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Correspondences Between ACT™ and SAT® I Scores

NEIL J. DORANS

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Abstract

Correspondences between ACT™ and SAT® I scores are presented from a conceptual framework that distinguishes among three kinds of correspondences, namely, equating, scaling, and prediction. Construct similarity plays an important role in determining the nature and degree of correspondence that can be achieved. This report also maintains that statistical indices in conjunction with rational considerations are needed to determine whether the highest level of correspondence attainable between scores from two admission tests is the conceptual and statistical exchangeability sought by equating, the distributional similarity achieved by scaling, or the association attained by prediction.

Relationships among the different scales of the ACT and SAT I are described in the context of the conceptual framework developed herein. Sums of scores, composites of scores, and individual scores are examined. Different types of correspondences between different sets of scores from these two admission tests are amenable to different interpretations.

Introduction

Score users often wonder how different tests relate to each other. Some users are cautious and hesitate to make comparisons across tests. Others presume that all tests can be linked in a manner that leads to simple comparisons and valid inferences.

To some "different tests" means two versions of the same test that are built to a clearly specified blueprint. To others "different tests" means measures of the same construct (e.g., math) built to different specifications (e.g., those used by ACT for the ACT test, and those used by Educational Testing Service (ETS) for the College Board's SAT I test). To others "different tests" is used to make a distinction between a test of math knowledge and a test of science reasoning.

Users of test scores often like to use scores interchangeably. Sometimes they presume that the scores are completely exchangeable. To ensure that scores are compared in the proper way, a better understanding of the continuum that ranges from strict exchangeability of scores to no association between scores is needed.

Several authors, for example, Angoff (1971), Linn (1993), and Mislevy (1992), have discussed distinctions among different types of score linkages. The present paper presents a conceptual framework for correspondences between scores and score scales that delineates three different kinds of correspondences, namely, equating, scaling, and prediction.

Construct similarity plays an important role in determining the degree of correspondence that can be achieved. This report also maintains that statistical indices in conjunction with rational considerations are needed to determine whether the highest level of correspondence attainable between scores from two tests is the conceptual and statistical exchangeability sought by equating, the distributional similarity achieved by scaling, or the association attained by prediction.

Relationships among the different scales of the ACT and SAT I, two nationally known college admission tests, are described in the context of the conceptual framework developed herein. Users want to know how scores on the ACT and the SAT I are related. Dorans, Lyu, Pommerich, and Houston (1997) presented correspondences between SAT I and both the ACT Sum and the ACT Composite. Data from that study are used to provide examples of both concordances and predictions among various scores on these two prominent tests. Sums of scores, composites of scores, and individual scores are examined. Different types of correspondences between different sets of scores from these two admission tests are amenable to different interpretations.

Distinctions Among Classes of Correspondence of Test Scores

Three classes of correspondence are delineated in this paper: equating, scaling, and prediction.

Equating

The goal of equating (Holland and Rubin, 1982; Kolen and Brennan, 1995) is to produce scores that are fully exchangeable. A score is exchangeable if it is a measure of the same thing, say, length, and expressed in the same metric, say, inches, as another score. The two scores may have been obtained via two versions of the same measuring instrument. A simple example is the length of a piece of string. Most foot-long rulers are gradated in inches and centimeters. If we measure a string in both metrics, we can easily convert the string's length "scores" into the same metric, either centimeters, inches, feet, or meters. The point is that length is the construct being measured and that meters, inches, feet,

and miles are all fully equitable; i.e., they can be placed on the same metric. Scores on tests of developed abilities and skills can be equated too, provided they are constructed to the same set of specifications, and a proper data collection design can be used to establish the equating relationship (Angoff, 1971). Imperfect reliability prevents test scores from achieving the full equitablity associated with measures, such as length, that have near perfect reliability.

Scaling

A second type of correspondence between two scales is scaling. Typically, the data collection designs and the statistical techniques used to establish a scaling relationship are also used to establish an equating relationship. The crucial distinction is that two scales that have been placed on a common metric are considered equated only if they measure the same thing. For example, different editions of the SAT I are placed on the same scale with the intent of producing exchangeable scores. An examinee should be able to take any edition of the SAT I and get the same reported scores on the 200 to 800 scale within the precision (reliability) of the test. The same can be said for ACT scores. SAT I scores and ACT scores, however, are not exchangeable. They measure different, albeit highly related, constructs.

When SAT I V+M (a sum) and ACT Composite (or ACT Sum) are scaled to each other, as they recently were by Dorans, Lyu, Pommerich, and Houston (1997), concordance tables are produced.[1] Because the correlation between the ACT Composite/Sum and SAT I V+M was so high (.92), scaling was used in the Dorans et al. (1997) study to establish the correspondences between these composite/sum scores. This means, for example, that the score on ACT Sum that corresponded to the same percentile in some group as a score on SAT I V+M was denoted as corresponding or concordant. This type of statistical equivalence does not mean, however, that a score on ACT Sum is an exchangeable measure of a score on SAT I V+M. Likewise, a scaling of SAT I Verbal to SAT I Mathematical does not yield exchangeable scores.

One distinguishing characteristic of scaling (and equating) is that the relationship between the two scores is invertible. That means that if a 125 on ACT Sum corresponds to a 1400 on SAT I V+M, then a 1400 on SAT I V+M corresponds to a 125 on ACT Sum. This statistical equivalence does *not* mean that a 125 and a 1400 can be used interchangeably as measures of the same construct. Instead, they can be thought of as occupying the same location in a rank ordering of scores in some group of people.

Prediction

The third type of correspondence to be discussed is prediction. It is the least restrictive and least demanding type of correspondence. Whereas equating strives to achieve fully exchangeable scores and scaling matches distributions of scores, prediction is merely concerned with doing the best job possible to predict one set of scores from another. The goal is to minimize the imprecision in the predictions of one score from one or more scores. A classic example of a prediction model is the estimation of grade-point average from earlier grades and high school scores. Unlike scaling and equating relationships, prediction relationships are *not* symmetric; i.e., the function that predicts scores on test A from scores on test B is not the multiplicative inverse of the function that predicts scores on test B from scores on test A.

How do we know the degree to which we can achieve exchangeability, concordance, or prediction? There are two factors that provide us with answers in any given situation. One is the logical evaluation of the similarity of the processes that produced the scores. The second is the strength of the empirical relationship among the scores, typically measured by the correlation coefficient.

A Measure of Uncertainty Reduction

McNemar (1969) describes a vintage statistical index called the coefficient of alienation that is a measure of statistical uncertainty that remains after inclusion of information from the predictor variable. This index involves the correlation coefficient r,

(1) coefficient of alienation = $\sqrt{(1-r^2)}$.

We can define the reduction of uncertainty as

(2) reduction of uncertainty =
1 – coefficient of alienation = $1 - \sqrt{(1-r^2)}$.

Note that when r=0, the coefficient of alienation = 1, which means that there is a zero reduction in uncertainty about scores on the measure predicted. For example, if

[1]ACT reports an ACT Composite score, which is the sum of four individual components divided by four and rounded to the nearest whole number.

the information in the predictor variable (say, a randomly picked lottery number) has no relationship with variation in scores on the variable to be predicted (the change in wealth expected to occur as a result of the draw of the winning number), then the predictor does nothing to reduce my uncertainty about performance on the variable to be predicted (winning the lottery). In contrast, a 100 percent reduction of uncertainty, represented by a zero coefficient of alienation, is achieved when $r=1$.

