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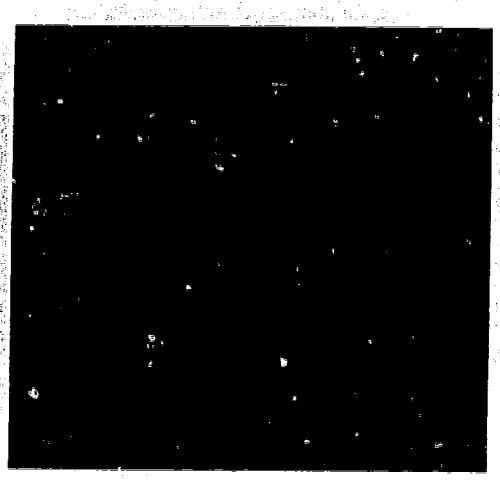
ABSTRACT

The Graduate Record Examination (GRE) subject-matter achievement tests are offered in 17 fields. This study investigated the performance of U.S. and non-U.S. citizens on the Subject Tests, and the relationship of selected English-proficiency-related background variables to the test performance of non-U.S. citizens. It was also concerned with exploring the hypothesis that foreign ESL examinees are likely to be more proficient at processing the discipline-specific content of GRE Subject Tests in their respective fields than in the verbal content of the GRE Verbal Test. Data were collected primarily from GRE files of all examinees who took the Subject Tests between October 1982 and September 1984, and who answered a question on citizenship status. Profiles of GRE Subject Test means were developed for U.S. and non-U.S. examinees, generally, and in classifications that introduced some controls for differences in English language background linked to country of origin. Non-U.S. examinees generally had higher means than U.S. examinees on Subject Tests in Spanish, French, Music, Psychology, Mathematics, Computer Science, Chemistry, Physics, and Economics, and slightly lower means in Engineering and Sociology. U.S. citizens had clearly higher means in Geology, Biology, Education, Political Science, History, and Literature. A major implication of the findings is that scores on the GRE Subject Tests appear to be useful for assessing relative levels of subject-matter mastery for examinees differing widely in linguistic-cultural-educational background. (Author/JAZ)



GRE

GRADUATE RECORD EXAMINATIONS

THE GRE SUBJECT TEST PERFORMANCE OF U.S. AND NON-U.S. EXAMINEES 1982-1984: A COMPARATIVE ANALYSIS

Kenneth M. Wilson

GRE Board Professional Report GREB No. 83-20P
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February 1987

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EDUCATIONAL TESTING SERVICE, PRINCETON, NJ

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Abstract

The Graduate Record Examinations (GRE) program at Educational Testing Service (ETS) offers tests of subject-matter achievement (GRE Subject Tests) in 17 fields. During the period between June 1982 and September 1984, more than 19,000 non-U.S. citizens and 78,000 U.S. citizens took one of the following Subject Tests, listed in descending order with respect to "quantitative vs verbal emphasis" in the corresponding fields of study: Engineering, Mathematics, Computer Science, Physics, Chemistry, Economics, Geology, Biology, Education, Psychology, Music, Political Science, Sociology, French, Spanish, History, and Literature in English. Substantial percentages of the Subject Test takers took the GRE General Test on the same date. The GRE General Test measures developed verbal (V), quantitative (Q), and analytical (A) abilities.

This study was undertaken to provide information regarding the performance of U.S. and non-U.S. citizens on the Subject Tests, and the relationship of selected English-proficiency-related background variables to the test performance of non-U.S. citizens. It was also concerned with exploring the hypothesis that foreign ESL examinees (for whom English is a second language) are likely to be more proficient at processing the discipline-specific content of GRE Subject Tests in their respective fields than in processing the more general verbal content of the GRE Verbal Test.

Detailed profiles of U.S. and non-U.S. Subject Test takers were developed to provide comparative information on self-reported relative English proficiency (better communication in English or BCE status vs better communication in some other language) and other background characteristics: sex, age, educational level, undergraduate origin (U.S. vs other), and undergraduate major.

Profiles of GRE Subject Test means were developed for U.S. and non-U.S. examinees, generally, and in classifications that introduced some controls for differences in English language background linked to country of origin. Non-U.S. examinees, generally, had higher means than U.S. examinees on Subject Tests in Spanish, French, Music, Psychology, Mathematics, Computer Science, Chemistry, Physics, and Economics, and slightly lower means in Engineering and Sociology. U.S. citizens had clearly higher means in Geology, Biology, Education, Political Science, History, and Literature.

Based on samples of Subject Test/General Test takers, foreign ESL examinees performed better, relative to U.S. examinees, on Subject Tests than on the GRE Verbal Test, supporting the hypothesis that they should be more proficient at processing discipline-specific English language test content than at processing general English language test content.

A major implication of the findings is that scores on the GRE Subject Tests appear to be useful for assessing relative levels of subject-matter mastery for examinees differing widely in linguistic-cultural-educational background. Research is needed to determine the extent to which the comparative academic performance of U.S. students and foreign students is consistent with their comparative performance on the GRE Subject Tests.

Acknowledgments

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SUMMARY

The GRE Subject Test Performance of U.S. and Non-U.S. Examinees, 1982-1984: A Comparative Analysis

The Graduate Record Examinations (GRE) Program at Educational Testing Service (ETS) offers the GRE General Test measuring verbal (V), quantitative (Q), and analytical (A) abilities, and Subject Tests (S) measuring achievement in 17 academic fields. The Subject Tests (alphabetically, left to right) are:

Biology	Chemistry	Computer Science
Economics	Education	Engineering
French	Geology	History
Literature (in English)	Mathematics	Music
Physics	Political Science	Psychology
Sociology	Spanish	

These tests are widely used to assess the academic qualifications of applicants for admission to U.S. graduate schools. The General Test is designed to avoid emphasis on particular fields of study. The GRE Subject Tests, on the other hand, are designed specifically to test mastery of subject matter emphasized in undergraduate curricula in the respective fields. Examiners try to develop questions that sample skills and understandings represented by a range of undergraduate programs. Accordingly, the Subject Tests typically are taken only by individuals who have majored in the corresponding fields of study or closely related fields, while the General Test is taken by individuals from all disciplines.

The GRE are oriented linguistically, educationally, and culturally to U.S. citizens. However, they are also taken by international students from over 140 different countries. Linguistic, educational, and cultural differences between U.S. examinees and foreign examinees, and between national contingents of foreign examinees, raise questions regarding the interpretation of the GRE scores of foreign nationals.

Regarding GRE General Test performance, available evidence indicates that the performance of foreign ESL (English second language) examinees on the GRE quantitative ability measure is fully comparable to that of U.S. examinees. High quantitative scores are obtained by individuals differing widely in general English proficiency. However, the verbal and analytical scores of ESL examinees are markedly depressed relative to those of U.S. examinees due to factors associated with less-than-native-levels of general English proficiency. Verbal score means for national contingents of examinees tend to vary directly with differences in English-language background associated with country of origin.

Performance of Foreign Nationals on GRE Subject Tests

Little is known regarding the comparative performance of U.S. and foreign

examinees on GRE Subject Tests. The present study was undertaken to provide information regarding the comparative performance of U.S. examinees and non-U.S. examinees, generally, and in classifications that introduce a measure of control for differences in English-language background associated with national origin. The study was also concerned with evaluating working hypotheses based on GRE General Test findings.

It was expected (a) that the performance of foreign nationals on Subject Tests involving primarily quantitative subject matter would be relatively independent of their English language backgrounds and (b) that for Subject Tests in fields that are primarily verbal in emphasis, as for the GRE General verbal test, performance might be sensitive to English language background.

However, ESL examinees who have specialized in a particular field may be relatively more proficient in processing the discipline-specific English content of the Subject Test in that field than in processing the generalized English content of the GRE verbal test. If so, foreign ESL examinees should tend to perform better, relative to U.S. examinees, on "verbal subject matter" Subject Tests than on the GRE General verbal test (involving vocabulary and on "verbal subject matter" Subject Tests than on the GRE General verbal test (involving vocabulary and reading comprehension items drawn from the activities of daily life, the domain of human experience, and broad academic areas).

Study Sample and Data

Data were obtained primarily from GRE files for all Subject Test takers between October 1982 and September 1984 who answered a background question on U.S. vs non-U.S. citizenship status (see Section II for detail).

The personal and background variables selected for study were country of citizenship, sex, year of birth, educational status at time of testing, level of degree goal (Ph.D. vs other), location of undergraduate school (U.S. vs other), and self-reported relative English proficiency (better communication in English than in any other language or BCE vs better communication in some other language or BCOL). An English-proficiency-related background variable linked directly to country of citizenship, called TOEFLEVL, was also studied. TOEFLEVL was derived by ascribing to each non-U.S. examinee the mean of contingents of U.S.-bound examinees from his or her country of citizenship on the Test of English as a Foreign Language (TOEFL), as reported by Educational Testing Service (1983).

The data for Subject Test samples were analyzed to obtain basic normative information regarding (a) the distribution of examinees by citizenship status, countries of origin, and so on (Section III); (b) the Subject Test performance of U.S. and non-U.S. examinees, selected characteristics of the examinees, and the relationship of these characteristics to test performance (Section IV); and (c) trends in Subject Test performance of non-U.S. examinees in classifications that introduced a measure of control for differences in linguistic and cultural background associated with national origin (Section V).

Concurrent GRE General Test verbal (V), quantitative (Q), and analytical ability (A) scores were available for between 55 and 90 percent of U.S. Subject Test (S) takers, and between 36 and 75 percent of non-U.S. S-takers (Table 1, Section III). Data for these restricted samples of Subject test/General Test takers (called SVQA-samples) provided a basis for evaluating the proposition that ESL examinees who have specialized in a given field are likely to be more proficient in processing discipline-specific English-language test content than in processing more general verbal content such as that included in the GRE verbal test (Section VI and Section VII; see also Section I).

Highlights of Study Finding

Major findings are highlighted below. (For detail, see specific tables and exhibits in the body of the report, indicated parenthetically).

Representation of Non-U.S. Citizens in S-Samples

Approximately 20 percent of all Subject Test takers were non-U.S. citizens (Table 1). However, non-U.S. citizens were disproportionately concentrated among examinees taking Subject Tests in the more quantitative fields. All Subject Test samples were quite diverse with respect to national origin. Overall, more than 150 countries were represented by at least one Subject Test taker. The 10 largest national contingents were from India, Canada, Taiwan, Korea, Japan, Hong Kong, Iran, England, France, and West Germany (see Tables 2 and 3, and Exhibit D, Section III; also see the appendix).

A total of 2,374 examinees, predominantly native English speakers from Australia, New Zealand, Canada, England, Scotland, Wales, or Ireland, were treated as a collective "English" contingent for descriptive and analytical purposes. The largest contingents of examinees, over all Subject Tests, were from Asia, followed in order by the collective "English" contingent, and contingents from Europe, America, the Mideast, and Africa.

- Between 27 and 50 percent of examinees taking the six most quantitatively oriented tests were non-U.S. citizens—Economics (49.9 percent), Engineering, Mathematics, Physics, Computer Science, and Chemistry (27.9 percent). These non-U.S. contingents were comparatively large, with Ns ranging between 1,393 (Economics) and 4,739 (Engineering).

Origins. In each of these Subject Test samples, the majority of non-U.S. examinees were from Asian or European countries. Asian examinees alone constituted a majority for all but the Economics sample.

- Foreign nationals accounted for between 12 percent and 18 percent of French, Spanish, Political Science, and Biology Test takers, and less than 10 percent of those taking the Geology, Education, Psychology, Music, Sociology, History, and Literature Tests.

Among French test takers, examinees naming France, Canada, Italy, the

Netherlands, and Vietnam as countries of citizenship were dominant (made up a majority); examinees from Spain, Colombia, Argentina, Mexico, and Peru were dominant among Spanish Test takers. National contingents were relatively small for these two tests.

Examinees in the collective "English" contingent outnumbered Asian examinees for tests in Geology, Education, Psychology, Music, and History; Asian and "English" examinees made up a majority of Biology and Literature S-takers.

