exam, memorized lists of vocabulary words needed for certain parts of the verbal section, and practiced coping with the strenuous time limits of the test. As always, the Educational Testing Service (ETS) and the College Entrance Examination Board have helped me with my task by publishing collections of previously administered exams.[1] It is very satisfying to see students come to “understand” this exam well enough to achieve scores that help them gain admission to the colleges they choose.

Thus it was with much anticipation that I followed the recent changes occurring with one of my favorite exams. Not only did the name change (from Scholastic Aptitude Test to Scholastic Assessment Tests and, finally, to SAT I: Reasoning Test), but also, according to the College Board, the test itself was changing: “A completely redesigned SAT will be administered beginning in the spring of 1994.”[2] As my students and I were preparing for the first administration of the “new SAT” on March 19, we considered with some trepidation the words of the College Board: “Developed jointly by the College Board and the Educational Testing Service, the revised SAT contains content and format changes necessary to ensure a valid measure of a students’ academic preparedness for college work throughout the 1990s and beyond.”[3]

I know that the College Board and the ETS have not ventured into this new endeavor by accident; their literature informs us that “three years of extensive research and field testing” preceded the 1990 approval of the new format by the College Board trustrees.[4] The College Board also adopted a recommendation of its own Commission on the New Possibilities for the Admissions Testing Program that it “adapt its tests so that they asses a greater variety of skills and knowledge and thereby serve a wider range of needs.”[5] The College Board was thus displaying not only its flexibility but also its prescience: “The revised SAT recognizes the increasing diversity of students in our educational system,

as well as changes in how and what these students are being taught in secondary school. The new testing program will assess many of the skills important to students' success in college."[6]

Wanting to maintain my own erudition in the face of my students' demands to know how to prepare for this new exam, I scrambled for information. Once again, the College Board facilitated my task. For the past year it has been publishing a newsletter on the new SAT, which describes the changes. Furthermore, it distributed to guidance counselors, teachers, and educators a preview of the upcoming test, titled *The New SAT I: Reasoning Test.*[7] My comments below are derived from an analysis of this booklet and from statements in the College Board newsletter.

The College Board states that the new SAT gives students more time to answer questions. According to one issue of the newsletter, "The primary benefit is that students will have more time to think about the questions in both the verbal and math sections."[8] Since time pressure has been reduced, students should feel more comfortable with the exam: "The less speeded test should also reduce student anxiety."[9] In my opinion, having more time per problem would be a tremendous advantage on this test, because students often feel that they must race through the exam in order to attempt all the problems.

So how much time are we talking about? On the old SAT verbal sections, students had 60 minutes to complete 85 problems, an average of .71 minutes per problem. On the new SAT (based on the sample test I examined), the students were presented with 78 problems in 75 minutes. Thus seven problems were eliminated and 15 minutes added to the exam. This works out to an average of .96 per problem on the verbal sections. Similarly, on the math section of the old SAT, students had 60 minutes for 60 problems, an average of one minute per problem. On the new SAT math sections, students had 75 minutes for 60 problems, for an average of 1.25 minutes per problem. Thus on both sections of the SAT students now have an average of 15 more seconds per problem than test-takers had previously.

My students and I will take the extra seconds. However, I'll still have to caution them against extended reveries (unless they're restricted to the 15-second variety) and urge them to move almost as quickly through this new exam as through the old SAT. What interests me is the context in which the College Board places this revision on the time limits. The College Board notes: "The revised SAT reflects the educational reform movements of the 1980s and 1990s."[10] I believe that I have followed these reform movements pretty closely, and it seems to me that educators have called for different types

of assessments: performance assessments, authentic assessments, exhibitions, portfolios, and the like. I believe that most of these assessments would allow substantially more than a minute to solve a problem. Unless, of course, I have completely misread the literature in this area or have missed the publication of *The One Minute Portfolio*.

Moving to more substantive changes, let's examine the verbal sections of the new SAT. The College Board says, much remains the same on the verbal sections of the new SAT. However, some significant revisions have occurred: a separate antonym section will no longer appear, a knowledge of vocabulary in context will be required, and longer reading passages that place a greater emphasis on critical reading will appear.