A 50 percent reduction is halfway between 100 percent reduction ($r=1$) and 0 percent reduction ($r=0$). A correlation coefficient of at least .866 is needed to reduce the uncertainty, as measured in score units, of knowing a person's score by at least 50 percent. If a predictor can not reduce uncertainty by at least 50 percent, it is unlikely that it can serve as a valid surrogate for the score you want to predict.

The selection of any cutoff point is arbitrary, but it may or may not be capricious. What does a 50 percent reduction in uncertainty mean in concrete terms? Suppose we were asked to predict a woman's height and all we knew was that she was an adult. With no other information, our best guess would be the average height of an adult, and the standard deviation of height among adults would represent an uncertainty measure of one. If we knew she was female, our estimate would shift downward and our uncertainty measure would get smaller. As we added more and more information about her, such as age, weight, height of parents, etc., our uncertainty would continue to reduce.

Shifting to a measurement example, consider the reliability of parallel forms. If we know nothing about a man other than that he took a test along with a group of others, we could use the group average score to estimate his performance on the test. In this case the standard deviation of scores in the group would represent an uncertainty of one. If we knew his true ability (in the sense of what he would do in the long run on tests parallel to the one he took), we could use his true score as an estimate of his observed score on the test. A test with a reliability of .75 would be needed to reduce the uncertainty by 50 percent, which means a test with a reliability of .75 has a standard error of measurement equal to half the original standard deviation. A reliability is a squared correlation. A reliability of .75 is equivalent to a correlation of .866 between true score and observed score. These two numbers may provide an additional interpretative hook for a 50 percent reduction in uncertainty.

For the SAT I and ACT in the population studied by Dorans et al. (1997), if an examinee presents an ACT Composite score, it reduces uncertainty about his SAT I V+M score by 60 percent, because the correlation between ACT Composite and SAT I V+M is .92. In other words, the range of plausible SAT I V+M scores is reduced by 60 percent once we have knowledge of an examinee's ACT Composite score. The logical evaluation needs to be verified with the empirical data. Reductions in uncertainty that fall short of 50 percent may be indicative of scores that are neither equivalent nor concordable.[2]

Content Considerations

Different editions of the SAT I are constructed to be similar in content and difficulty by experienced assessment professionals who use a clearly specified blueprint to guide them. These tests are administered to students seeking admission in colleges and universities. The rigor of the assembly process and the motivation of the students taking the tests combine to produce scores that can be equated. ACT uses its professional assembly process, and administers its tests to comparably motivated students to produce scores that are also equitable. The two processes, though different in some ways, yield distributions of sum scores that are highly correlated and can be related via concordance tables.

The process used to produce grades differs markedly from test scores. In contrast to test scores, which are obtained from carefully constructed tests administered under standardized conditions in a brief period of time, grades are a cumulative record obtained under varied nonstandard circumstances. Prediction is the best that one can expect under these circumstances. The relatively low correlations between grades and test scores attest to the dissimilarity of these processes.

[2]The correlation coefficient has its limitations. For one, it does not describe nonlinear relations well. For the purposes of this paper, we will assume that the distributions of the two scores have either been matched (Holland and Thayer, 1998) or are similar enough in shape that a linear relationship is adequate for prediction purposes. Another criticism is that correlation coefficients can be easily attenuated. For example, suppose we are only interested in distinguishing among SAT I Mathematical scores at 750 or above. ACT Mathematics scores or scores from any other measure, including those from other editions of SAT I Mathematical, would not be of much use because the range restriction on the score we are interested in predicting is so severe that virtually all potential predictors have very limited validity. The attenuated correlation reflects these practical limitations. The fact that it suggests that two versions of SAT I Mathematical are not correlated enough to warrant exchangeability is a troublesome but accurate description of what is achievable in the highly restricted subpopulation of data under study.

Differences and Similarities in ACT and SAT I Content Specifications[3]

The SAT I yields two scores: a Verbal score based on 78 questions administered in 75 minutes, and a Mathematical score based on 60 questions administered in 75 minutes.

The ACT yields four component scores: an English score based on 75 questions administered in 45 minutes, a Mathematics score based on 60 questions administered in 60 minutes, a Reading score based on 40 questions administered in 35 minutes, and a Science Reasoning score based on 40 questions administered in 35 minutes. ACT also reports a Composite score.

At this very general level of description, the ACT Mathematics score and the SAT I Mathematical score appear similar in name and number of questions. In contrast, the SAT I and the other three ACT scores all appear different. Further evaluation of the content specifications of the tests that produce these four scores confirm these apparent similarities and differences.

More than 5/6 of the SAT I Mathematical content comes from three primary domains: arithmetic, algebra, and geometry. Less than 1/6 is drawn from other areas of mathematics such as trigonometry. For ACT Mathematics, about 11/12 of the items come from algebra, geometry, and pre-algebra. Trigonometry items make up the balance of the test. To the extent that "arithmetic" and "pre-algebra" overlap, the specifications between SAT I Mathematical and ACT Mathematics are quite similar. This high level of content correspondence indicates that statistical concordance should also be high.

The SAT I Verbal measures verbal reasoning via critical reading questions (about half the test) and analogical reasoning questions and sentence completions.

ACT English measures the "six elements of effective writing." About half the test is dedicated to Usage/Mechanics of the English language, which is assessed via punctuation, grammar and usage, and sentence structure. The remainder of the test assesses Rhetorical Skills, i.e., strategy, organization, and style. The content of ACT English is similar to that of the writing test that used to be administered with the old SAT, the Test of Standard Written English. It measures something more akin to the SAT II Writing test than it does the SAT I Verbal test.

ACT Reading, in fact, is more aligned from a content perspective with the SAT I Verbal than is ACT English. The questions in this test come from four domains: prose fiction, social sciences, humanities, and natural sciences. It appears as if this test measures half of what the SAT I Verbal test measures, namely, the reading portion of reasoning.

TABLE 1

Content Comparison Across ACT and SAT I Component Scores

SAT I Verbal	Critical Reasoning (36–44) questions	Analogies/Sentence Completions (34–42) questions				
SAT I Math	Arithmetic Reasoning (18–19) questions	Algebraic Reasoning (17) questions		Geometric Reasoning (16–17) questions		Miscellaneous Reasoning (7–9) questions
ACT Math	Pre-Algebra (14) questions	Elementary Algebra (10) questions	Intermediate Algebra (9) questions	Coordinate Geometry (9) questions	Plane Geometry (9) questions	Trigonometry (4) questions
ACT English	Usage/Mechanics (40) questions	Rhetorical Skills (35) questions				
ACT Reading	Prose Fiction (10) questions	Humanities (10) questions		Social Sciences (10) questions	Natural Sciences (10) questions	
ACT Science Reasoning				Research Summaries (18) questions	Conflicting Viewpoints (7) questions	Data Representation (15) questions

[3]The *Handbook for the SAT Program (1996-97)*, published by the College Board, and the *Test Preparation Reference Manual*, published by ACT, served as the source material for these content comparisons.