For the Political Science test, Asian and African contingents dominated and for the Sociology Test the dominant contingents were from Asia and Europe.

Comparative Performance of U.S. and Foreign Examinees On GRE Subject Tests

Non-U.S. examinees as a group had higher means than U.S. examinees on nine of the 17 Subject Tests, slightly lower means on two, and clearly lower means on the remaining six (**Table 4, Section IV**).

- Non-U.S. citizens had higher means for Mathematics, French, Spanish, Physics, Chemistry, Psychology, Music, Economics, and Computer Science. For Sociology and Engineering, non-U.S. means were slightly lower than U.S. means.
- Non-U.S. means were lower than U.S. means on the History, Literature, Biology, Geology, Political Science, and Education Tests.

Relationship of Selected Examinee Characteristics to Subject Test Performance, by Citizenship Status

Detailed data are provided in Section IV regarding (a) the composition of the U.S. and general non-U.S. S-samples with respect to educational level at time of testing (**Table 5**), Subject Test/major-field agreement, sex, age, degree goal, undergraduate origin (U.S. versus other), and self-reported BCE (better communication in English) status and (b) the relationship of these characteristics to Subject Test performance (**Tables 6, 7, and 8**).

Educational Level at Time of Testing

For each Subject Test except Education, a majority of U.S. examinees were tested as enrolled undergraduates. This was not true for non-U.S. examinees (except for Psychology). Proportionately more non-U.S. examinees were tested as either enrolled graduate students or as nonenrolled master's or doctoral degree holders.

Relationship to test performance. For both U.S. and non-U.S. examinees, Subject Test means tended to increase with educational level. Enrolled graduate students and, to a lesser extent, unenrolled master's degree holders

tended to outperform enrolled undergraduates or unenrolled bachelor's degree holders. The direction of U.S. vs non-U.S. differences in mean performance tended to be consistent across educational levels, especially for the Subject Tests on which one population clearly outperformed the other.

Sex, Age, Degree-Goal

For Subject Tests in quantitative subjects, males outnumbered females, while the opposite tended to be true for social science and humanities subjects (except Political Science and History). This pattern tended to be consistent for both citizenship classifications. Non-U.S. examinees tended to be slightly older than their U.S. counterparts, and tended to be somewhat more Ph.D. oriented.

Relationship to test performance. With one exception, for each Subject Test and in both citizenship classifications, males had higher means than females—non-U.S. females outperformed their male counterparts only on the Literature (in English) test. Without exception, Ph.D. oriented examinees had higher means than those with lower degree goals. For age, the pattern of relationships with test performance was not as consistent. In both citizenship classifications, age was directly related to performance on the Spanish, French, and Education tests; younger examinees tended to outperform their older counterparts on the Engineering and Computer Science tests.

Subject Test/Major-Field Agreement

Percentages with Subject Test and undergraduate majors in the same field or a closely related field were generally comparable across citizenship categories: for Mathematics, Computer Science, Chemistry, Physics, Economics, Geology, and Biology, medians were roughly 86 percent, as compared to 81 percent and 74 percent (U.S. vs. non-U.S.) for the remaining tests.

Relationship to test performance. In both citizenship categories and for all Subject Tests, this was a very weak correlate of test performance.

U.S. versus other Undergraduate School

Most U.S. examinees (about 96 percent) reported attending U.S. undergraduate schools. Among non-U.S. examinees, percentages reporting U.S. schools tended to be higher for the tests in social science or humanities fields (median = 38 percent) than in the more quantitative fields (median = 20 percent).

Relationship to test performance. For non-U.S. examinees in every Subject Test sample except Education, having attended a U.S. undergraduate school was negatively correlated with test performance. This trend was most pronounced for Psychology, Mathematics, Engineering, Computer Science, Economics, and Chemistry. For U.S. examinees, no consistent relationships could be discerned.

Self-Reported BCE Status

Most U.S. examinees reported better communication in English than in any other language (BCE status)—the Subject Test sample median was 96 percent. For non-U.S. examinees taking Subject Tests in social science or humanities fields, the median reporting BCE status was 53 percent—only about 36 percent of French test takers and 28 percent of Spanish test takers reported BCE status. For the more quantitatively oriented Subject Tests, the BCE median was 20 percent. BCE status is reported both by native-English speakers (predominantly from major English-speaking societies) and by nonnative-English speakers (ESL examinees), primarily from countries in which English is an academic lingua franca. BCE/ESL examinees tend to be less proficient in English than native-English speakers, but more proficient than their counterparts who report better communication in a language other than English (as indexed by higher means on U.S. verbal admission tests or TOEFL).

Relationship to test performance. For non-U.S. S-samples, BCE status was very weakly and/or negatively correlated with performance not only on the six most quantitatively oriented Subject Tests (Mathematics, Chemistry, Physics, Computer Science, Economics, and Engineering), but also with performance on the primarily verbal Sociology and Political Science tests (with English language content) as well as the Spanish and French tests (not written in English). For these tests, point biserial coefficients for BCE status ranged from $r = -.32$ (Spanish) to $r. = .04$ (Engineering).

Self-reported BCE status was positively related to performance in Literature, Education, Psychology, History, and Music (coefficients ranged from $r = .48$ to $r = .28$), and to a lesser extent with performance in Geology ($r = .22$) and Biology ($r = .13$).

For U.S. examinees, BCE status was very weakly associated with test performance except in Spanish ($r = -.25$); the coefficient for French was negative but very low ($r = -.03$).

Subject Test Performance in Relation to National Origin

The representation of individual countries in the respective Subject Test samples was not adequate for trend analysis. Accordingly, attention was focused on "regional-level" rather than country-level data. Regions were defined on the basis of both English-proficiency-related considerations and geography (see Exhibit C, Section III, and related discussion).

Regional Classifications

1. A collective "English" contingent (Australia, New Zealand, Canada, England and Scotland, Wales, and Ireland). Based on previous studies, more than 90 percent of GRE examinees from these countries report English as the native language and BCE status; less than 10 percent of Canadian examinees report French as the native language.

1. Europe I (France, West Germany, France, Spain, and so on), a "low BCE/high TOEFLEVL region—that is very few examinees typically report BCE status (better communication in English), but U.S.-bound students typically earn high average TOEFL scores (high TOEFLEVL).

3. Europe II (Greece, Turkey, Cyprus, Finland, and so on), a "low BCE/low TOEFLEVL" region.

4. Mideast (Iran, Saudi Arabia, Lebanon, Jordan, and so on), a "low BCE/low TOEFLEVL" region.

5. Africa I (Nigeria, Ghana, Kenya, Liberia, and so on);

6. America I (typified by Jamaica, Guyana, Trinidad, Bahamas, and so on);

7. Asia I (India, the Philippines, Singapore).

These three regions are "high BCE/high TOEFLEVL" regions. A substantial majority of GRE examinees from these countries report BCE status. English is an official language in most of these countries. However, nonnative patterns of English-language acquisition are assumed to be characteristic of these examinees—that is, they are assumed to be ESL examinees. BCE/ESL examinees tend to be more proficient in English (as reflected by higher means on TOEFL and/or the GRE verbal test) than their ESL counterparts who report better communication in a language other than English, but less proficient than native English speakers.

8. Africa II (Algeria, Egypt, Ethiopia, Libya, and so on).

9. America II (Mexico, Argentina, Brazil, Chile, Peru, and so on).

10. Asia II (Japan, Taiwan, Thailand, Peoples' Republic of China, Korea, and so on).

These three regions are "low BCE/low TOEFLEVL" regions.

All regional contingents except the "English" are assumed to be made up predominantly of ESL examinees.

Regional Trends in Subject Test Performance

Subject Test means for all regional contingents with at least 10 examinees (Section V, Table 9) were expressed as deviations from the means of U.S. examinees in U.S. standard deviation units. Deviation-score profiles for three sets of regional contingents are shown in Figure S.1. Tests (except French and Spanish, which call for separate consideration) are listed in descending order, left to right, Engineering through Literature, with respect to degree of quantitative-relative-to-verbal emphasis in the corresponding fields of study (see Exhibit B, Section I, and related discussion).

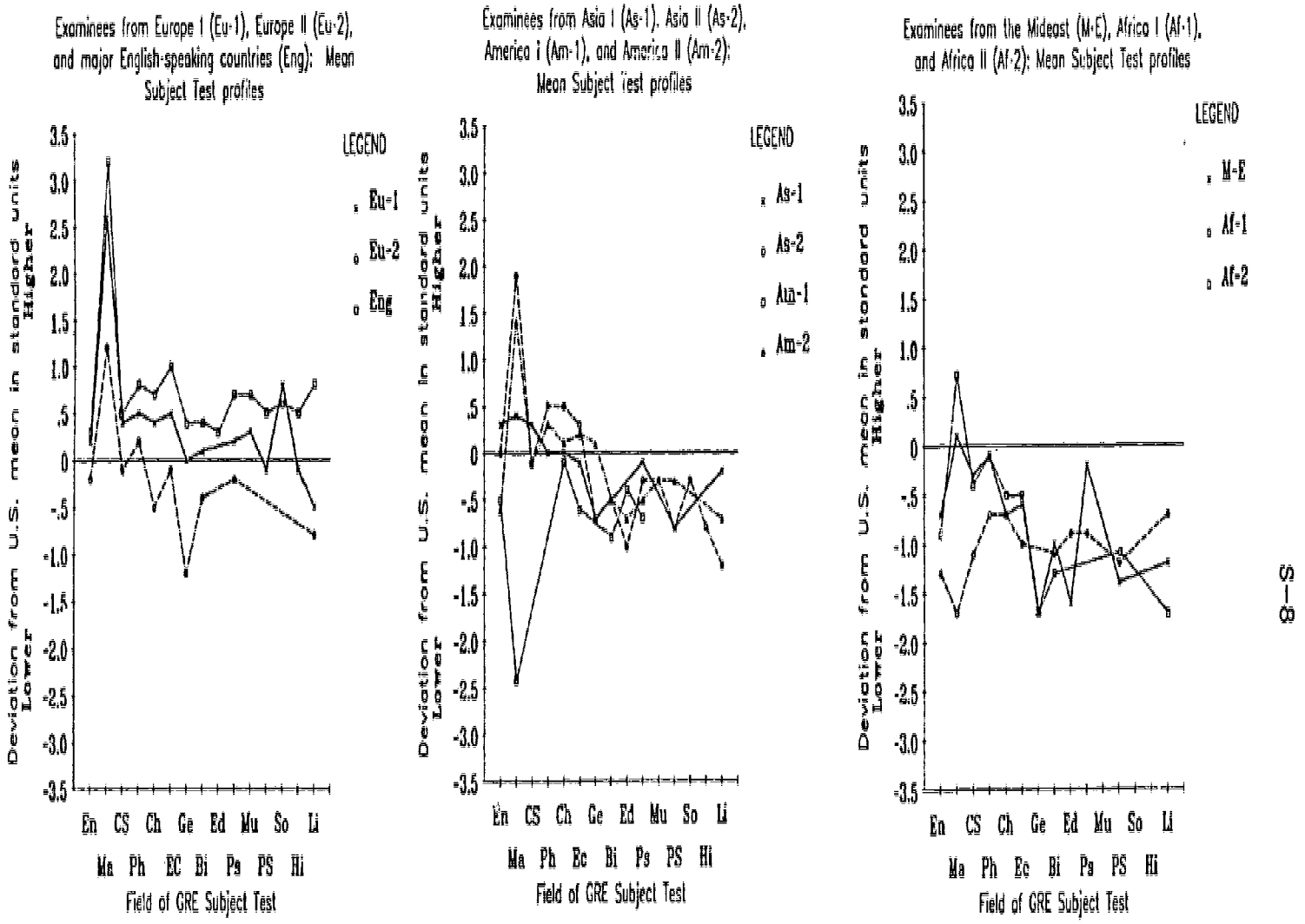


Figure S-1. Average performance of contingents of non-U.S. GRE examinees on GRE Subject Tests relative to the average performance of U.S. examinees: All means are expressed as deviations from U.S. means in standard units

S-1

The horizontal line in each frame in the figure represents the mean for U.S. examinees. In a number of instances profiles are not complete. For example, the Europe II profile (left frame) has no points for Education, Music, Political Science, Sociology, and History. Regional Subject Test samples differed in size and were comparatively small for Geology, and for Education through Literature (see Section III, Table 2, for Ns). Despite these limitations, certain general trends are evident.