To be candid, I will miss the antonym section, although my students won't. I reveled in discussing meanings and etymologies of words and debating what would qualify as an appropriate antonym for such words as *ostentatious, mutability, querulous, pithy, propensity, daunt, burgeon, equanimity, voluble, noisome, decorum, prodigal, penchant, eclectic, abstemious, assiduous, diminution, penury, fecund, celerity, puerile, dross, salubrious, burnish, tepid, sinuous, munificence, supercilious,* and *desultory*. These are just a few vocabulary items that have appeared on recent SATs.[11] I can no longer use my favorite motivational gambits: that *abstemious* is one of the only two common words in the English language in which all five vowels appear in order or that *supercilious* derives from the Latin for "eyebrow," with the connotations of haughtiness that are associated with raised eyebrows.

Of course, the SAT has been heavily criticized for testing vocabulary out of context, and I applaud the attempt to include more context-sensitive items on the verbal test. For instance, the sentence completion section will remain intact. My students and I will continue to discuss the strategies for determining what constitutes a grammatically, stylistically, and logically reasonable sentence. Consider the following item:

> By nature he was …, usually confining his remarks to … expression.
>
> A) acerbic..friendly
> B) laconic..concise
> C) garrulous..voluminous
> D) shrill..complimentary
> E) vague..emphatic[12]

From past SATs my students and I know that sentence completion items with two blanks are often searching for answers that are complementary (words that tend to share meanings) or contrasting words (words that are nearly opposite in meaning). This particular item seems to be calling for complementary responses; furthermore, the clue word "confining" indicates the type of expression. At this point, however, I have a subtle feeling that knowing the meanings of the vocabulary items would help: that *acerbic* is the opposite of friendly and won't work; that *garrulous* and *voluminous* are slightly synonymous but that *voluminous* doesn't go with "confining"; and that *laconic* is synonymous with *concise*, which fits nicely with "confining." Furthermore, *laconic* derives from the Greek *Lakonia* (Sparta), whose citizens were rumored to have been quite concise when they took the ancient SAT.

The analogies section also remains intact on the new SAT. I must admit that I've always found this section difficult. Not only must one discern the relationship between the given pair of words, but one must discover a similar relationship in one of five pairs that are presented as potential answers. For instance, consider the following item:

Repugnant:aversion::

A) insatiable:satisfaction
B) informed:knowledge
C) bigoted:judgment
D) shameless:regret
E) admirable:esteem[13]

The difficulty here is in the initial pair of words. Once again, without knowing the meanings of the items, a student could only guess at the relationship involved. If *repugnant* and *aversion* are recognized as somehow synonymous, then a student could conceivably narrow the choices to B and E, perhaps leaning toward the latter. After considering these sample items from the sentence-completion and analogies sections, I don't believe that I'll advise my students to discard their vocabulary lists just yet.

The reading sections on the new SAT are very similar to those on the old test. Some of the passages are longer (as promised), and the College Board notes that the passages now include "introductory information to give students a context for each passage."[14] For instance, one passage was prefaced with the following: "There has been a great deal of scientific debate about the nature of the object above Tunguska in 1908. The following passage presents one theory of what happened."[15]

Furthermore, the reading material is supposed to be "more accessible and engaging."[16] In the one test that I examined, the topics of the reading passages were as follows: the Tunguska project; an extract from the memoirs of poet Elizabeth Bishop; a discussion by a Japanese American about an experience during World War II; and a discussion of the architectural design of cities that contrasts English "garden cities" with modern cities.

It's been a long time since I was an adolescent, and even when I was one I couldn't claim that my interests were necessarily those of my peers. But from listening to my students talk about their interests and about what they find "engaging," I must admit that I have seldom heard discussions of English "garden cities" or unexplained explosions in Tunguska. I do not mean to advocate reading passages on "Beavis and Butthead," but I do mean that my students must still confront reading passages that often lie totally outside their experience or areas of interest.

Instead of a separate section on antonyms, the new SAT will test knowledge of vocabulary in the context of a reading passage. After the passage on the Tunguska object, the following question appears:

> In line 4, the word "appreciation" most nearly means
>
> (A) increase in value
> (B) artistic interest
> (C) understanding
> (D) curiosity
> (E) gratitude[17]

The appropriate context for this item is as follows:

> The thoughts came and went in a flash: there was not a chance in a billion years that an extraterrestrial object as large as Halley's comet would hit the Earth. But that was 15 years ago, when I had little appreciation of geological time. I did not consider then the adage that anything can happen does happen - given the time.