ACT Science Reasoning measures science knowledge via three formats: data representation, research summaries, and conflicting viewpoints. It does not appear to be aligned with any other test.

Table 1 contains a condensed comparison of the various ACT and SAT I component scores. SAT I Math and ACT Math are contained within bold lines to highlight their similarity. SAT I Verbal is set apart from the four ACT scores to emphasize its dissimilar content. In sum, this comparison of the content of the two SAT I tests and the four ACT tests suggests that a strong concordance should be found between the mathematical portions of ACT and SAT I, but does not suggest any other likely concordances, with the possible exception of SAT I Verbal and ACT Reading.

Correspondences Among ACT and SAT I Scores

Dorans, Lyu, Pommerich, and Houston (1997) reported a correlation between SAT I V+M and ACT Sum (Composite) of .92 in a sample of 103,525 students who took both the SAT I and ACT. The magnitude of this correlation justified the reporting of concordances between the SAT I and ACT composites, which are reported in Dorans et al. (1997), and repeated in the Appendix of this report.

Correlations among individual SAT I and ACT scores were also computed in this large sample of 103,525. As suggested by the content analysis above, the highest correlation of any ACT score with any SAT I score was the .89 between ACT Mathematics and SAT I Mathematical. SAT I Verbal correlated .83 with ACT Reading and .83 with ACT English. The equivalence of these statistical relations mirrors the ambiguity about how the SAT I Verbal relates to these two ACT scores that we observed in the content analysis. The fact that ACT Reading and ACT English correlate .81 with each other is further evidence that SAT I Verbal, ACT English and ACT Reading are distinct measures.

Correlations in the low .80s are high, especially in the context of predicting grades from test scores, where the unreliability of the grade-point average and its scaling problems attenuate the correlation coefficient. But in establishing correspondences between test scores, correlations in the low .80s are too low to merit concordance tables, and unacceptable if the goal is to establish exchangeability of scores. In fact, we suggested earlier that correlations below .866 reduce uncertainty by less than 50 percent; hence their scores are not concordable.

The correlations observed for the ACT Science Reasoning test indicate the need to draw the line somewhere near the mid .80s. This test correlates .76 or .75 with each of the other SAT I and ACT scores. Few would argue that this ACT Science Reasoning measure is a measure of SAT I Mathematical, SAT I Verbal, ACT Reading, ACT English, and ACT Mathematics all at the same time. Nor would many argue that SAT I V+M is a measure of ACT Science Reasoning because it correlates .82 with it. Likewise, few would argue that SAT I V+M is a measure of ACT English because it correlates .87 with it. Most, however, would agree that these ample correlations would yield solid predictions of performance on these other tests. Prediction, yes. Concordance, no. Exchangeability, definitely not.

Description of Analysis Sample

Dorans, Lyu, Pommerich, and Houston (1997) describe the processes used to screen data and select the concordance sample of 103,525 used for the analyses that linked the composite scores for ACT and SAT I. Their description covers data collection, data screening, matching of data files, the effects of time between testings on test performance relationships, and other factors. Ultimately, a scaling sample was selected from data supplied by two states and 14 universities. Although the sample used for this study was not a random sample of all students who took both examinations, the data file included over 100,000 students.[4]

Tables 2 and 3 contain distributions of scores on ACT Composite, ACT Sum, and SAT I V+M. The students in the scaling sample appear more academically able than the general ACT-tested or SAT I-tested population. The average ACT Composite and SAT I (V+M) scores were considerably higher for the sample than for the national ACT-tested and SAT I-tested populations. The average ACT Composite for the concordance sample was 23.2, while the national average ACT Composite was 21.0 (*1997 ACT High School Profile Report*, 1997). The average SAT I V+M score for the concordance sample was 1071, while the national average SAT I V+M was 1013 (*College Bound Seniors*, 1996). The percentage of males (43 percent) and females (57 percent) in the sample was typical of the percentages in the ACT-tested population (44

[4]The states that provided data for this study were Florida and Texas. In addition, data were provided by University of California, Duke University, Ohio State University, Ball State University, University of Illinois, Northwestern University, University of South Carolina, Texas A&M University, University of Texas, Baylor University, Rice University, Prairie View A&M University, University of Maryland, and Stephen F. Austin University.

TABLE 2

Frequency and Cumulative Frequency for ACT Composite and Sum Scores

ACT Composite	*Frequency*	*Cumulative Frequency*	*ACT Sum*
36	24	103525	142-144
35	187	103501	138-141
34	611	103314	134-137
33	1345	102703	130-133
32	2126	101358	126-129
31	3059	99232	122-125
30	4081	96173	118-121
29	4662	92092	114-117
28	5342	87430	110-113
27	6109	82088	106-109
26	6709	75979	102-105
25	6862	69270	98-101
24	7346	62408	94-97
23	7491	55062	90-93
22	7558	47571	86-89
21	7269	40013	82-85
20	6980	32744	78-81
19	6359	25764	74-77
18	5544	19405	70-73
17	4699	13861	66-69
16	3429	9162	62-65
15	2579	5733	58-61
14	1676	3154	54-57
13	953	1478	50-53
12	375	525	46-49
11	107	150	42-45
10	34	43	38-41
9	3	9	34-37
8	5	6	30-33
7	0	1	26-29
6	1	1	22-25
23.15	***Mean***		***92.10***
4.86	***Standard Deviation***		***19.39***

TABLE 3

Frequency and Cumulative Frequency for SAT I V+M Scores

SAT I V+M	*Frequency*	*Cumulative Frequency*
1550-1600	279	103525
1500-1540	678	103246
1450-1490	1418	102568
1400-1440	2377	101150
1350-1390	3776	98773
1300-1340	5342	94997
1250-1290	6576	89655
1200-1240	8016	83079
1150-1190	9084	75063
1100-1140	9725	65979
1050-1090	9971	56254
1000-1040	9764	46283
950-990	8886	36519
900-940	7875	27633
850-890	6513	19758
800-840	4918	13245
750-790	3420	8327
700-740	2202	4904
650-690	1356	2705
600-640	697	1349
550-590	389	652
500-540	175	263
450-490	66	88
400-450	22	22
	Mean	***1071.4***
	Standard Deviation	***194.4***

percent and 56 percent, respectively) and, to a lesser extent, the SAT I-tested population (47 percent and 53 percent).

The relationship between ACT and SAT I scores was evaluated for students taking both tests between October 1994 and December 1996, and within 217 days of each other. The scaling sample consisted of student records from two states and 14 universities. The samples for states and for institutions were mutually exclusive, so that a student was represented in either the state sample or the institution sample, but not both. The total number of student scores used in the analyses was 103,525 students.

Scaling Procedure

The scaling procedure used by Dorans et al. (1997) was the equipercentile method. A single group design was used in which students took both forms to be scaled. As the name implies, the equipercentile method sets equal the scores that have the same percentile ranks in the sample. For example, the 90th percentile in the ACT Sum score distribution is set equal to the 90th percentile in the SAT I V+M score distribution. See Dorans et al. (1997) for a discussion of technical issues associated with using equipercentile equating with these data.