Non-U.S. examinees in several of the regional contingents outperformed their U.S. counterparts on the Subject Tests in Mathematics, Chemistry, Physics, Computer Science, and Economics. On the Mathematics test, the performance of all foreign contingents, except those from Africa I (right frame) and America I (middle frame), was exceptionally strong. Means for all ESL examinees (not shown in the figure) were slightly lower than U.S. means on the Engineering, Psychology, Music, and Sociology tests, and lowest relative to U.S. means, for Geology, Biology, Education, Political Science, History, and Literature.

Strongest overall average performance was registered by the "English" examinees, who had higher means on all Subject Tests than U.S. examinees (and foreign ESL examinees as a whole). However, the predominantly ESL contingent from western Europe (Europe I) also outperformed U.S. examinees, not only on tests involving quantitative subject matter, but also on the Geology, Biology, Psychology, Music, and Sociology tests. On the Sociology test, Europe I examinees outperformed the non-U.S. "English" contingent as well.

Lowest overall average performance was registered by examinees from Africa I (a high BCE/high TOEFLEVL region), and Africa II and the Mideast (both low BCE/low TOEFLEVL regions).

Data (not included in the figure) for the Spanish test and the French test, on which foreign nationals substantially outperformed U.S. examinees, suggest that the highest-scoring examinees were native speakers of these languages. Highest means were registered by contingents from Europe I (made up predominantly of Spanish nationals) and America II (led by Colombia, Mexico, and so on). For the French Test, Europe I (led by French nationals) and the "English" contingent (including a number of Canadians, possibly native-French speakers) had very high means relative to U.S. examinees (Section V, Table 9 and Table 10).

Related Findings

Analyses based on data for the restricted SVQA samples—Subject Test takers with concurrent verbal (V), quantitative (Q), and analytical ability (A) scores from the GRE General Test—indicated that in every SVQA sample, the average performance of ESL examinees, collectively, on the verbal and the analytical ability measures was lower than that for U.S. citizens, but that this was not true for the quantitative ability measure on which performance was fully comparable to that of U.S. citizens. In addition, it was found that the Subject Test means of ESL examinees deviated less from the corresponding means for U.S. citizens than did their verbal or analytical ability means (Section VI and Section VII).

Basic trends in GRE Subject Test performance versus GRE verbal test performance are pointed up by profiles in Figure S.2. The profiles show (a) differences in **Relative Verbal Performance Index (RVPI) means** ("Verbal" profile in the figure), reflecting GRE Verbal Test performance relative to expectancy for U.S. examinees with comparable GRE quantitative (Q) scores and (b) differences in **Relative Subject Test Performance Index (RSPI) means** ("Subject" profile in the figure) that reflect Subject Test performance relative to expectancy for U.S. examinees with comparable GRE-Q scores.

The "verbal" profile reflects patterns of mean differences between observed and predicted verbal scores, when predictions were based on U.S. regression equations with GRE-Q as the predictor. The "Subject" profile (RSPI means) reflects patterns of differences between observed and predicted Subject Test (S) scores, with GRE-Q as the predictor in U.S. regression equations. The horizontal line in the figure represents expectation for U.S. examinees. RSPI (Subject) and RVPI (verbal) means are expressed in U.S. standard-error-of-estimate (SEest) unin the figure represents expectation for U.S. examinees. RSPI (Subject) and RVPI (verbal) means are expressed in U.S. standard-error-of-estimate (SEest) units.

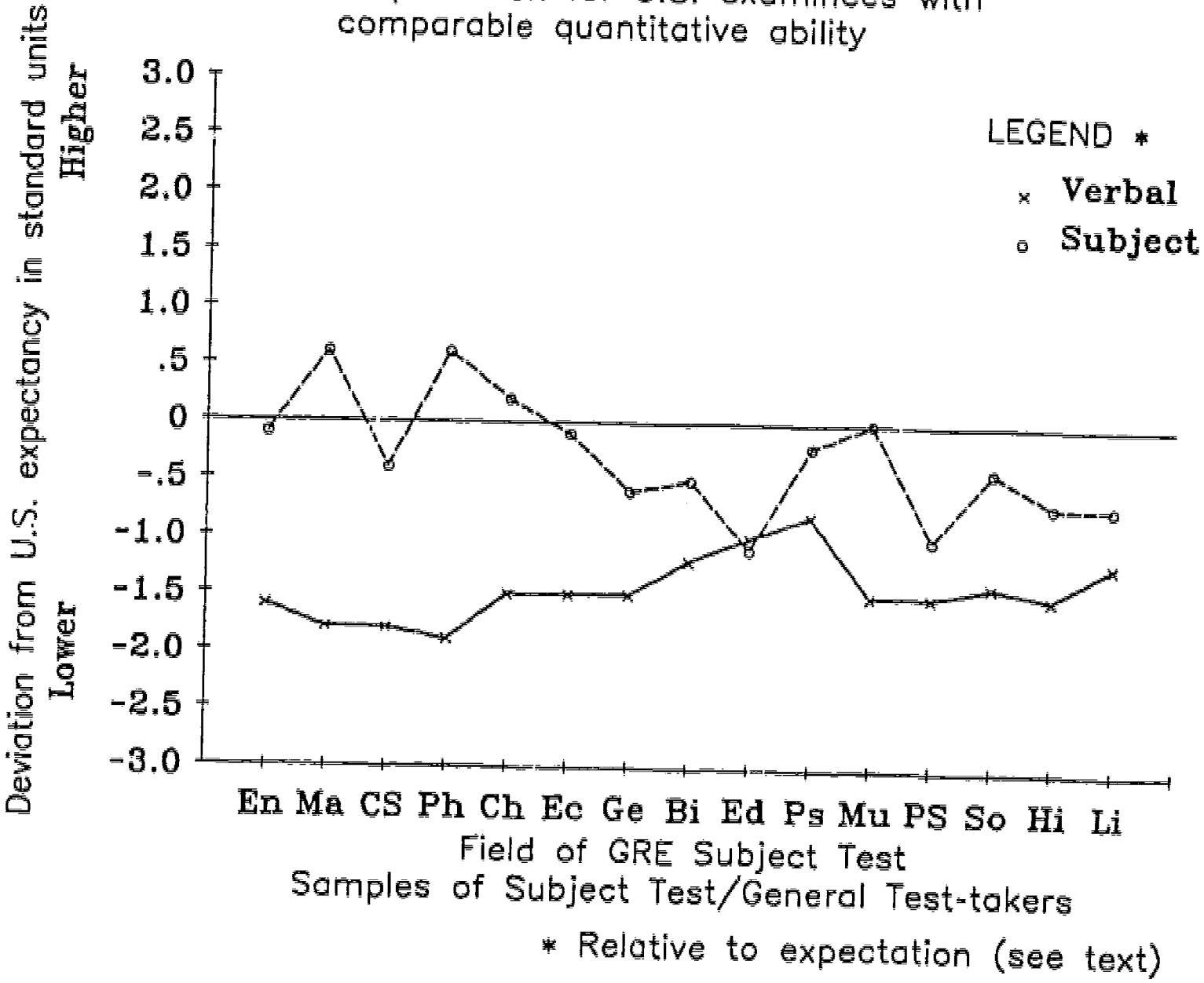
From the verbal (RVPI) profile it may be seen that average verbal performance was lower than expected for U.S. examinees in every sample of ESL Subject Test/General Test takers (by 1.0 SEest unit or more in most instances. This is assumed to reflect primarily a general English proficiency deficit (EPD) in their performance on the general verbal ability measure. Only in the Education sample did ESL examinees perform no better, relative to expectancy, on the subject-matter examination than on the general verbal ability test. It is noteworthy that this sample had one of the two highest RVPI means —suggesting higher average levels of English proficiency for the Education sample than for other samples.

U.S. vs Non-U.S. Differences in Subject Test Performance: Language versus Other Factors

U.S. and non-U.S. Subject Test takers differ in educational, linguistic, and cultural backgrounds. The respective non-U.S. regional contingents may also differ among themselves and from U.S. Subject Test takers in degree of selection on general academic ability and motivation. The content of Subject Tests in social science and humanities fields (for example, History, Literature, Political Science, Sociology, Education, Psychology, and Music) tends to reflect primarily U.S.-English-Western experience, thus favoring (implicitly) U.S. examinees and non-U.S. examinees who have have had richest exposure to such experience. On the French and Spanish Tests, native speakers of French or Spanish have a native-language proficiency advantage as well as a cultural advantage relative to native speakers of English or other languages. Such cultural bias is not present in the inherently structured content of tests in science and mathematics.

Only the data for the "English" contingent are assumed to be completely free of effects associated with less than native levels of general proficiency in English (that is, effects due to English proficiency deficit, or EDP. Thus, differences between U.S. examinees and non-U.S. "English" examinees can clear-

Figure S-2. Verbal performance and Subject Test performance of foreign ESL GRE examinees relative to expectation for U.S. examinees with comparable quantitative ability



Samples of Subject Test/General Test-takers

* Relative to expectation (see text)

ly be attributed to non-EFL related factors: for example, differences in (a) degree of selection on general academic ability and motivation, (b) the duration and intensity of concentration in the field of the test, (c) general rigor of instruction, (d) curriculum content, and so on.

However, in comparisons involving U.S. and foreign ESL contingents, or the respective non-U.S. regional contingents, both English proficiency-related and non-English proficiency-related factors need to be taken into account. The strong performance of the predominantly ESL Europe I contingent indicates that contingents with less-than-native average levels of general English proficiency can perform well not only on tests in mathematics and physical science fields, but also on tests of subject-matter achievement in primarily verbal fields that call for extensive English-language processing.

Factors other than those associated with differences in general levels of English proficiency clearly appear to be primary in accounting for U.S. versus non-U.S. differences, or differences among non-U.S. regional contingents, in performance on the tests in Mathematics, Engineering, Computer Science, Physics, Chemistry, and Economics. For the Subject Tests in Geology and Biology, and in the social science and humanities fields, on which ESL examinees generally earned lower average scores than U.S. or "English" examinees, some general English proficiency-related factors may be involved. However, even for these tests, subgroup differences in average levels of general English proficiency, per se, may be relatively less important than differences in degree of selection, educational background, or other factors, in explaining either the regional differences in Subject Test performance or differences between U.S. examinees and foreign examinees in Subject Test performance.

This is suggested, for example, by (a) the strong performance of the "low BCE/high TOEFLEVL" Europe I contingent on most tests and the relatively low performance of some "high BCE/high TOEFLEVL" contingents and (b) the fact that among non-U.S. examinees, self-reported relative proficiency in English (BCE vs BCOL status) was essentially unrelated to test performance in Sociology and Political Science and only relatively weakly related to performance in Geology and Biology.

In evaluating the pattern of differences in Subject Test performance between U.S. and non-U.S. examinees, it is important to recognize that as compared to U.S. S-takers, foreign S-takers are very highly selected representatives of the undergraduate-level and graduate-level student populations of their respective countries, which are, in turn, much more highly selected than the corresponding U.S. student populations. Access to successively higher levels of education is much more open in the United States than in most other countries. For example, it has been estimated that 75 percent of all 12th graders in the world are enrolled in the United States and Canada (Vardon, 1985).

Non-U.S. examinees in the basic and applied sciences and in mathematics may be more highly selected than their counterparts in the social sciences or humanities. And test content in the inherently-structured quantitative fields is relatively free of cultural bias.