In this context, it seems clear that the primary sense of appreciation as relating to gratitude doesn't fit. The context might incline us toward choosing 'curiosity" or "understanding," with a preference for the latter. I didn't consider this item to be very hard, and the vocabulary choices were not nearly as pedantic as some I had seen in earlier SATs. I do have one small concern. I looked up *appreciation* in my unabridged *Random House Dictionary of the English Language*. The three primary meanings given are: 1) gratitude; 2) the act of estimating the qualities of things and giving them their proper value; and 3)

clear perception or recognition, as a course in art appreciation. In none of the primary meanings is the word *appreciation* clearly understood to mean “understanding.”

I examined other examples of vocabulary items in context and found that many seemed to be testing either the third, fourth, or fifth meanings of words (as listed in the dictionaries) or perhaps a close variant, as in the case of *appreciation*. Consequently, I have been warning my students not to automatically assume the most common meanings for vocabulary items in the questions based on the reading passages. It really is an interesting paradox for me as a teacher. Some items, such as analogies, are nearly impossible to answer because the vocabulary items are much too difficult for students to recognize any of the meanings of the words, while in other items they can’t use the primary meaning of more familiar words and must be wary of secondary interpretations.

The final innovation on the reading passages involves the use of a double passage that offers different points of view. The purpose here is to test the students’ critical reading ability by having them compare and contrast the passages. In the test that I examined, this double passage concerned the English “garden cities" as opposed to modern cities, with the passages containing more than 90 lines of text, followed by 13 questions. The time limit was 15 minutes. I must admit that I read both passages together and was overwhelmed with detail (especially since I allowed myself about two minutes to read each passage). I tried the following strategy: I skimmed the first passage and looked for test questions related to it (five questions); then I skimmed the second passage and did the test items related to it (six questions). That left two questions that genuinely tested my ability to compare and contrast the points of view in the two passages. These two questions took more time. However, they represented only 15% of the items in this section and only 5% of all the reading questions. I think my students won't be slowed down too much by this type of critical reading challenge.

Let us now turn to an examination of the mathematical reasoning sections of the new SAT. I notice that in its promotional materials the College Board suggested that the content of the new exam would remain essentially the same as that of the older version. There are two new features: 1) some questions require students to “produce" their own responses and not just choose from a set of multiple choice alternatives, and 2) students will be encouraged to bring calculators to the exam and to use them. As the College Board notes: “The introduction of calculator use will parallel the changes occurring

nationally in the use of calculators in mathematics instruction."[18] The brochure then cites the advocacy for the use of calculators by the National Council of Teachers of Mathematics (NCTM) and other organizations.

I certainly applaud this long-awaited revision in testing practices. I first started using calculators in mathematics classes in the late 1970s. Most of my students tell me that they have been using calculators since they were children, and I'm glad to see that the College Board has realized that these devices are not just fads. Furthermore, 1992 field trials of the new SAT showed that 94% of college-bound seniors indicated that they owned or had access to a calculator.[19]

But here's the interesting irony. Although calculators are recommended, it seems that no test question will require the use of a calculator.[20] This presents an interesting paradox for me as I prepare my students for the exam. I will certainly encourage them to take a calculator with them, as the College Board wishes me to, but I have to ask myself to what extent they will need it. Will a calculator help at all on the test questions? Will it hinder their thinking? That is, will they be concerned with pushing buttons when they should be analyzing a problem?

Let's look for answers by considering some actual problems. Consider the following example, which is meant to be an easy mathematical reasoning problem.

Which of the following integers is a divisor of both 36 and 90?[21]

(A) 12
(B) 10
(C) 8
(D) 6
(E) 4

With a calculator, a student could divide all five choices into both numbers and determine that answer D is correct. I tried it this way, and, even punching buttons quickly, it took about 30 to 40 seconds. Some students could answer the problem by a process of elimination combined with some mental arithmetic: 10 and 8 don't divide into 36; 12 won't go into 90, 6 goes into both 36 and 90; thus 4 can't be the answer, and 6 must be correct. Or perhaps a student could combine these strategies in some way. In any case, having access to a calculator wasn't all that helpful on this problem - but then, it didn't hurt either.

Consider another example.