Previous Findings

The relationships between ACT and SAT I scores are summarized for two combinations of scores: ACT Composite with SAT I V+M, and ACT Sum with SAT I V+M. Both ACT Composite and ACT Sum correlate .92 with SAT I V+M. The results of the equipercentile concordance procedure are summarized for the total

group in the Appendix. Tables A.1 and A.2 give the ACT to SAT I concordances. Table A.3 gives the SAT I to ACT concordances. Tables A.1 and A.2 should be used to convert ACT scores to SAT I scores. Table A.3 can be used to convert SAT I V+ M scores to either ACT Sum *or* ACT Composite scores. Table A.4 contains correlations between all scores and composites from that the data set used by Dorans, Lyu, Pommerich, and Houston (1997).

Concordance Between SAT I Math and ACT Math

Earlier, we noted the high degree of content overlap for these two tests, both of which contain 60 items. As noted above, the correlation between these two scores in this sample of 103,525 students is .89. When SAT I Verbal is added to SAT I Mathematical to predict ACT Mathematics, the correlation remains .89. When the ACT Reading, ACT English, and ACT Science Reasoning are added to ACT Mathematics, the correlation with SAT I Mathematical increases to .90 from .89. These small gains indicate that the additional scores add very little to the predictive power contained in each test's math score. The combination of logical and empirical evidence points to the acceptability of producing concordance tables relating the two math scores. Maxey (1998) presented partial concordance tables relating these two math scores. Our results are consistent with his, which were based on the same data.

The scaling procedure used by Dorans, Lyu, Pommerich, and Houston (1997), the equipercentile method with data from a single group design, was also used to obtain concordances for the math scores.

Tables 4 and 5 contain distributions of scores on ACT Mathematics and SAT I Mathematical. The results of the equipercentile concordance procedure are summarized for the total group in Tables 6 and 7. Table 6 contains the ACT to SAT I concordances; Table 7 the SAT I to ACT concordances. Table 6 should be used to convert ACT Mathematics scores to SAT I Mathematical scores. Table 7 can be used to convert SAT I Mathematical scores to ACT Mathematics scores. Because the SAT I scale contains 61 points and the ACT scale effectively contains 26 points, there are many gaps in Table 6 and a large number of SAT I scores that convert to the same ACT score in Table 7.

TABLE 4

Frequency and Cumulative Frequency for ACT Mathematics Score

ACT Mathematics	*Frequency*	*Cumulative Frequency*
36	535	103525
35	346	102990
34	691	102644
33	1594	101953
32	2246	100359
31	3821	98113
30	4242	94292
29	4408	90050
28	4770	85642
27	5944	80872
26	6318	74928
25	6497	68610
24	6387	62113
23	6974	55726
22	6056	48752
21	6783	42696
20	7061	35913
19	6509	28852
18	6099	22343
17	6583	16244
16	3925	9661
15	2877	5736
14	1705	2859
13	703	1154
12	306	451
11	110	145
10	28	35
9	3	7
8	2	4
7	0	2
6	0	2
5	2	2
	Mean	*23.12*
	Standard Deviation	*5.12*

TABLE 5

Frequency and Cumulative Frequency for SAT I Mathematical Score

SAT I Mathematical	*Frequency*	*Cumulative Frequency*	*SAT I Mathematical*	*Frequency*	*Cumulative Frequency*
800	611	103525	500	3630	39494
790	193	102914	490	3417	35864
780	509	102721	480	3069	32447
770	154	102212	470	3056	29378
760	590	102058	460	3084	26322
750	295	101468	450	3052	23238
740	598	101173	440	2242	20186
730	952	100575	430	2808	17944
720	1104	99623	420	2359	15136
710	1551	98519	410	1861	12777
700	1567	96968	400	1851	10916
690	1701	95401	390	1584	9065
680	1634	93700	380	1327	7481
670	2032	92066	370	1142	6154
660	2113	90034	360	967	5012
650	2687	87921	350	836	4045
640	2476	85234	340	732	3209
630	3215	82758	330	589	2477
620	2688	79543	320	437	1888
610	2775	76855	310	277	1451
600	3317	74080	300	251	1174
590	3128	70763	290	254	923
580	3866	67635	280	118	669
570	2915	63769	270	139	551
560	3816	60854	260	105	412
550	3496	57038	250	73	307
540	3464	53542	240	87	234
530	3964	50078	230	23	147
520	3131	46114	220	45	124
510	3489	42983	210	7	79
			200	72	72
			Mean		*540.4*
			Standard Deviation		*106.8*

TABLE 6

Concordance Between ACT Mathematics and SAT I Mathematical Scores

ACT Math	*SAT I Math*	*ACT Math*	*SAT I Math*
36	800	23	540
35	790	22	520
34	780	21	500
33	740	20	480
32	720	19	460
31	700	18	440
30	680	17	420
29	650	16	390
28	640	15	360
27	620	14	330
26	600	13	290
25	580	12	250
24	560	11	220

Note: This and all concordance tables in this report are based on data from 103,525 students from 14 universities and 2 states who took the ACT and the SAT I between October 1994 and December 1996. These tables contain scores that were achieved by comparable proportions of students who took both tests within 217 days of each other. Because the ACT and the SAT I tests have different content, concordant scores should *not* be viewed as interchangeable measures of the same combination of skills and abilities.

TABLE 7

Concordance Between SAT I Mathematical and ACT Mathematics Scores

SAT I Math	*ACT Math*	*SAT I Math*	*ACT Math*
800	36	500	21
790	35	490	20
780	34	480	20
770	34	470	19
760	33	460	19
750	33	450	18
740	33	440	18
730	32	430	18
720	32	420	17
710	31	410	17
700	31	400	17
690	31	390	16
680	30	380	16
670	30	370	15
660	29	360	15
650	29	350	15
640	28	340	14
630	28	330	14
620	27	320	14
610	27	310	14
600	26	300	13
590	26	290	13
580	25	280	13
570	25	270	13
560	24	260	12
550	23	250	12
540	23	240	12
530	22	230	11
520	22	220	11
510	21		

Predicting SAT I Verbal From ACT and ACT English and Reading From SAT I

The nonmathematical domains of the ACT and SAT I are not as highly related as the mathematical domains. For example, SAT I Verbal correlates .83 with both ACT English and ACT Reading, which correlate .81 with each other. This means that ACT English and ACT Reading are equally informative about SAT I Verbal performance. In addition, ACT Reading predicts ACT English about as well as it predicts SAT I Verbal. The same can be said of ACT English as a predictor of ACT Reading and SAT I Verbal. These correlations suggest that the three scores measure distinct but highly related constructs. Writing (English), Verbal Reasoning (Verbal), and Reading (Reading) are related and may even overlap to some degree (Verbal and Reading), but are nonetheless separate measures. Their scores are neither exchangeable nor concordable. They can be used for prediction, however.

Predicting ACT Reading

SAT I Verbal correlates .83 with ACT Reading. When SAT I Mathematical is added to a linear multiple regression prediction equation, the correlation only improves from .83 to .84, a small increase that does not warrant inclusion of SAT I Mathematical in the prediction model.

A predicted ACT Reading score is the score that examinees who have a given SAT I Verbal score are expected to get on ACT Reading. Actually, there is an expected range of ACT Reading scores associated with SAT I Verbal scores; the single value associated with the prediction equation is the average of that possible range of ACT scores. The equation for predicting ACT Reading from SAT I Verbal is

(3) ACT Reading = (5.11*SATIV−351)/100.