Implications of Findings

Perhaps the major implication of the findings of this study is that observed differences between U.S. and foreign examinees, or between national contingents of foreign examinees, on GRE Subject Tests reflect primarily valid differences in degree of mastery of the knowledge, understanding, and skills that are deemed to be important for graduate study in the respective fields. Judging from the findings, scores on GRE Subject Tests appear to be less sensitive to differences in general English proficiency than scores on tests involving more general English language content. **Thus, scores on GRE Subject Tests (or other well-standardized tests of subject-matter achievment) would appear to be useful for assessing relative levels of subject-matter mastery for prospective students differing widely in linguisitic-cultural-educational background.**

In evaluating this conclusion, it should be recognized that the foreign nationals who take GRE Subject Tests are not necessarily representative of all non-U.S. citizens who are studying or who plan to study in the United States. Non-U.S. Subject Test takers may be more highly selected in terms of general English proficiency, for example, than their counterparts who do not take the Subject Tests.

Differences in English proficiency may be of some importance in accounting for some of the differences in the present study. Items on even the most quantitatively oriented Subject Tests call for considerable English-language processing, and the Subject Tests in the social sciences and in the humanities fields (except Spanish and French) call for extensive English-language processing. Accordingly, some differences in test performance may be due to differences in "general English proficiency." The somewhat stronger performance of the "English" contingent than the ESL contingents from western Europe or Asia II on a quantitatively oriented Subject Test such as Mathematics or Chemistry may be due in part to differences in general English proficiency—for example, greater speed of verbal processing by the "English" examinees.

However, the English-language content of the Subject Test items in every field is stylistically, conceptually, and substantively comparable to the content that students in the field of a Subject Test will be required to process in their academic work in U.S. graduate departments. And, ESL examinees performed relatively better on GRE Subject Tests than on the GRE verbal test. This finding is consistent with the working proposition that ESL examinees who have specialized in a particular field of study or discipline will be more proficient, on the average, at processing English-language test content that is specific to the particular field of study, than in processing more general English-language test content.*

Study findings thus point up the potential importance of distinguishing between proficiency in "English for specialized academic purposes" and

* For consideration of various aspects of the English for Specific Purposes approach to second-language testing and teaching see, for example, Erickson and Molloy, 1983; Bridgeman and Carlson, 1983, pp. 4-6).

"general English proficiency," not only in technical fields such as engineering and physics, but also in the social sciences and humanities.

GRE Subject Tests (or other well-designed tests of achievement in various disciplines) may provide not only (a) information regarding the level of educational attainment of ESL students relative to that of U.S. students, but also (b) a useful indication of their level of proficiency in processing English language content that is central to their respective fields of study, as opposed to their "general English proficiency" (as measured at different levels of educational sophistication and difficulty by tests such as the GRE verbal test and the TOEFL).

Needed Research

Very little systematically developed empirical evidence is available regarding the relationships between test scores (or other preadmission data), academic performance, and levels of "communicative competence" (both general and academic) for foreign students. The informed use and interpretation of the GRE (or other test) scores of foreign students generally, and especially ESL students, is dependent, ultimately, upon the availability of such evidence.

Research is needed to determine the comparative validity of measures that are sensitive to differenced in the English language backgrounds of foreign ESL students (GRE verbal and analytical ability scores, TOEFL scores, scores on locally administered English proficiency examinations, and so on) for differentiating subgroups of ESL students classified according to level of functional ability to perform the English-language tasks required of them in U.S. graduate departments as judged, for example, by faculty members.

Faculty members must observe and evaluate the academic performance of ESL students. It is reasonable to assume that in observing and evaluating the written and oral academic products of foreign ESL students, faculty members (a) tend to notice communication-related deficiences (deviations, flaws, defects) that are present in varying degree, and (b) are in a position to rate students, with a useful degree of reliability, according to the incidence and severity of observed communication-related deficiencies. Followup studies linking levels of performance on preadmission and early postadmission English-proficiency-related (verbal) measures, such as those noted above, to average faculty ratings would provide novel and potentially useful information regarding their comparative validity for the purpose of making English-proficiency-related admission and placement decisions.

Research is also needed to determine the extent to which the comparative academic performance of U.S. students and foreign students in contingents such as those defined for this study is consistent with their comparative performance on the GRE Subject Tests and the GRE General Test.

Efforts to conduct comprehensive research of this nature is likely to be complicated by varied patterns of test taking—for example, substantial percentages of non-U.S. Subject Test takers do not take the General Test, and

many may not take the TOEFL. National contingents of foreign students in individual graduate departments are likely to be small and unevenly represented. Cooperation among several departments in a coordinated research effort would be the most desirable approach to obtaining the information needed.

Short of this ideal approach, graduate departments can obtain information of value for score interpretation (a) by making and recording formal observations of both the academic performance patterns and the characteristic patterns of "communicative competence" of the subgroups of foreign nationals that are most heavily represented and (b) by linking these observations to general levels of performance on GRE Subject Tests, the GRE General Test, and tests such as the TOEFL.

In addition to providing information regarding the Subject Test performance of foreign examines, the findings of this study confirm and extend findings of previous research regarding the performance of foreign nationals on the GRE General Test. First, the general quantitative ability measure appears to be quite insensitive to differences in linguistic-cultural background. Second, the discrepancy between the observed verbal performance of ESL examinees and verbal performance predicted from their GRE-Q scores, using U.S. regression equations—the Relative Verbal Performance Index—appears to be a potentially useful measure of degree of English proficiency deficit in the verbal performance of foreign ESL students.

The GRE Subject Test Performance of U.S. and Non-U.S. Examinees, 1982-1984: A Comparative Analysis

Section I: Background

The Graduate Record Examinations Program at Educational Testing Service offers a General Test measuring verbal, quantitative, and analytical abilities and Subject Tests measuring achievement in 17 academic fields. These tests are widely used to assess the academic qualifications of individuals applying for admission to U.S. graduate schools.

The verbal, quantitative, and analytical ability measures provided by the GRE General Test are designed to avoid emphasis on skills and understandings associated with a particular field of study. The GRE Information Bulletin (e.g., Educational Testing Service, 1984a) states that in order to be as appropriate as possible for all examinees, the verbal sections include questions drawing from diverse areas of experience—from the activities of daily life and the domain of human relationships—and broad categories of academic interest, such as sciences, social studies, and humanities. The quantitative sections assume familiarity only with the arithmetic, plane geometry, and algebra that would have been learned in high school by most students. And the questions in the analytical sections measure analytical skills required and developed in virtually all fields of study.

The GRE Subject Tests, on the other hand, are designed to emphasize discipline-related skills and understandings (ETS, 1984b). They are intended to indicate students' mastery of the subject matter emphasized in many undergraduate programs. Within the subject matter domain represented by a range of undergraduate curricula in each field, examiners try to select questions that sample the basic knowledge and understanding deemed to be most important for successful graduate study in the particular field. The fields for which Subject Tests are offered are listed below.

Biology	Chemistry	Computer Science
Economics	Education	Engineering
French	Geology	History
Literature (in English)	Mathematics	Music
Physics	Political Science	Psychology
Sociology	Spanish	

In sum, the GRE General Test is designed to be appropriate for undergraduate-level and graduate-level students without regard to their field of study. The General Test population includes individuals from all disciplines, and the scales of the three sections are comparable. The GRE Subject Tests, on the other hand, are designed specifically to test subject-matter achievement in particular fields, and typically are taken primarily by undergraduate or graduate students who have majored in the field of the Subject Test or a closely related field. Each of the 17 GRE Subject Tests, accordingly, has a distinct examinee population, and Subject Test scales are not comparable.

Score Interpretation for Foreign Nationals Taking GRE Tests

The GRE General and Subject Tests are oriented educationally, culturally, and linguistically to U.S. citizens. However, these tests are also taken by foreign nationals in support of their applications for admission to U.S. graduate programs. Foreign nationals differ from U.S. citizens, and among themselves, with respect to linguistic, cultural, and educational background variables, nested primarily in countries of citizenship.

For example, the average scores of national contingents of U.S.-bound students on the Test of English as a Foreign Language (TOEFL) vary markedly (e.g., Educational Testing Service, 1983). The TOEFL measures selected aspects of "English profici- ency," namely, receptive skills (listening comprehension, word knowledge, and reading comprehension), and knowledge of rules governing English language structure written expression.*

Such differences in background complicate interpretation of the scores of foreign examinees, especially those for whom English is a second languge (ESL examinees), on the GRE and other standardized tests that are designed primarily for individuals who are reared and educated in the United States.

It is estimated (e.g., Wilson, 1984a) that about 17 percent of General Test takers are non-U.S. citizens and that about 20 percent of General Test takers, U.S. and non-U.S. alike, also take a GRE Subject Test. Several studies have provided evidence regarding the GRE General Test performance of foreign examinees relative to that of U.S. examinees, and some of the background variables, especially level of proficiency in English, that appear to account for much of the observed differences in verbal performance (e.g., Wilson 1984a, 1984b, 1982).

Very little is known regarding the comparative performance of U.S. and foreign nationals on the GRE Subject Tests—the principal concern of the present study. However, the basic findings and conclusions from studies involving the GRE General Test have direct implications for evaluation of the comparative performance of U.S. and foreign examinees on the GRE Subject Tests.

Foreign Nationals and the GRE General Test

The most salient findings and conclusions (thought of as working hypotheses) from studies of the GRE General Test performance of foreign nationals have to do with their differential performance on the verbal and quantitative sections of the General Test.

* TOEFL total/GRE-verbal correlations of approximately .70 have been reported for representative samples of foreign examinees taking both TOEFL and the GRE verbal test (Wilson, 1982). The GRE verbal test is made up of vocabulary and reading comprehension items. The correlation of the TOEFL Vocabulary and Reading Comprehension score with GRE-Verbal was approximately equal to the GRE-Verbal/TOEFL-total score correlation.

Foreign nationals for whom English is a second language (foreign ESL examinees) obtain much lower average scores on the verbal (and analytical) section of the GRE General Test than do either U.S. examinees or foreign examinees for whom English is the primary language (EPL examinees). On the other hand, the average quantitative performance of foreign ESL examinees appears to be comparable to that of U.S. examinees in similar fields of study. In addition, variation among national contingents of examinees in average performance on the general quantitative measure is largely independent of their average performance on the general verbal measure. Many national contingents with very low average verbal scores have very high average quantitative scores.*

Available evidence thus suggests (a) that the scores of foreign ESL examinees on the quantitative section of the test permit generally valid inferences regarding their level of developed quantitative reasoning ability, but (b) that the average performance of ESL examinees on the verbal and analytical sections of the GRE General Test is depressed by factors associated with their less-than-native levels of proficiency in English. Based on this line of reasoning, it was proposed (Wilson, 1984a) that the discrepancy between the (depressed) observed verbal scores of foreign ESL examinees and the verbal scores predicted from their (valid) quantitative scores, using a regression equation based on U.S. examinees, called the **Relative Verbal Performance Index (RVPI)**, be thought of as indexing (at least in part) an English proficiency deficit (EPD) in their verbal test performance.**

* Although the amount of English-language verbal processing involved in the GRE quantitative measure is much less than that involved in the verbal and analytical measures, the items on the GRE Quantitative Test are embedded in an English language matrix of instructions, specifications, stems, and so on. Accordingly, the observed quantitative performance of foreign nationals, even though comparable to that of U.S. examinees in similar fields of study, may to some extent be artifactually depressed by English proficiency-related factors —speed of verbal processing in English, for example.

** A pattern of depressed verbal performance relative to quantitative performance is generally characteristic of foreign ESL examinees taking standardized U.S. admission tests (such as the **Graduate Management Admission Test** [GMAT]) and the College Board **Scholastic Aptitude Test** [SAT], for example) that are designed to measure general verbal and quantitative reasoning abilities (Wilson, 1985, 1982a; Powers, 1980). The RVPI concept appears to have general applicability for estimating degree of English proficiency deficit (EPD) in the observed verbal admission test scores of ESL students. In a study of factors affecting the predictive validity of GMAT scores for foreign MBA students (Wilson, 1985), for example, the RVPI was found to be a strong moderator of the correlation between first year grades and GMAT scores—that is, for ESL students with lowest EPD (that is, whose verbal scores most closely approximated the level expected for U.S. GMAT examinees with similar quantitative scores), the correlation of GMAT scores with grades was comparable to that for U.S. students; for those with the highest EPD, GMAT validity was lower than that for U.S. students.