The sales tax on a $6.00 meal is $0.36. At this rate what would be the tax on a $14.00 meal?[22]

(A) $0.48
(B) $0.72
(C) $0.84
(D) $0.90
(E) $0.96

If a student recognizes the correct procedure, doing this problem on a calculator is relatively straightforward: .36/6 = .06 times 14 = .84. Calculating this problem by hand, using ratios, is also not too difficult: the .36/6 ratio reduces to .06/1 which multiplied by 14 produces .84. Or, sometimes, I would encourage the student to estimate in order to eliminate some answers: $14 is more than twice the $6 meal, so the sales tax must be more than $0.72.

On some problems, however, a calculator might mean trouble. Consider the following problem.

P=(1-1/2) (1-1/3) (1-1/4) … (1-1/16)

The three dots in the product above represent eleven missing factors of the form (1-1/*n*), where *n* represents all of the consecutive integers from 5 to 15, inclusive. Which of the following is equal to P?[23]

(A) 1/16
(B) 1/2
(C) 3/4
(D) 7/8
(E) 15/16

If a student tries to calculate the factors (1/2)(2/3)(3/4) etc., he or she is going to be quickly mired in decimal points, at least on an ordinary calculator. If a student looks at the problem, however, and recognizes that terms cancel each other regularly, then he or she should see that the answer is 1/16, although this is still a difficult problem. Another technique for solving this problem involves a process of elimination. Since the first term is 1/2 and every other factor is a fraction, then the product must be less than 1/2. And there's only one answer that is less than 1/2.

Of course, many other types of problems - those involving algebraic or geometric expressions - may not lend themselves to calculator use at all. My analysis suggests that a calculator would be unlikely to hurt a student on the new SAT, but the help it provides may be only minimal. Since most of the mathematical problems on the new SAT are nearly identical in format to those on previous exams,

strategies for students still center on the ability to decode quickly what the problem is asking for and then use the appropriate mathematical knowledge.

There is one new type of mathematical reasoning problem that requires students to produce their own answers and then enter their responses on a grid in a special section of the answer sheet. I'm sure that the College Board has been influenced by recommendations from such organizations as the NCTM in designing this new type of item. In *Curriculum and Evaluation Standards for School Mathematics*, the NCTM has urged that mathematics assessments measure the ability of students to solve more open-ended problems and even to formulate problems of their own. One of the examples cited by NCTM for grades 9-12 illustrates this new trend: "You have 10 items to purchase at a grocery store. Six people are waiting in the express lane (10 items or fewer). Lane 1 has one person waiting, and lane 3 has two people waiting. The other lanes are closed. What check-out lane should you join?"[24] This problem is ambiguous and calls for the student to identify missing information and to make estimates of the missing quantities.

Are these the type of student-produced responses that the College Board has in mind? A brief look at the "Directions for Student-Produced Response Questions" that appear in the sample test booklet, *The New SAT I*, suggests that these instructions are intended less to accommodate student-produced responses than to ease the scoring burden for ETS. Anyone who has ever had to blacken the ovals for each of the numbers of his or her date of birth will understand that the accuracy of entry should be among test-takers' major concerns. Moreover, while simple numerical answers that are in the form of whole numbers, decimals, or proper fractions are merely time-consuming to enter accurately, mixed numbers appear to present a problem to the scorers. Indeed, they are outlawed. All fractional answers larger than one must be given as improper fractions or as decimals. For example, a fraction such as 2½, if entered as a mixed number, will be read as 21/2, so it must be entered as 5/2 or 2.5.

Giving the College Board the benefit of the doubt and recognizing that, with thousands of students taking the exam, an efficient means of scoring must be established, perhaps we can examine the content of these new items and determine what makes them revolutionary.

Consider the following open-ended problem.

If $3x = y$ and $y = z + 1$, what is the value of x when $z = 29$?[25]

This problem doesn't seem too difficult. Plug in 29 for z, and determine that y = 30. That makes 3x = 30, which makes x = 10. Students can do this either by mental arithmetic, quick paper-and-pencil calculation, or by use of the calculator. The biggest problem students face is making sure that they "grid in," the number 10 correctly.

Consider another problem.

What is one possible value of x for which 1/5< x <1/4?[26]

Clearly, this problem is revolutionary and could not be accommodated in a multiple-choice format, given that there are an infinite number of correct answers! What is one possible value? My students could approach this problem in terms of decimals or fractions. The numbers given should be easily recognized as decimals: 1/5 = .20 and 1/4 = .25. Thus possible values are .21, .22, .222, etc. Once again, students must take care to "grid in" an appropriate response.