About 95 percent of ACT Reading scores should fall in a range that is within ± 7 points of these predicted scores. This ± 7 points represents a 45 percent reduction in the uncertainty associated with estimating an ACT Reading score without any SAT I score information. Table 8 portrays this prediction equation in a tabular form with predicted ACT Reading scores alongside SAT I Verbal scores. Note that a 300 on SAT I Verbal yields a predicted ACT Reading score of 12, while an 800 yields a predicted ACT Reading score of 36, the maximum score attainable on ACT.

TABLE 8

Predicted ACT Reading Scores for Selected SAT I Verbal Scores

Actual SAT I Verbal	*Predicted ACT Reading*
300	12
350	14
400	17
450	19
500	22
550	25
600	27
650	30
700	32
750	35
800	36

Predicting ACT English

By itself, SAT I Verbal correlates .83 with ACT English. When SAT I Mathematical is added to the prediction equation, the correlation goes up to .85, just enough to warrant inclusion of SAT I Mathematical in the equation,

(4) ACT English = (3.50*SATIV+1.19*SATIM−256)/100.

About 95 percent of ACT English scores are expected to fall in a range of ± 6 points around these predicted scores. This ± 6 points represents a 47 percent reduction in the uncertainty associated with estimating an ACT English score without any SAT I score information.

A predicted ACT English score is the score that people who have a certain combination of SAT I scores are expected to get on ACT English. Actually, there is an expected range of ACT English scores associated with each pair of Math and Verbal SAT I scores; the single value associated with the prediction equation is the average of that possible range of ACT English scores.

Table 9 portrays this prediction equation in a tabular

TABLE 9

Predicted ACT English Scores for Selected Combinations of SAT I Verbal and Mathematical Scores

		Actual SAT I Mathematical Score					
	300	**400**	**500**	**600**	**700**	**800**
	300	12	13	14	15	16	17
Actual	**400**	15	16	17	19	20	21
SAT I	**500**	19	20	21	22	23	24
Verbal	**600**	22	23	24	26	27	28
Score	**700**	26	27	28	29	30	31
	800	29	30	31	33	34	35

form with predicted ACT English scores appearing in the body of the table, selected SAT I Verbal scores as rows, and SAT I Mathematical scores as columns. To obtain a predicted ACT English score from a pair of SAT I scores, you look up the row that corresponds to the SAT I Verbal score and the column corresponding to the SAT I Mathematical score, find the intersection of this column and row in the body of the table, and read the predicted ACT English score from that spot in the table. For example, a SAT I Mathematical score of 800 and an SAT I Verbal score of 800 yield a predicted ACT English score of 35, which is just below the maximum of 36.

SAT I Verbal is a better predictor of ACT English than is SAT I Math. This expected result is reflected in the body of Table 9 where predicted ACT English scores change about three times as fast with changes in SAT I Verbal scores as they do with comparable changes in SAT I Mathematical scores. For example, a pair of 500s on SAT I Verbal and SAT I Mathematical yield a predicted ACT English score of 21. An increase in 100 points on SAT I Mathematical (with no change in SAT I Verbal) leads to a predicted ACT English score of 22. Contrast that with the predicted ACT English score of 24 that is associated with a 600 on SAT I Verbal and a 500 on SAT I Mathematical. Similar changes can be observed throughout the table.

Predicting ACT Science Reasoning

As noted earlier, ACT Science Reasoning correlates .75 or .76 with all other scores. Both SAT I Mathematical and SAT I Verbal scores are needed to the raise the correlation up to .82, well above the mid .70s level. The resulting equation is

(5) ACT Science Reasoning =
(2.10*SATIV+1.95*SATIM+119)/100.

About 95 percent of ACT Science Reasoning scores are expected to fall in a range of ± 6 points around these predicted ACT Science Reasoning scores. This ± 6 points represents a 43 percent reduction in the uncertainty associated with estimating an ACT Science Reasoning score without any SAT I score information.

Table 10 portrays this prediction equation in a tabular form with predicted ACT Science Reasoning scores appearing in the body of the table, with SAT I Verbal scores as rows and SAT I Mathematical as columns. To obtain a predicted ACT Science Reasoning score from a student's SAT I scores, you look up the row that corresponds to his Verbal score and the column corresponding to his Mathematical score, find the intersection of this column and row in the body of the table and read his predicted Science Reasoning score from that spot in the table. For example, a SAT I Verbal score of 800 and a SAT I Mathematical score of 800 yield a predicted ACT Science Reasoning score of 31, well below the maximum of 36. This lower prediction for ACT Science Reasoning is due to the lower correlation between ACT Science Reasoning and the two SAT I scores.

In direct contrast to Table 9, in which SAT I Verbal is clearly more important as predictor of ACT English, Table 10 has a striking symmetry associated with it. All rows and columns exhibit 2-point gains with 100-point changes in SAT I Mathematical or SAT I Verbal. The diagonals running from the upper left to the lower right exhibit 4-point differences, and the diagonals running from the upper right to the lower left all contain numbers that do not change. SAT I Mathematical and SAT I Verbal are essentially equally good predictors of ACT Science Reasoning scores in this sample.

Predicting SAT I Verbal Scores

Either ACT Reading or ACT English alone correlates .83 with SAT I Verbal. The best linear regression model combining both these scores correlates .87 with SAT I Verbal, a marked increase in predictive power. Adding ACT Mathematics and ACT Science Reasoning to the predictive mix increases the correlation to only .88, which is not worth the extra complexity associated with presenting a prediction equation with four predictors (each of the four ACT scores). The equation for ACT Reading and ACT English combined is:

(6) SAT I Verbal = (7.52*ACTR+8.76*ACTE+156)

About 95 percent of SAT I Verbal scores are expected to fall within ± 150 points of these predicted scores. This ± 150 points represents a 52 percent reduction in the uncertainty associated with estimating an SAT I Verbal score without any ACT score information.

TABLE 10

Predicted ACT Science Reasoning Scores for Selected Combinations of SAT I Verbal and Mathematical Scores

		Actual SAT I Mathematical Score					
		300	400	500	600	700	800
Actual SAT I Verbal Score	300	11	13	15	17	19	21
	400	13	15	17	19	21	23
	500	15	17	19	21	23	25
	600	17	19	21	23	25	27
	700	19	21	23	25	27	29
	800	21	23	25	27	29	31

TABLE 11

Predicted SAT I Verbal Scores for Selected Combinations of ACT English and Reading Scores

		Actual ACT English Score								
		13	**16**	**19**	**22**	**25**	**28**	**31**	**34**	**36**
	13	370	390	420	450	470	500	530	550	570
	16	390	420	440	470	500	520	550	570	590
Actual	**19**	410	440	470	490	520	540	570	600	740
ACT	**22**	440	460	490	510	540	570	590	620	640
Reading	**25**	460	480	510	540	560	590	620	640	660
Score	**28**	480	510	530	560	590	610	640	660	680
	31	500	530	560	580	610	630	660	690	700
	34	530	550	580	600	630	660	680	710	730
	36	540	570	590	620	650	670	700	720	740

Table 11 portrays this equation in a tabular form with predicted SAT I Verbal scores appearing in the body of the table, with ACT Reading scores as rows and ACT English scores as columns. To obtain a predicted SAT I Verbal score from a student's ACT scores, you look up the row that corresponds to the ACT Reading score of interest and the column corresponding to the ACT English score, find the intersection of this column and row in the body of the table and read the predicted SAT I Verbal score from that spot in the table. For example, an ACT Reading score of 36 and an ACT English score of 36 yield a predicted SAT I Verbal score of 740, well below the maximum score of 800.