Mean scores of contingents of foreign GRE examinees on the Relative Verbal Performance Index (RVPI) varied directly with English-proficiency-related variables, as illustrated in Exhibit A. The first entry following country name in Exhibit A is the mean RVPI for the country contingent. Mean values ranged from -01 to -22 (for native English-speaking contingents from Australia, Canada, and Great Britain) to -251 (for Taiwanese and Japanese examinees). Generally speaking, the largest mean discrepancies in verbal performance relative to quantitative performance were present for ESL contingents from countries without a strong academic English-usage tradition, whose U.S. bound nationals typically earn relatively low scores on the **Test of English as a Foreign Language** ([TOEFL], Educational Testing Service, 1983).

Implications for Study of GRE Subject Tests

The fields of the respective Subject Tests differ along a verbal versus quantitative dimension. Exhibit B lists the 17 Subject Tests in descending order with respect to the degree of "quantitative versus verbal emphasis" that is characteristic of the corresponding fields of study. The order of listing of the French and History Tests has been reversed in order to place the French test in immediate proximity to the Spanish test. These two examinations are distinctive in that they are not written in English.

"Quantitative versus verbal emphasis" for a field is defined as the discrepancy between the quantitative-score mean and the verbal-score mean (Q - V) of U.S. GRE General Test-takers (regardless of Subject Test-taking status) who designate a Subject-Test field as the undergraduate major field. The fields of the respective Subject Tests clearly differ in degree of quantitative versus verbal emphasis thus defined. Quantitative means are markedly higher than verbal means for majors in engineering, computer science, mathematics, chemistry, physics, economics, and, to a lesser extent, for majors in biology and geology. At the other extreme, U.S undergraduate majors in English, history, French, and Spanish, tend to have more highly developed verbal than quantitative ability. Undergraduate majors in the fields of education, psychology, and music do not exhibit marked differences in quantitative means relative to verbal means.

By inference from findings regarding the GRE General Test, it is plausible to expect that the performance of foreign ESL students on Subject Tests in fields that are primarily quantitative in emphasis is less likely to be affected by English-proficiency-related factors than is their performance on Subject Tests in fields that are primarily verbal in emphasis. However, even in the more quantitative subject areas, Subject Test items are heavily embedded in an English language matrix of instructions, stems, options, and so on. Considerable English language verbal processing is called for. Accordingly, the possibility of some English proficiency-related deficit in performance on Subject Tests involving quantitative subject matter must be entertained.

For foreign ESL examinees taking subject-matter tests in the more verbal fields, scores may tend to be depressed by linguistic-cultural factors in much the same way that such factors depress performance on the GRE General Test

Exhibit A

Variation in Level of GRE Verbal Relative to Quantitative Performance as a Function of Differences in English Language Background Associated with Country of Citizenship: Math/Science Majors

Percentage of GRE examinees, 1981-82, reporting English as the primary language of communication (EPL)	Characteristic level of English proficiency of contingents of graduate-level students planning to study in the United States								
	Non-native patterns of acquisition and use						Native pattern of English language acquisition and use		
	Lower mean TOEFL score*			Higher mean TOEFL score*					
66 percent or more EPL				Nigeria	-105	(520)+	Australia	-01	(714)++
				India	-97	(656)++	Canada	-11	(708)++
				Philippines	-60	(605)++	Great Britain	-22	(660)++
							United States	00	(645)++
33-65 percent EPL	Pakistan	-152	(580)+	Malaysia	-136	(626)++			
	Mexico	-122	(576)++	France	-118	(691)++			
	Brazil	-123	(629)++	West Germany	-129	(675)++			
	Colombia	-127	(612)++						
	Venezuela	-126	(572)+						
Less than 33 percent EPL	Greece	-177	(655)++						
	Turkey	-200	(648)+						
	Iran	-192	(591)+						
	Lebanon	-184	(597)+						
	Saudi Arabia	-199	(542)+						
	Taiwan	-251	(703)++						
	Hong Kong	-198	(700)++						
	Indonesia	-213	(638)++						
	Japan	-251	(701)++						
	Korea	-212	(696)++						
	Thailand	-228	(624)++						

- First entry following country is the discrepancy between observed and predicted GRE verbal mean (V - V'), where V' is given by .52Q + 185, a regression equation based on data for U.S. math-science majors tested during 1981-82
- The parenthetical entry is the GRE quantitative mean for the national contingent
- ++ = GRE-Q mean at or above the 70th percentile for the general GRE examinee population (ETS, 1982, Table 3A)
- + = GRE-Q mean approximately at or above the 50th percentile, same reference group

* Classification of countries by TOEFL score level is based on data for graduate-level TOEFL examinees from the respective countries, tested during 1977-79. "Higher" = mean TOEFL total score of 550+; "lower" = less than 550, typically around 500.

Exhibit B

GRE Subject Tests Listed in Generally Descending Order with Respect to "Quantitative vs Verbal Emphasis" in the Corresponding Fields of Study*

Subject Test	GRE-Verbal Mean	GRE-Quantitative Mean	Difference (Q - V)
Engineering	517	673	156
Mathematics	521	657	136
Computer Science	517	649	132
Physics	553	683	130
Chemistry	519	627	108
Economics	524	596	72
Geology	521	591	70
Biology	519	575	56
Education	433	442	9
Psychology	505	507	2
Music	495	493	-2
Political Science	508	497	-11
Sociology	470	448	-22
Spanish	513	474	-39
French	570	512	-58
History	542	501	-41
Literature (English)	566	496	-70

* "Quantitative versus verbal emphasis" is defined as the discrepancy between the quantitative-score mean and the verbal-score mean of U.S. GRE General Test-takers naming the field of the Subject Test as the undergraduate major. The GRE General Test means and differences tabled are for a 10 percent sample of U.S. examinees tested during 1981-82 (see Wilson, 1984b, Appendix A, Exhibit A.11). Note that the means are based on GRE General Test-takers naming a field, not all of whom took a GRE Subject Test.

verbal ability measure. However, ESL examinees who have specialized in a particular field may be relatively more "proficient" in processing the discipline-specific English-language content of the Subject Test in that field than in processing the generalized English content of the GRE Verbal Test.

Following this line of reasoning, even though some effects associated with English proficiency deficit may be expected in the performance of foreign ESL examinees, especially on the "verbal subject-matter" Subject Tests, performance on these tests may be less affected by "general level of English proficiency" than performance on the verbal section of the GRE General Test. If so, foreign examinees at given levels of quantitative ability as indexed by their (valid) scores on the GRE General Test quantitative ability measure should perform better, relative to expectation for U.S. examinees of similar ability, on "verbal" Subject Tests than on the GRE General Verbal Test. The line of reasoning involved here is similar to that underlying the English for Specific Purposes (ESP) approach to second language testing and instruction (e.g., Erickson & Molloy, 1983).*

Subject Tests in French and Spanish represent special cases. These tests do not call for English-language verbal processing. ESL examinees who take these tests may include native speakers of these languages—examinees who have "native educated familarity" with the languages and literatures involved. Such examinees would have a language-proficiency advantage as well as a cultural advantage over U.S. or non-U.S. native English speakers for whom French or Spanish would be a nondominant, second language. Thus, for native speakers of English who take the Spanish Test or the French Test, some deficit due to less than native levels of proficiency in these languages would be expected.

Other Factors

The Subject Tests are oriented educationally and culturally as well as linguistically to U.S. examinees, most of whom complete their undergraduate education and graduate education in U.S. institutions. The educational backgrounds of foreign nationals differ perhaps as much as their language backgrounds. In comparing the performance of U.S. examinees with that of non-U.S. examinees, it is especially important to recognize that non-U.S. GRE examinees are much more highly selected representatives of their respective national populations than are U.S. examinees. Most non-U.S. national educational sys-

* Tests (such as the TOEFL) that are used to assess the level of general English proficiency of ESL students include English vocabulary and reading comprehension items that are not intended to have either an academic or a disciplinary bias. Instruction and testing in English for Academic Purposes (EAP), on the other hand, would emphasize content that is specific to the intended fields of study of the ESL examinee. The GRE Subject Tests may be thought as representing EAP measures, while the GRE verbal test may be thought of as representing a measure of general "educated" proficiency in English as reflected in performance on vocabulary and reading comprehension items drawn from the general activities of daily life, the domain of human relations, and broad academic areas.

tems are much more selective, academically, than the U.S. educational system. According to one estimate (Vardon, 1985), for example, the U.S. and Canada account for 75 percent of all 12th graders in the world.

National educational systems differ not only in degree of selectivity, but also in organization, structure, and overall level of development. Curricular content in particular subjects may vary across as well as within countries (interinstitutonally). Differences in educational as well as linguistic background need to be considered in evaluating the Subject Test performance of foreign nationals relative to that of U.S. citizens, or the Subject Test performance of foreign examinees from different countries.

The Present Study

The study reported in this paper was undertaken to provide base-line information regarding the performance of U.S. and foreign examinees on GRE Subject Tests and the relationship of selected background characteristics to test performance. It was also concerned with Subject Test performance in relation to GRE General Test performance, following lines of inquiry suggested by GRE General Test findings and their implications, as outlined above.

Study data are described in detail in **Section II**. They were drawn primarily from GRE files for individuals who took GRE Subject Tests between October 1982 and September 1984, inclusive, and who answered the GRE Background Question regarding U.S. citizenship status. A majority of each of the 17 Subject Test (S) samples had concurrent (same test administration date) verbal (V), quantitative (Q), and analytical ability (A) scores on the GRE General Test.

Subject Test Samples

The findings reported in **Sections III, IV, and V** were based on data for Subject Test samples, including examinees without GRE General Test scores as well as those with General Test scores. Data for these samples were analyzed to obtain information regarding the background and the test performance of all Subject Test takers without regard to the availability of GRE General Test scores.

Section III provides data on Subject Test sample composition by citizenship status (U.S. vs non-U.S.), and on the national origins of non-U.S. examinees. **Section IV** provides information regarding (a) the Subject Test performance of U.S. and non-U.S. citizens and (b) selected characteristics of U.S. and non-U.S. Subject Test takers: educational level at time of testing, Subject Test/undergraduate-major-field agreement, U.S. vs non-U.S. undergraduate origin, sex, self-reported English communication status, level of degree goal [Ph.D. vs other], and year of birth. Findings regarding the relationship of these characteristics to test performance are provided in **Section IV** for examinees classified by citizenship status. **Section V** completes evaluation of data for the Subject Test samples by analyzing data for foreign examinees with control for background variables linked to national origin.

Subject Test/General Test (SVQA) Samples

Subject Test takers with concurrent verbal (V), quantitative (Q), and analytical (A) ability scores constitute a selected sample of S-takers generally. Data for samples with S, V, Q, and A scores (called SVQA samples) were employed in analyses designed to explore working hypotheses regarding the role of English proficiency in Subject Test performance as compared to General verbal test performance. Results of these analyses are reported in Sections VI and VII and the appendix).

Section VI reports findings regarding (a) U.S. versus non-U.S. differences in Subject Test performance as compared to differences in General Test performance and (b) correlations of two English-proficiency-related variables with Subject Test scores as compared to their correlations with the GRE General Test verbal, quantitative, and analytical ability scores.

Section VII reports findings of analyses designed to permit comparison of the performance of non-U.S. examinees on Subject Tests and the GRE General Test in relation to expected performance for U.S. examinees with comparable GRE Quantitative Test scores. Data for U.S. SVQA-samples were used to develop regression equations (shown in the appendix) for estimating GRE Verbal Test scores and Subject Test scores from GRE-Q scores. These equations were used to predict S-scores (S.q) and verbal scores (V.q) for non-U.S. citizens.

The difference between observed verbal score and predicted verbal score, (V - V.q), is the Relative Verbal Performance Index described earlier (see Exhibit A and related discussion). An analogous difference value for Subject Tests, (S - S.q), was employed as a Relative Subject (Test) Performance Index. Mean RVPI and RSPI values for various contingents of non-U.S. examinees were analyzed to assess the hypothesis that foreign examinees on the average should perform better on GRE Subject Tests than on the GRE General verbal test, relative to expectation for U.S. examinees with comparable quantitative scores--that is, it was expected that RSPI means should tend to be higher (algebraically) than RVPI means.