I must admit that l examined only a few sample problems of this new type. And perhaps I'm being dense, but it seems to me that this new type of problem is extremely similar to the older multiple-choice formats - except that the choices are not listed. I could see clearly why ETS would want to move to this type of item, given that it takes as much time and energy to construct alternative answers as it does to write test items in the first place. However, once again, I am not privy to the details of the intensive research they conducted.

I coached my students for the first administration of the new SAT, using many of the methods and strategies that have been developed over the past decade. I know that the College Board notes that coaching won't work; as Donald Powers, senior research scientist at ETS, comments, preparation courses "are of relatively limited usefulness now, and there is no reason to believe that they will become any more effective with the new test. In fact, it is more likely these courses will be less effective."[27] Although my experience disconfirms this remark, I don't want to tangle with the exhaustive, nationwide research that ETS has conducted. I'm only thankful that the folks in charge of publications at the College Board don't totally agree with Powers' comment, because they remain the best source of study guides and test-preparation materials.[28]

I took the new SAT with my students on March 19 at Central High School in Knoxville, Tennessee. The waiting room was packed with dozens of high school juniors and seniors, together with

about 20 seventh-graders who were taking the exam for a national talent search. Were the students aware of the changes to the SAT? One sleepy-eyed student responded to my query: "I didn't know I could bring a calculator until last night." After talking to several mothers of the seventh-graders, including one with whom I had attended high school two decades ago, I concluded that neither parents nor children knew much about the SAT, much less the new SAT.

After we were marched into separate classrooms for the actual testing, I discovered that the proctor for my classroom was the assistant principal of my former school, West High School. He had joined the staff one year after I graduated. He seemed nonplused that so old a person was taking the test; he asked if I was trying to get into college. I told him that I only hoped they wouldn't take away my college degrees if my performance that morning failed to measure up.

The testing session itself was utterly exhausting. After more than an hour of settling in and listening to instructions, the new SAT itself consisted of three hours of continuous testing. We were allotted only one five-minute break, during which we could go to the bathroom, and one one-minute break, during which we could stand up without conversing or leaving the room. We were allowed to use calculators on the mathematics sections, but, for some strange reason known only to ETS, the instructions demanded that all calculators be removed from our desks during the verbal sections. Perhaps ETS has conducted an unpublished study on the positive effects of calculator use on reading comprehension.

The content of the new SAT was just about what the preview test discussed above had led me to expect. The vocabulary level on this new test did not seem quite as difficult as that usually contained in the antonym sections of the old SAT. There were, however, many difficult sentence completion and analogy items, containing such words as *iconoclastic*, *restive*, and *reverie*. The reading passages tended to be longer than those on the old SAT; the topics covered by the passages ranged from two views of life on the prairie to a discussion of the acculturation of Chinese Americans to an analysis of the origin of Bohemian lifestyles. It's not that these passages couldn't be interesting; the Bohemian section actually contained a reference to hippies (although I was probably the only one in the room other than the proctor to whom this term wasn't strictly ancient history). It's just that the nature of the task and the intense time pressure force one to dissect the passages quickly in a quest for the right answers to some very narrowly

focused questions.

I didn't use my calculator a single time on the mathematics questions. Students around me used their calculators sporadically. It was extremely difficult for me to finish the mathematics sections, even though I feel I'm good at this subject. I knew that I could have done better if I'd only had 10 more minutes or even five. I wonder why ETS doesn't consider more generous time limits; the extra 15 seconds per problem allotted on the new SAT were just not quite enough. I noticed one statistics problem and one problem that related to probability; the other items tested the arithmetic, algebra, and geometry skills that have always been represented on the SAT. (My SAT scores arrived at press time: verbal 760, 99th percentile; math 720, 97th percentile.)

I talked to several students as they left the testing area. Most said that they were going home to sleep, a feeling with which I heartily concurred. I know that I would not endure an experience like this again unless I were forced to (or paid big bucks for doing so). I also have much more sympathy for the students whom I tutor. It is too soon to say whether or not the new SAT is blazing a trail toward the future of assessment. But at the very least, taking the SAT will remain one experience about which both parents and children can commiserate.

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