In contrast to the symmetry in Table 10, and the marked asymmetry in Table 9, Table 11 reveals that ACT English is a slightly better predictor of SAT I Verbal than is ACT Reading.

Concordance Between SAT I Verbal and the ACT Reading + English Sum

Since the use of ACT Reading and ACT English together reduces the uncertainty in the prediction of SAT I Verbal scores by 52 percent, a concordant relationship between Verbal and the composite of Reading and English may be statistically acceptable. The scaling procedure used by Dorans, Lyu, Pommerich, and Houston (1997), the equipercentile method with data from a single group design, was also used to obtain concordances for SAT I Verbal with the sum of ACT English and ACT Reading.

Tables 12 and 13 contain distributions of scores on ACT English and ACT Reading Sum and SAT I Verbal. The results of the equipercentile concordance procedure

TABLE 12

Frequency and Cumulative Frequency for ACT English plus Reading Scores

ACT E+R	*Frequency*	*Cumulative Frequency*	*ACT E+R*	*Frequency*	*Cumulative Frequency*
72	216	103525	40	3006	33879
71	112	103309	39	3049	30873
70	345	103197	38	2922	27824
69	382	102852	37	2742	24902
68	760	102470	36	2552	22160
67	789	101710	35	2364	19608
66	1082	100921	34	2218	17244
65	1445	99839	33	2120	15026
64	1498	98394	32	1849	12906
63	1654	96896	31	1744	11057
62	1983	95242	30	1521	9313
61	1861	93259	29	1456	7792
60	1946	91398	28	1335	6336
59	2061	89452	27	1157	5001
58	2225	87391	26	882	3844
57	2368	85166	25	779	2962
56	2448	82798	24	605	2183
55	2675	80350	23	500	1578
54	2816	77675	22	395	1078
53	3046	74859	21	270	683
52	2951	71813	20	156	413
51	2999	68862	19	100	257
50	3066	65863	18	67	157
49	3101	62797	17	36	90
48	3270	59426	16	31	54
47	3067	56426	15	6	23
46	3243	53359	14	5	17
45	3389	50116	13	6	12
44	3107	46727	12	1	6
43	3281	43620	11	2	5
42	3145	40339	10	2	3
41	3315	37194	9	1	1
			Mean		*46.10*
			Standard Deviation		*11.22*

TABLE 13

Frequency and Cumulative Frequency for SAT I Verbal Scores

SAT I Verbal	*Frequency*	*Cumulative Frequency*	*SAT I Verbal*	*Frequency*	*Cumulative Frequency*
800	432	103525	500	3268	41431
790	191	103093	490	3841	38163
780	137	102902	480	3995	34322
770	387	102765	470	2898	30327
760	232	102378	460	3186	27429
750	444	102146	450	3358	24243
740	619	101702	440	2167	20885
730	648	101083	430	2937	18718
720	766	100435	420	1926	15781
710	816	99669	410	2277	13855
700	1045	98853	400	1547	11578
690	1491	97808	390	1950	10031
680	1426	96317	380	1010	8081
670	1908	94891	370	1376	7071
660	1613	92983	360	1247	5695
650	2256	91370	350	652	4448
640	2228	89114	340	650	3796
630	2435	86886	330	645	3146
620	2978	84451	320	571	2501
610	2687	81473	310	396	1930
600	3712	78786	300	262	1534
590	3458	75074	290	289	1272
580	3008	71616	280	234	983
570	4114	68608	270	168	749
560	4107	64494	260	132	581
550	3497	60387	250	87	449
540	3724	56890	240	63	362
530	3560	53166	230	54	299
520	4165	49606	220	35	245
510	4010	45441	210	60	210
			200	150	150
				Mean	*531.0*
				Standard Deviation	*103.6*

TABLE 14

Concordance Between ACT English plus Reading and SAT I Verbal Scores

ACT E+R	*SAT I Verbal*	*ACT E+R*	*SAT I Verbal*
72	800	45	520
71	800	44	510
70	790	43	510
69	770	42	500
68	750	41	490
67	740	40	480
66	720	39	470
65	710	38	460
64	690	37	450
63	680	36	440
62	670	35	430
61	660	34	430
60	650	33	420
59	640	32	410
58	630	31	400
57	620	30	390
56	620	29	370
55	610	28	360
54	600	27	350
53	590	26	340
52	580	25	330
51	570	24	310
50	560	23	300
49	560	22	280
48	550	21	260
47	540	20	240
46	530	19	210
		18	200

are summarized for the total group in Tables 14 and 15. Table 14 contains the ACT to SAT I concordances, Table 15 the SAT I to ACT concordances. Table 14 should be used to convert the ACT English and ACT Reading sum scores to SAT I Verbal scores. Table 15 can be used to convert SAT I Verbal scores to the ACT English and ACT Reading sum.

The concordance results for SAT I Verbal with the composite ACT Reading plus ACT English (see Table 14) are different from the prediction results summarized in Table 11. Note that in the concordance tables, an 800 is matched up with a 72, the sum of 36 and 36. This is a by-product of the statistical scaling model. It may or may not be sensible. In Table 11, the prediction model led to an estimate of 740 for 36 and 36. This disparity illustrates the difference between a scaling and a prediction, and how these approaches differ when the uncertainty reduction measure gets smaller and smaller. Scaling ensures that score distributions are similar. Prediction models yield predicted score distributions that nearly always have less variance than the distribution of scores being predicted. In addition, scaling pools together students with different combinations of ACT Reading and ACT English, while the prediction approach retains their uniqueness.

Which approach is fairer to use in a selection situation? The answer depends on the reduction in uncertainty. A disparity in score distributions produces unfairness for the prediction model. Individuals with high scores on test A have lower predicted scores on test B than they would obtain if they took test B, while low-scoring individuals are advantaged by the prediction model's tendency to regress scores toward the average score.

TABLE 15

Concordance Between SAT I Verbal and ACT English plus Reading Scores

SAT I Verbal	*ACT E+R*	*SAT I Verbal*	*ACT E+R*
800	72	500	42
790	70	490	41
780	69	480	40
770	69	470	39
760	68	460	38
750	68	450	37
740	67	440	36
730	66	430	35
720	66	420	33
710	65	410	32
700	64	400	31
690	64	390	30
680	63	380	29
670	62	370	29
660	61	360	28
650	60	350	27
640	59	340	26
630	58	330	25
620	57	320	25
610	55	310	24
600	54	300	23
590	53	290	23
580	52	280	22
570	51	270	21
560	49	260	21
550	48	250	20
540	47	240	20
530	46	230	20
520	45	220	19
510	43	210	19
		200	17

This regression to the mean is most severe when the two tests have no correlation. In that case, the scaling results would match distributions but produce an invalid ordering of examinees for the selection process. On the other hand, to the extent that the two measures are highly related, scaling and prediction converge. If they converge, then a user knows that the two measures have a very strong correspondence that can be used with confidence. To the extent that the prediction and scaling models diverge, which is a function of the reduction of uncertainty or related statistics, the user should be cautious about the use of either approach because one (prediction) may disadvantage deserving candidates, while the other (scaling) may be invalid for the intended use.