Section II: Description of Study Data

Between October 1982 and September 1984 (the 1982-1984 testing period) a total of 97,553 examinees took a GRE Subject Test and identified themselves as either U.S. citizens or non-U.S. citizens by responding to the relevant GRE Background Question. Scores on the GRE General Test were obtained for Subject Test takers, as available, if the dates of administration were concurrent with Subject Test administration dates. Data on several demographic and academic-background variables were also obtained from GRE files:

- **Sex** (nominally coded, F = 2, M = 1)
- **Year of birth** (inversely related to age)
- **Educational level at time of testing**
- **Degree goal** (Ph.D. or postgraduate = 1; other = 0)
- **Undergraduate major field**
- **Undergraduate institution** (U.S. = 1; other = 0)
- **Self-reported English communication status**
- **Country of citizenship**

Data on sex, year of birth, undergraduate institution, and educational level were obtained from items on the GRE test registration form that are relatively clearly addressed to all registrants. Observations on these variables were available for almost all of the Subject Test takers. Data on degree goal, undergraduate field, undergraduate GPA, English language communication, and country of citizenship were obtained from responses to background questions that are not specifically addressed to all registrants (see, for example, ETS, 1984a). Response rate for these items was lower than that for the registration form items, and was typically lower for foreign examinees than for U.S. examinees.

In addition to data obtained directly from GRE files, an English-proficiency-related background variable (called **TOEFLEVL**) linked to country of citizenship was derived by ascribing to each Subject Test taker the mean TOEFL total score for U.S.-bound contingents of TOEFL examinees from the examinee's country of citizenship (from Educational Testing Service, 1983, Table 10).

Data on degree goal, undergraduate school, and country of citizenship require little explanation. The other variables call for some elaboration.

Educational level at time of testing. Based on responses to an item of the GRE registration form, students were classified as follows:

Enrolled undergraduate (largely senior-level)
Enrolled 1st year graduate student
Enrolled 2nd year graduate student
Nonenrolled bachelor's degree holder
Nonenrolled master's degree holder
Status not classified above or no response

Undergraduate major in relation to Subject Test. Reported undergraduate major field was used to define a nominally coded variable differentiating Sub-

ject Test takers whose undergraduate field was the same as that of the Subject test or "closely related" (coded 1) from all others (coded 0). Strict Subject Test/undergraduate major agreement was required for certain tests; related fields were included for others. The list below indicates for each Subject Test the undergraduate field(s) included in the "same or related" category.

Subject Test	Undergraduate major field(s)
Engineering	All engineering fields
Mathematics	Mathematics, applied mathematics, statistics
Computer Science	Computer Science
Chemistry	Chemistry
Physics	Physics
Economics	Economics, business & commerce
Geology	Geology
Biology	Biology, biochemistry, biophysics, botany, physiology, zoology, genetics, microbiology
Education	Education (including M.A. in Teaching), educational administration, physical education, guidance and counseling
Psychology	Educational, experimental, developmental, clinical, social, industrial relations
Music	Music
Political Science	Political science, government, American studies, international relations
Sociology	Sociology, social work, planning
Spanish	Spanish
French	French
History	History
Literature	English, comparative literature

Self-reported English language communication status. A GRE background question asks: "Do you communicate better in English than in any other language?" ("Yes" or "No."). "Yes" = Better communication in English (BCE) and "No" = Better communication in some other language (BCOL). BCE status may be reported validly by both native speakers and nonnative speakers of English. It was employed as a general index of relative proficiency in English.

Evidence from previous studies (Wilson, 1984a, 1984b, 1982a) indicates that nonnative BCE examinees, typically from countries such as India, Singapore, and the Philippines, tend be less proficient in English than native BCE examinees from England, Australia, and other native-English speaking societies. However, nonnative BCE examinees tend to be more proficient than their ESL counterparts who do not report BCE status as indicated by higher average performance on both the GRE General verbal test and the TOEFL.

TOEFLEVL (TOEFL mean of U.S. bound nationals from a country ascribed to GRE Subject Test takers from the same country). Differences among national contingents of U.S.-bound TOEFL takers in average TOEFL scores may be thought of as reflecting differences linked to countries of origin in patterns of

English language acquisition and usage and associated differences in the general "richness" of the English language backgrounds of students planning to study in the United States (Wilson, 1985). However, TOEFLEVL also reflects other theoretically important background differences that are associated with countries of origin. For example, in a study of TOEFL examinees during 1977-1979, it was found that the TOEFL total means of approximately 100 national contingents of examinees were positively correlated (coefficients of approximately .50) with the level of development of the corresponding countries of origin as reflected by social and economic indicators such as school enrollment rate, literacy rate, educational expenditures per capita, and so on (Wilson, 1982b, pp. 63 ff.).

The pattern of national differences is illustrated by TOEFL means (TOEFLEVL scores) for India (555) vs Japan (487), Sweden (581) vs Greece (502), Ghana (568) vs Egypt (485), Bahamas (554) or Guyana (570) vs Venezuela (479) or Brazil (513), and so on. TOEFL is not taken by native English speakers. Accordingly, examinees from the major native English speaking (NS) countries were assigned arbitrarily a TOEFLEVL score of 625, higher than that reported for any national contingent of U.S. bound TOEFL examinees.

Section III: Distribution of Subject Test Takers According to U.S. versus Non-U.S. Citizenship Status and National Origin*

The distribution of Subject Test takers by citizenship status (U.S. versus non-U.S.) is shown in Table 1. Also shown for each Subject Test sample, by citizenship status, is the percentage of test takers with concurrent GRE General Test scores—that is, the percentage of individuals who took the GRE General Test on the same test administration date as that of the Subject Test.

Approximately one-fifth of all Subject Test takers (19,267 or 19.8 percent) identified themselves as non-U.S. citizens. However, for five of the Subject Tests (those for the five highest ranking fields in terms of quantitative relative to verbal emphasis), substantially higher percentages of examinees were foreign nationals: Economics (49.7 percent), Engineering (44.4 percent), Mathematics (41.0 percent), Physics (37.9 percent), Computer Science (32.5 percent), and Chemistry (27.9 percent).

Foreign nationals accounted for between 12 percent and 18 percent of French, Spanish, Political Science, and Biology Subject Test takers; for the other Subject Tests (Geology, Education, Psychology, Music, Sociology, History, and Literature), less than 10 percent of the examinees were foreign nationals.

Concurrent scores from the GRE General Test were available for a majority of examinees in most Subject Test samples. The percentage of Subject Test takers with concurrent GRE General Test scores varied by both Subject Test and citizenship status. Percentages of U.S. examinees with concurrent scores ranged from 55 percent (Spanish Test sample) to 90 percent (Engineering), while for non-U.S. examinees the comparable range was from 36 percent (Spanish) to about 75 percent (for several Subject Test samples).

Over 150 countries were named by non-U.S. Subject Test takers as countries of citizenship.* A classification of these countries by world region and English-proficiency-related variables is provided in Exhibit C. Native English-speaking societies are grouped without regard to geographic location. Other countries are classified by world region: Europe, Mideast, Africa, America, Asia.

Within the world regions (except for the Mideast) subgrouping of countries (for example, Europe I and Europe II, Asia I and Asia II) was based primarily on known differences in the average levels of measured "English proficiency" and/or patterns of English language usage that are characteristic of contingents of U.S.-bound students from the respective countries. Contingents of U.S.-bound students from countries in Category I typically have higher TOEFLEVL scores (that is, they earn higher scores on the Test of En-

* The GRE list of countries of citizenship includes not only independent nations but also dependent territories, protectorates, and other geopolitical entities. All are referred to for convenience as "countries of citizenship." About 3,800 non-U.S. citizens did not name a country of citizenship.

Table 1

Number of GRE Subject Test Takers During the 1982-83 and 1983-84 Testing Years, and the Percentage Taking the GRE General Test on the Same Test Administration Date, By Citizenship Status

Code	GRE Subject Test	U.S. citizen N	Non-U.S. citizen N	Total examinees N	Percent non-U.S.
37	Engineering	5945 (90.0)*	4739 (76.6)	10684	44.4
67	Mathematics	2701 (73.6)	1877 (59.3)	4578	41.0
29	Computer Science	3493 (76.3)	1828 (56.9)	5321	32.5
77	Physics	2662 (75.2)	1624 (57.3)	4286	37.9
27	Chemistry	4730 (76.6)	1826 (48.2)	6556	27.9
31	Economics	1408 (60.9)	1393 (76.4)	2801	49.7
47	Geology	4356 (73.2)	314 (68.3)	4670	6.7
24	Biology	14384 (74.0)	2147 (64.2)	16531	13.0
34	Education	5536 (70.7)	241 (67.5)	5777	4.2
81	Psychology	15750 (69.4)	1700 (75.7)	17450	9.7
71	Music	2383 (72.7)	218 (58.9)	2601	8.4
79	Political Science	2342 (80.4)	328 (56.4)	2670	12.8
87	Sociology	1239 (58.2)	94 (73.9)	1333	7.1
91	Spanish	471 (55.5)	105 (36.2)	576	18.2
44	French	515 (61.9)	99 (46.5)	614	16.1
57	History	2862 (74.2)	134 (72.4)	2996	4.5
64	Literature	5644 (75.1)	491 (75.7)	6135	8.0
	All Subject Tests**	78286	19267	97553	19.8

Note. Examinees who failed to respond to the GRE Background Question on U.S. citizenship status are not included in these tabulations. Data for fields in which more than 25 percent of test takers were non-U.S. citizens are highlighted by bold type. Fields are listed in descending order with respect to quantitative versus verbal emphasis (see Exhibit B and related discussion).

* Entries in parentheses indicate the percentage of Subject Test takers with concurrent GRE General Test scores (the SVQA sample).

** Total includes 754 examinees who took 3 Subject Tests in Geography, German, or Philosophy, now discontinued.

Exhibit C

Countries of Citizenship Classified by Region and Total Number of GRE Subject Test Takers, 1982 - 1984*

"English"

(4) Australia, New Zealand, Canada, England, Ireland
(3) Scotland
(2)
(1) Wales

Europe I

(4) Belgium, France, West Germany, Italy, Netherlands, Spain, Sweden
(3) Austria, Norway, Portugal, Switzerland
(2) Denmark
(1) Luxembourg

Europe II

(4) Cyprus, Greece, Turkey
(3) Iceland, Finland, Poland, Yugoslavia
(2) USSR
(1) Azores, Bulgaria, Czechoslovakia, Greenland, Hungary, Licitenstein, Madeira, Maldives, Romania

America I

(4) Cuba, Jamaica
(3) Guyana, Trinidad
(2) Bahamas, Barbados, Belize, Bermuda, Dominican Republic, Haiti, Honduras, West Indies
(1) Grenada, Guadelope, Martinique, Netherlands Antilles, Puerto Rico, Suriname

America II

(4) Argentina, Brazil, Chile, Colombia, Mexico, Peru, Venezuela
(3) Costa Rica, Ecuador, Guatemala, Panama
(2) Bolivia, El Salvador, Uruguay
(1) Nicaragua, Paraguay

Asia I

(4) India, Philippines, Singapore

Asia II

(4) Bangladesh, Peoples' Republic of China, Hong Kong, Indonesia, Japan, Korea, Pakistan, Sri Lanka, Taiwan, Thailand, Vietnam
(3)
(2) Burma, Nepal
(1) Afghanistan, Laos, Macao, Mauritius

Mideast

(4) Iran, Israel, Jordan, Lebanon
(3) Iraq, Saudi Arabia, Syria
(2) Kuwait, West Bank
(1) Bahrain, Qatar, United Arab Emirates, Yemen

Africa I

(4) Ghana, Nigeria, South Africa
(3) Kenya
(2) Liberia, Tanzania, Uganda
(1) Botswana, Lesotho, Malawi, Swaziland, Zambia, Zimbawe

Africa II

(4) Algeria, Egypt
(3) Ethiopia, Libya
(2) Cameroon, Gambia, Ivory Coast, Morocco, Sierra Leone
(1) Angola, Gambia, Madagascar, Mali, Mozambique, Rwanda, Sudan, Tunisia, Zaire

Note. The 4,3,2,1 categories include countries with different total numbers of Subject Test takers as follows: (4) = 50+, (3) = 25-49, (2) = 10-24, (1) = < 10. Countries with 90 or more Subject Test takers are underscored. The within-region subgrouping (I vs II) is based primarily on characteristic differences in mean scores of U.S.-bound nationals on the Test of English as a Foreign Language (TOEFL) and/or typical degree of English language experience. U.S.-bound students from countries in Group I tend to have higher means on the TOEFL and/or somewhat more experience with English than their counterparts from countries Group II. Ns for all countries are provided in the Appendix.