Summary

Figure 1 summarizes the types of correspondences that work best for ACT and SAT I scores. There are eight circles, one for each of the three SAT I scores and five ACT scores (the four components and ACT Composite/Sum). At the top of the figure are two circles for composite or sum scores, SAT I V+M and ACT Composite/ACT Sum. (ACT Sum and ACT Composite are included in the same circle because the Composite is simply the Sum divided by 4 and rounded to the nearest integer.) Just below the composite/sum circles are two circles for the SAT I and ACT Math scores. The remaining four circles are for SAT I Verbal and the three other ACT scores, Reading, English, and Science Reasoning.

The word *equivalence* appears within each of the eight circles to denote that scores within these circles are designed to be exchangeable with each other. For example, all ACT Mathematics scores come from test editions built to the same specifications and are equated in an effort to achieve exchangeability across different editions of the ACT. Likewise, all SAT I Verbal scores come from test editions built to the same specifications and are equated so that they can be used interchangeably, regardless of which edition they came from. Equivalence is the strongest form of correspondence that scores can have.

The Sum/Composite circles for ACT and SAT I are connected by a line that is bidirectional and labeled *concordance*. Adjacent to each line is the reduction in uncertainty expressed as a percentage. These bidirectional lines connecting two distinct circles represent a strong statistical relationship between sets of scores drawn from tests built to different sets of specifications. ACT Math and SAT I Math scores are also represented by a concordance relationship. A concordance relationship links, in some large group, such as the 103,525 examinees used to establish the concordances represented in Tables A.1, A.2, and A.3, scores that correspond to the same percentile rank in this group. Different groups could have different concordant relationships. In contrast, equating relationships are the same across different groups. In short, concordant scores cannot be used interchangeably in the way equivalent scores can be. ACT Math scores and SAT I Math scores, though highly related, should not be used interchangeably.

A second type of arrow appears in the figure. This unidirectional arrow denotes a *prediction* relationship. For example, SAT I Math in conjunction with SAT I Verbal can be used in a prediction equation to predict ACT English scores. A predicted ACT English score is the score that people who have a certain combination of

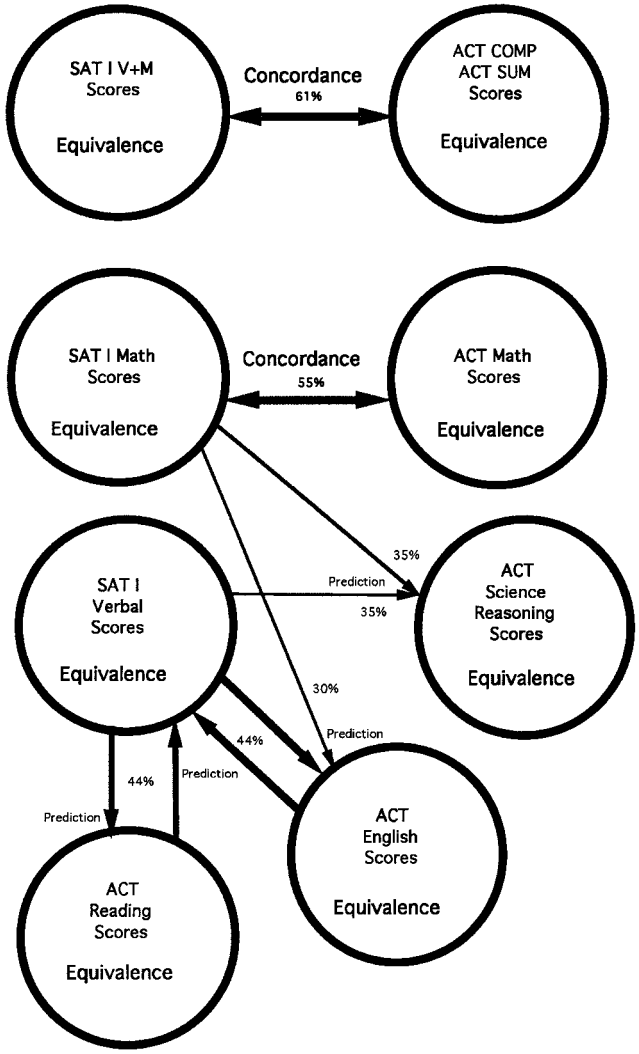

Figure 1. ACT/SAT I correspondences.

SAT I scores are expected to get on ACT English. Actually, there is an expected range of ACT English scores associated with each pair of Math and Verbal SAT I scores. The ± scores associated with each prediction model can be used to construct these ranges.

Prediction is also the preferred form of correspondence for ACT Reading, as indicated by the unidirectional arrow that goes from SAT I Verbal to ACT Reading. Prediction is used in this case instead of concordance because the correlation of .83 is not high enough for an equipercentile concordant relationship to yield an acceptable reduction in uncertainty in the prediction of ACT Reading scores. Note that there is no arrow connecting SAT I Math to ACT Reading because SAT I Math does not add much to the predictability of ACT Reading beyond that already associated with SAT I Verbal.

A prediction model can also be used for ACT Science Reasoning. Unidirectional arrows lead from the SAT I Math and SAT I Verbal circles to the ACT Science Reasoning circle. Use of a prediction model for ACT Science Reasoning has much face validity because concordance between SAT I Math and ACT Science Reasoning or between SAT I Verbal and ACT Science Reasoning does not make sense given the definition of concordance. There are few if any requests for concordances between ACT Science Reasoning and SAT I scores.

In contrast, there are many requests for concordances between the two math scores, and this paper provides these concordance tables. There are also requests for concordances between ACT English and SAT I Verbal. Perhaps these requests stem from the misconception that SAT I Verbal is an English test and that ACT English is a verbal reasoning test. Actually, as we learned from our examination of the content specifications, ACT English is a writing skills test. Perhaps it is highly related enough to SAT II Writing to warrant a concordance relationship. The data used in this study indicate that ACT English is no more related to SAT I Verbal than ACT Reading is, which is not surprising because reading items comprise about half of SAT I Verbal. Therefore, no concordant relationship exists between SAT I Verbal and ACT English or ACT Reading. Nor does it make sense to establish a concordance between ACT English and ACT Reading.

In sum, distinctions were made between three classes of statistical correspondence: equivalence, concordance, and prediction. These distinctions were based on rational content considerations and empirical statistical relationships. A large data base involving SAT I and ACT scores was mined to determine which type of correspondence was best suited for different scores and composite scores.

All scores were presumed to be equivalent to scores from different editions of the same test. For example, SAT I Verbal scores from different editions of the SAT I undergo equating in order to ensure the equivalence of scores across these editions.

Earlier research had produced equivalence tables between the ACT Composite/Sum and the SAT I sum (Dorans et al., 1997), and between SAT I Mathematical and ACT Mathematics (Maxey, 1998). This research provides a content-based and empirical justification for these concordances.

Applying the same rationale to the SAT I Verbal and ACT Reading, ACT English, and ACT Science Reasoning scores leads to the conclusion that these scores are not concordable from a content or statistical rationale. Prediction models are the appropriate form of correspondence with these scores. SAT I Verbal is best

predicted by ACT English and ACT Reading scores (and has strong enough of a statistical relationship to warrant a concordance with the sum of these two scores). ACT Reading is best predicted by SAT I Verbal (the math score adds little to this prediction). Both ACT English and ACT Science Reasoning are best predicted by a combination of SAT I Verbal and SAT I Mathematical.

In general, prediction should be used. Content considerations and the reduction of uncertainty can be used in conjunction to determine whether scaling should be performed to produce concordance tables. Tests should measure similar constructs. Otherwise, scaling is merely a mathematical operation applied to two sets of numbers to match score distributions. The act of scaling social security number to SAT I Verbal score does not produce a meaningful correspondence. Reduction in uncertainty of prediction can be used, with content, to distinguish between pairs of scores that are concordable and those that are not.

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Appendix

Concordance tables in this appendix appeared in an article published in 1997 in *College and University*, 73(2), pp. 24–34, entitled "Concordance Between ACT Assessment and Recentered SAT I Sum Scores" by Neil J. Dorans and C. Felicia Lyu of Educational Testing Service, and Mary Pommerich and Walter M. Houston of ACT (used with permission).

These tables are based on data from 103,525 students from 14 universities and two states who took the ACT and the SAT I between October 1994 and December 1996. These tables contain scores that were achieved by comparable proportions of students who took both tests within 217 days of each other. Because the ACT and the SAT I tests have different content, concordant scores should *not* be viewed as interchangeable measures of the same combination of skills and abilities. In addition, these differences in content mean that the concordances may vary from sample to sample.

TABLE A.1

Concordance Between ACT Composite and SAT I V+M Scores

ACT Composite	*SAT I V+M*	*ACT Composite*	*SAT I V+M*
36	1600	23	1070
35	1580	22	1030
34	1520	21	990
33	1470	20	950
32	1420	19	910
31	1380	18	870
30	1340	17	830
29	1300	16	780
28	1260	15	740
27	1220	14	680
26	1180	13	620
25	1140	12	560
24	1110	11	500

TABLE A.2

Concordance Between ACT Sum and SAT I V+M Scores

ACT Sum	*SAT I V+M*	*ACT Sum*	*SAT I V+M*	*ACT Sum*	*SAT I V+M*	*ACT Sum*	*SAT I V+M*	*ACT Sum*	*SAT I V+M*
144	1600	124	1390	104	1190	84	1000	64	790
143	1600	123	1380	103	1180	83	990	63	780
142	1600	122	1360	102	1170	82	980	62	770
141	1600	121	1350	101	1160	81	970	61	750
140	1590	120	1340	100	1150	80	960	60	740
139	1580	119	1330	99	1140	79	950	59	730
138	1560	118	1320	98	1130	78	940	58	710
137	1550	117	1310	97	1120	77	930	57	700
136	1530	116	1300	96	1110	76	920	56	690
135	1520	115	1290	95	1100	75	910	55	670
134	1510	114	1280	94	1090	74	900	54	660
133	1500	113	1270	93	1080	73	890	53	640
132	1480	112	1260	92	1070	72	880	52	630
131	1470	111	1250	91	1070	71	870	51	610
130	1460	110	1240	90	1060	70	860	50	590
129	1440	109	1230	89	1050	69	840	49	570
128	1430	108	1220	88	1040	68	830	48	560
127	1420	107	1210	87	1030	67	820	47	540
126	1410	106	1200	86	1020	66	810	46	520
125	1400	105	1200	85	1010	65	800	45	510
								44	500

TABLE A.3

Concordance Among SAT I V+M and ACT Sum Scores (and ACT Composite)

SAT I V+M	*ACT Sum*	*ACT Composite*	*SAT I V+M*	*ACT Sum*	*ACT Composite*	*SAT I V+M*	*ACT Sum*	*ACT Composite*	*SAT I V+M*	*ACT Sum*	*ACT Composite*	*SAT I V+M*	*ACT Sum*	*ACT Composite*
1600	141-144	35-36	1380	123	31	1160	101	25	940	78	20	720	58	15
1590	140	35	1370	123	31	1150	100	25	930	77	19	710	58	15
1580	139	35	1360	122	31	1140	99	25	920	76	19	700	57	14
1570	138	35	1350	121	30	1130	98	25	910	75	19	690	56	14
1560	138	35	1340	120	30	1120	97	24	900	74	19	680	56	14
1550	137	34	1330	119	30	1110	96	24	890	73	18	670	55	14
1540	137	34	1320	118	30	1100	95	24	880	72	18	660	54	14
1530	136	34	1310	117	29	1090	94	24	870	71	18	650	53	13
1520	135	34	1300	116	29	1080	93	23	860	70	18	640	53	13
1510	134	34	1290	115	29	1070	91	23	850	69	17	630	52	13
1500	133	33	1280	114	29	1060	90	23	840	69	17	620	52	13
1490	132	33	1270	113	28	1050	89	22	830	68	17	610	51	13
1480	132	33	1260	112	28	1040	88	22	820	67	17	600	50	13
1470	131	33	1250	111	28	1030	87	22	810	66	17	590	50	13
1460	130	33	1240	110	28	1020	86	22	800	65	16	580	49	12
1450	129	32	1230	109	27	1010	85	21	790	64	16	570	49	12
1440	129	32	1220	108	27	1000	84	21	780	63	16	560	48	12
1430	128	32	1210	107	27	990	83	21	770	62	16	550	47	12
1420	127	32	1200	105	26	980	82	21	760	62	16	540	47	12
1410	126	32	1190	104	26	970	81	20	750	61	15	530	46	12
1400	125	31	1180	103	26	960	80	20	740	60	15	520	46	12
1390	124	31	1170	102	26	950	79	20	730	59	15	510	45	11
												500	44	11

Table A.4

Correlations Among Scores and Composites on ACT and SAT I

Score	*ACT English*	*ACT Reading*	*ACT English+ Reading*	*SAT I Verbal*	*SAT I Math*	*ACT Math*	*ACT S. R.*	*ACT SUM*	*SAT I V+M*
ACT English	1.0	.81	*.94*	.83	.71	.69	.76	*.92*	*.83*
ACT Reading	.81	1.0	*.96*	.83	.63	.62	.76	*.91*	.79
ACT English+Reading	*.94*	*.96*	1.0	.88	.70	.69	.79	*.96*	.85
SAT I Verbal	.83	.83	.88	1.0	.71	.66	.76	.87	.92
SAT I Math	.71	.63	.70	71	1.0	.89	.76	.83	*.93*
ACT Math	.69	.62	.69	.66	.89	1.0	*.75*	*.85*	.84
ACT S. R.	.76	.76	.79	.76	.76	*.75*	1.0	*.90*	.82
ACT SUM	*.92*	*.91*	*.96*	.87	.83	*.85*	*.90*	1.0	.92
SAT I V+M	.83	.79	.85	*.92*	*.93*	.84	.82	.92	1.0

Italics indicate part/whole correlation.