* The GRE list of "countries" includes not only independent countries, but also dependent territories, protectorates, and other political entities. For convenience, all are referred to as "countries of citizenship."

glish as a Foreign Language [TOEFL]) than their counterparts from countries in Category II. There are exceptions to this rule. For example, some countries with comparatively low TOEFLEVL scores (for example, Nigeria) were assigned to Category 1 because English is an official language and/or widely used for academic purposes. The principal western European countries in Europe I are somewhat more homogeneous than those in Europe II in terms of educational, economic, and cultural variables.

Within each regional classification, countries are grouped according to number of nationals with Subject Tests, regardless of field, in categories ranging from [4] = 50+ to [1] = < 10. Leading national suppliers of Subject Test takers without regard to field (that is, countries represented by 90 or more examinees) are highlighted.

Table 2 shows the number of examinees taking each Subject Test by region, and Table 3 shows the number of test takers from each of 30 countries selected as representative of the respective regions (except America I, with no country represented among the leading suppliers of Subject Test takers—see appendix).

The 30 countries accounted for a majority of examinees in each Subject Test sample. For example, 3,117 of 3,704 Engineering examinees (the 30-country total from Table 3 compared with the regional total from Table 2) were from the selected countries. These countries accounted for about two-thirds of examinees taking the French, Spanish, and History Tests, and 80 percent or more of those taking the Engineering, Mathematics, Computer Science, Physics, Chemistry, Geology, Psychology, and Music Tests.

The four largest national contingents of Subject Test takers were from India, Canada, Taiwan, and Korea, each country represented by more than 1,000 examinees. The remaining contingents among the 10 largest were from Japan, Hong Kong, Iran, England, France, and West Germany. National and regional contingents were small for Subject Tests in Geology, Education, Music, Political Science, Sociology, Spanish, French, History, and Literature.

Trends in Table 2 and Table 3 are highlighted in Exhibit D, which shows the rank order of the major regions (Categories I and II combined), and the leading six countries (among the 30 selected), in terms of the sizes of their contingents of Subject Test takers. The region(s) accounting for a majority of test takers are highlighted. "English" countries were treated collectively in the country rankings as well as in the regional rankings.

Asian and "English" contingents accounted for a majority of all Subject Test takers. For the Subject Tests in predominantly "verbal" fields, "English" contingents tended to be larger than the Asian contingents. The opposite tended to be true for the more quantitative fields.

Table 2. Number of Non-U.S. Examinees, 1982-1984, by World Region

	ENGIN	MATHE	COMP.	PHYSI	CHEMI	GEOLO	ECONO	BIOLO	EDUCA	PSYCH	MUSIC	POL.S	SOCIO	SPANI	FRENC	HISTO	LITER	ALL S
ENGLISH	187	107	102	173	65	69	147	265	65	844	93	35	13	2	15	49	143	2374
EUROPE I	187	173	99	112	74	39	156	127	9	90	10	28	12	20	33	17	58	1244
EUROPEII	249	102	52	79	62	20	68	64	4	58	4	5	2	1	1	5	19	795
MIDEAST	363	74	88	58	61	15	39	130	13	75	3	17	5	1	4	4	12	962
AFRICA I	94	33	15	13	43	9	63	80	19	33	5	28	9	1	0	4	12	461
AFRICAII	115	35	27	39	27	13	36	64	3	8	0	11	3	0	2	5	12	400
AMER I	36	10	4	6	20	3	15	48	14	54	1	7	2	7	6	5	9	249
AMER II	248	81	101	96	68	25	166	174	22	147	12	19	7	45	11	5	10	1237
ASIA I	807	109	266	186	270	22	123	252	7	64	2	19	7	2	4	3	49	2192
ASIA II	1370	659	578	470	583	47	412	535	51	143	61	111	30	8	8	23	107	5196
OTHER	32	16	34	3	4	0	13	22	5	21	3	3	0	0	0	0	1	157
TOTAL	3704	1409	1374	1249	1287	262	1240	1767	212	1543	194	283	90	87	84	122	434	15341
NOT LIST	1020	457	456	381	539	51	155	375	31	151	25	41	2	18	15	13	56	3794
GR TOT	4724	1861	1826	1624	1821	313	1394	2139	243	1691	219	324	92	105	99	134	489	19098

Table 3. Number of Non-U.S. Examinees, Selected Countries, 1982-1984

	ENGIN	MATHE	COMP.	PHYSI	CHEMI	GEOLO	ECONO	BIOLO	EDUCA	PSYCH	MUSIC	POL.S	SOCIO	SPANI	FRENC	HISTO	LITER	ALL S
CANADA	116	43	60	91	44	41	73	164	54	747	72	22	8	0	7	20	55	1617
ENGLAND	34	30	19	44	11	14	27	50	2	41	12	10	4	2	4	21	55	380
FRANCE	52	100	21	15	12	9	25	15	0	7	1	5	2	2	23	2	9	300
GERMANY	17	33	21	38	21	8	13	35	3	32	3	4	0	3	1	2	13	247
ITALY	21	12	12	20	3	5	38	10	0	5	1	3	2	1	3	2	8	154
SPAIN	30	3	6	4	8	4	32	18	2	15	1	1	1	13	0	3	7	148
GREECE	115	62	26	35	33	7	29	32	0	23	1	2	0	0	0	2	4	371
TURKEY	79	8	8	14	12	7	19	5	0	12	0	1	2	0	0	0	2	169
NIGERIA	53	16	10	4	20	5	30	43	10	14	9	23	4	0	0	0	4	236
EGYPT	42	9	11	6	12	6	6	23	0	3	0	1	0	0	0	0	5	124
IRAN	194	28	35	27	27	7	10	64	3	17	0	2	3	1	3	1	1	423
ISRAEL	29	14	28	11	4	0	7	16	1	44	3	3	1	0	0	1	2	164
BRAZIL	37	23	19	24	3	9	14	23	1	13	0	1	2	1	0	1	3	174
COLOMBIA	51	5	20	13	7	3	24	28	1	28	1	2	1	11	2	2	1	200
MEXICO	40	18	18	15	21	5	40	30	3	26	1	6	0	8	1	0	1	233
PERU	36	10	6	6	4	1	27	6	6	7	0	0	1	4	0	0	0	114
VENEZUEL	23	9	7	4	13	5	4	14	2	10	0	2	0	3	1	0	1	98
INDIA	765	91	248	178	238	20	96	204	4	43	1	13	6	2	4	2	43	1958
PHILIPPI	42	18	18	8	32	2	27	46	3	21	1	6	1	0	0	1	6	234
SINGAPOR	28	13	32	2	2	0	12	12	3	14	3	2	0	0	0	0	0	123
SRI LANK	32	27	2	29	50	0	7	35	0	3	0	0	0	0	0	0	1	186
PAKISTAN	34	5	5	9	19	3	10	12	0	5	0	3	0	0	0	0	3	108
MALAYSIA	53	26	32	24	24	6	17	39	7	6	1	2	0	0	1	1	4	245
HONG KON	155	69	126	61	37	3	20	46	4	22	16	2	3	0	0	2	6	572
KOREA	293	184	87	131	173	13	175	110	6	27	11	31	8	1	1	7	30	1288
TAIWAN	441	185	214	115	186	10	30	161	9	34	13	6	3	2	2	1	13	1425
PEOPLE'S	32	27	24	34	13	1	4	10	0	1	3	3	2	0	0	0	6	160
INDONESI	59	11	17	6	5	2	13	11	6	6	0	2	2	0	0	0	0	140
THAILAND	53	10	15	3	10	1	23	31	12	7	2	12	2	0	0	1	7	189
JAPAN	161	92	37	33	46	3	97	45	7	29	15	48	9	4	0	11	30	667
TOTAL	3117	1181	1184	1004	1090	202	949	1348	149	1262	162	218	67	58	53	83	320	12447

Exhibit D

Regions and Leading Countries of Origin of Non-U.S. GRE Subject Test Takers, 1982-1984

Test	Regions of origin listed in rank order					
	(1)	(2)	(3)	(4)	(5)	(6)
ALL TEST TAKERS	**ASIA**	**ENGLISH**	EUROPE	AMERICAS	MIDEAST	AFRICA
Engineering	**Asia**	Europe	Mideast	Americas	Africa	English
Mathematics	**Asia**	Europe	English	Americas	Mideast	Africa
Computer Sci	**Asia**	Europe	English	Americas	Mideast	Africa
Physics	**Asia**	Europe	English	Americas	Mideast	Africa
Chemistry	**Asia**	Europe	Americas	Africa	English	Mideast
Economics	**Asia**	**Europe**	Americas	English	Africa	Mideast
Geology	**English**	**Asia**	Europe	Americas	Africa	Mideast
Biology	**Asia**	**English**	Americas	Europe	Africa	Mideast
Education	**English**	**Asia**	Americas	Africa	Europe	Mideast
Psychology	**English**	Asia	Americas	Europe	Mideast	Africa
Music	**English**	**Asia**	Europe	Americas	Africa	Mideast
Political Sci	**Asia**	**Africa**	English	Europe	Americas	Mideast
Sociology	**Asia**	**Europe**	English	Africa	Americas	Mideast
Spanish	**Americas**	Europe	Asia	English	Africa	Mideast
French	**Europe**	**Americas**	English	Asia	Africa	Mideast
History	**English**	**Asia**	Europe	Americas	Africa	Mideast
Literature	**Asia**	**English**	Europe	Africa	Americas	Mideast

	Leading countries of origin in rank order					
	(1)	(2)	(3)	4)	(5)	(6)
Engineering	India	Taiwan	Korea	Iran	**English**	Japan
Mathematics	Taiwan	Korea	**English**	France	Japan	India
Computer Sci	India	Taiwan	Hong Kong	**English**	Korea	Japan
Physics	India	**English**	Korea	Taiwan	Hong Kong	W.Germany
Chemistry	India	Taiwan	Korea	**English**	Sri Lanka	Japan
Economics	Korea	**English**	Japan	India	Mexico	Italy
Geology	**English**	India	Korea	Taiwan		
Biology	**English**	India	Taiwan	Korea	Iran	Philippin
Education	**English**	Thailand	Nigeria			
Psychology	**English**	Israel	India	Taiwan	W. Germany	Japan
Music	**English**	Hong Kong	Japan	Taiwan	Korea	
Political Sci	Japan	**English**	Korea	Nigeria	India	Thailand
Sociology	**English**	(Japan	Korea	India	Nigeria)	
Spanish	Spain	Colombia	(Argentina	Mexico	Peru	Japan)
French	France	**English**	(Italy	Netherla*	Vietnam*)	
History	**English**	Japan	Korea			
Literature	**English**	India	Korea	Japan	Taiwan	W.Germany

Note. "English" contingents, of which the Canadian was the largest, are treated collectively in both the regional and national rankings. Countries in parentheses were represented by less than 10 test takers. See Table 3 and the Appendix for complete detail on Ns by country.

* Not included in Table 3. See Appendix for detail on all countries.

Section IV: Subject Test Performance, and Selected Nontest Correlates of Performance, by Citizenship Status

Subject Test means and standard deviations are shown in Table 4 for U.S. citizens and non-U.S. citizens. Since the scales of the various Subject Tests are not comparable, differences between the scaled-score means of U.S. and foreign examinees on the respective tests were converted to standard units. The "difference" column indicates for each Subject Test the deviation of the foreign examinees' mean from the mean of U.S. examinees, in Subject Test reference group standard deviation units (as reported by Educational Testing Service, 1984, page 18). For example, on the Engineering Test the mean of non-U.S. examinees (606) was less than the mean for U.S. examinees (610) by 4 scaled-score points. This translated into -0.03 standard deviation units.

Foreign examinees had higher means than U.S. examinees on 9 of the 17 Subject Tests (Mathematics [by 0.63 standard deviation units], Spanish, French, Physics, Chemistry, Psychology, Music, Economics, and Computer Science [by 0.10 standard units]). Means of foreign examinees were slightly lower than those of U.S. examinees on two tests (Engineering and Sociology, both by -0.03 standard units).

Foreign examinees' means were clearly lower than those of U.S. examinees on the remaining 6 tests (from History [-.16 standard units], Literature, Biology, Geology, and Political Science, to Education [-.63 standard units]).

Standard deviations for foreign examinees were larger than those for U.S. examinees on 16 of the 17 tests (all except Political Science). This is consistent with the greater heterogeneity of the foreign Subject Test populations with respect to educational, linguistic, and cultural background variables.

Educational Level at Time of Testing*

Percentage distributions of examinees according to reported educational level at time of testing are shown in Table 5 for each Subject Test, by citizenship status. Differences in percentages, by level, are also shown; negative signs indicate a lower percentage of non-U.S. citizens in a given category.

- Except for those taking the Education Test, a majority of U.S. students (between 73 percent and 90 percent) took Subject Tests either as enrolled undergraduates (the modal category for all Subject Tests) or unenrolled bachelor's degree holders.

* The level classifications employed for the study were designed to fit the organization of education in the U.S. For U.S. examinees, they represent educational levels that are unambiguously applicable. Given the worldwide diversity in the organization of educational systems, some ambiguity may be involved for some foreign nationals.

Table 4

Subject Test Summary Statistics, by Citizenship Status: Examinees Tested between October 1982 and September 1984

Subject Test*	(a) U.S. citizens N	Mean	S.D.	(b) Non-U.S. citizens N	Mean	S.D.	(c) Difference in means (b – a) [standard units]**	
Engineering ++++	5926	610	103	4724	606	119	-.03	10.5***
Mathematics ++++	2695	664	54	1861	763	143	.63	1
Computer Sci +++	3488	606	98	1826	616	102	.10	9
Physics +++	2670	616	132	1624	667	150	.35	4
Chemistry ++	704	610	97	1821	637	113	.26	5
Economics ++++	1231	610	100	1394	628	114	.17	8
Geology	4352	576	87	313	537	108	-.44	15
Biology +	1456	627	112	2139	578	122	-.43	14
Education	5525	463	87	243	416	102	-.63	17
Psychology	1575	535	95	1691	557	105	.23	6
Music	2380	496	89	219	513	100	.19	7
Political Sci +	2325	468	84	324	414	81	-.56	16
Sociology	1237	445	111	92	442	120	-.03	10.5
Spanish +	470	511	98	105	574	106	.58	2
French +	515	505	87	99	540	100	.38	3
History	554	516	79	134	504	84	-.16	12
Literature	5633	530	94	489	499	120	-.31	13

* Subject tests are listed in descending order with respect to "quantitative versus verbal emphasis" for the corresponding major fields of study (see Exhibit B and related discussion). For U.S. examinees, Ns for some Subject Tests represent samples: Biology and Psychology, 10 percent; Chemistry, 15 percent; History, 20 percent; Economics and Sociology, 50 percent; all other U.S., and all non-U.S., 100 percent.

** The difference between scaled score means was divided by the standard deviation reported for all examinees who took the respective tests between 10/80 and 9/83 inclusive (see ETS, 1984, Table 2a, page 18). Negative entries indicate that the mean for foreign examinees was lower than that for U.S. examinees. Thus, for example, the Engineering mean for foreign examinees was .03 standard deviations lower than that for U.S. examinees; the Spanish mean for foreign examinees was .58 standard deviations higher than that for U.S. examinees; and so on.

++++ 40 – 49 percent of examinees were non-U.S. citizens; +++ 30 – 39 percent; ++ 20–29 percent; + 10–19 percent; other = less than 10 percent.

*** Rank of foreign relative to U.S. Subject Test mean differences.

Table 5

Distribution of Subject Test-Takers According to Educational Level at Time of Testing, By Citizenship Status, in Percent

Subject		Enrolled student: Undergraduate %	Enrolled student: Graduate Year 1 %	Enrolled student: Graduate Year 2 %	Not enrolled: Bachelor's degree %	Not enrolled: Master's degree %	Other %	Total N
Engineering	U.S.	66.1	6.3	1.7	21.1	3.1	1.8	5926
	Non-U.S.	37.3	8.4	6.2	23.5	13.5	11.0	4724
	Difference	-28.8	2.1	4.5	2.4	10.4	9.2	
Mathematics	U.S.	72.3	3.9	2.7	13.2	3.9	3.9	2695
	Non-U.S.	29.8	10.2	10.3	18.9	13.2	17.6	1061
	Difference	-42.5	6.3	7.6	5.7	9.3	13.7	
Computer Sci	U.S.	59.9	6.0	2.7	21.5	4.1	5.7	3488
	Non-U.S.	35.5	7.3	12.4	19.5	12.8	12.5	1827
	Difference	-24.4	1.3	9.7	-2.0	8.7	6.9	
Physics	U.S.	81.0	3.9	2.2	9.1	1.5	2.3	2670
	Non-U.S.	33.7	10.7	12.7	18.0	10.5	14.3	1624
	Difference	-47.3	6.8	10.5	8.9	9.0	12.0	
Chemistry	U.S.	79.5	3.0	1.8	11.5	1.0	3.1	704
	Non-U.S.	27.1	7.5	11.3	22.4	15.5	16.2	1821
	Difference	-52.4	4.5	9.5	10.9	14.5	13.1	
Economics	U.S.	72.1	4.0	3.6	12.3	5.0	3.0	1231
	Non-U.S.	29.1	10.8	12.3	15.6	14.9	16.7	1394
	Difference	-43.0	6.8	9.2	3.3	9.9	13.7	
Geology	U.S.	65.6	5.7	3.7	19.8	1.9	3.3	4352
	Non-U.S.	28.4	11.2	11.8	20.1	11.8	16.6	313
	Difference	-37.2	5.5	8.1	0.3	9.9	13.3	
Biology	U.S.	64.8	4.7	3.8	19.4	2.4	4.9	1456
	Non-U.S.	32.3	6.7	10.2	19.1	15.7	16.0	2139
	Difference	-32.5	2.0	7.2	-0.3	13.3	11.1	
Education	U.S.	23.2	19.9	13.6	13.7	12.7	16.8	5525
	Non-U.S.	17.3	14.4	13.6	13.6	19.3	21.8	243
	Difference	-5.9	-5.5	0.0	-0.1	6.6	5.0	
Psychology	U.S.	60.0	3.9	5.3	17.0	8.2	5.7	1575
	Non-U.S.	55.2	4.7	5.5	17.0	8.5	9.1	1691
	Difference	-4.8	0.8	0.2	0.0	0.3	3.4	

Table 5, continued

Subject		Enrolled student: Undergraduate %	Enrolled student: Graduate Year 1 %	Enrolled student: Graduate Year 2 %	Not enrolled: Bachelor's degree %	Not enrolled: Master's degree %	Other %	Total N
Music	U.S.	52.6	11.9	4.2	20.5	5.4	5.3	2380
	Non-U.S.	40.2	11.9	7.3	23.3	5.9	11.4	219
	Difference	-12.4	0.0	3.1	2.8	0.5	6.1	
Political Science	U.S.	69.2	4.2	2.8	17.1	2.8	3.9	2325
	Non-U.S.	34.6	8.6	16.4	13.3	13.6	13.6	324
	Difference	-34.6	4.4	13.6	-3.8	10.5	9.4	
Sociology	U.S.	74.1	3.6	2.8	9.8	3.4	6.3	1237
	Non-U.S.	39.1	9.8	14.1	12.0	8.7	16.3	92
	Difference	-35.0	6.2	11.3	2.2	5.4	10.0	
Spanish	U.S.	59.4	10.9	3.2	14.9	6.2	5.5	470
	Non-U.S.	24.8	24.8	12.4	15.2	8.6	14.3	105
	Difference	-34.6	13.9	9.2	0.3	2.4	8.8	
French	U.S.	63.1	4.3	4.3	20.0	4.9	3.5	515
	Non-U.S	35.3	11.1	10.1	16.2	8.1	19.2	99
	Difference	-27.8	6.8	5.8	-3.8	3.2	15.7	
History	U.S.	58.8	6.7	3.2	20.9	4.0	6.3	554
	Non-U.S.	36.6	9.7	14.9	17.2	11.2	10.4	134
	Difference	-22.2	3.0	11.7	-3.9	7.2	4.1	
Literature	U.S.	50.9	6.4	4.8	25.7	6.6	5.6	5633
	Non-U.S.	30.3	9.2	12.3	16.4	14.9	17.0	489
	Difference	-20.6	2.8	7.5	-9.3	8.3	11.4	
Median (Difference)								
Engin-Biol		-43.6	4.0	8.5	2.9	9.9	12.5	
Educ-Liter		-22.2	3.0	7.5	-0.1	5.4	8.8	

Note. Subject Tests are listed in descending order with respect to "quantitative versus verbal emphasis" for the corresponding fields of study (see Exhibit B and related discussion).

Negative signs indicate a lower percentage of non-U.S. examinees in a given educational level category. Row-totals for U.S. and non-U.S. percentages should equal 100.0, within rounding limits.

- o Between 50 percent and 81 percent of U.S. examinees, except for Education (23 percent), were enrolled undergraduates, but substantially lower percentages of foreign examinees were enrolled undergraduates (between 27 percent and 55 percent for tests other than Education [17 percent]).

- o Proportionately more foreign than U.S. examinees were tested as enrolled second-year graduate students or master's degree holders, or were not classifiable as to level ("other").

Subject Test Performance by Educational Level

Table 6 shows Subject Test means for U.S. and non-U.S. examinees, and differences between means, by educational level. Scaled-score means and non-standardized scaled-score mean differences for all test takers, without regard to educational level, are also shown (last column of Table 6).

The Subject Tests are listed in descending order, Mathematics through Education, with respect to the performance of non-U.S. examinees relative to U.S. examinees, based on the adjusted or standardized total mean differences previously reported in Table 4. Thus, the raw (unadjusted) total mean scaled-score differences reported in Table 6 are not in strict descending order.

The direction of U.S. vs non-U.S. differences in mean Subject Test performance tended to be consistent across educational levels, especially for Subject Tests on which one population clearly outperformed the other.

- o For the Mathematics, Spanish, French, Physics, and Chemistry Tests, for example, with few exceptions, the performance of non-U.S. examinees at each educational level was higher than that of their U.S. counterparts. The opposite tended to be true for the Education, Political Science, Geology, Biology, and Literature Tests

The relationship between educational level and test performance was positive—Subject Test means tended to increase with educational level.

- o Enrolled graduate students and, to a lesser extent, unenrolled master's degree holders tended to have higher means than enrolled undergraduates or unenrolled bachelor's degree holders. These trends were somewhat more consistent across tests for U.S. citizens than for non-U.S. citizens.

- o Among U.S. citizens, on 13 of the 17 Subject Tests the means for undergraduate level test takers (who constituted a majority of all examinees except in Education) were lower than the total mean. Undergraduate test takers had slightly higher than average means only for the Subject Tests in Mathematics, Chemistry, Computer Science, and Engineering. Among non-U.S. citizens, enrolled undergraduates had lower than average means on 9 of 17 Subject Tests.

- o Non-U.S. undergraduate-level examinees, typically underrepresented among examinees tested as undergraduates, outperformed their U.S. counterparts on 12 of the 17 Subject Tests—all except the Literature, Biology, Geol-

Table 6

Subject Test Means for U.S. and Non-U.S. Citizens, by Reported Educational Level

Subject		Enrolled student: Undergraduate	Enrolled student: Graduate Year 1	Enrolled student: Graduate Year 2	Not enrolled: Bachelor's degree	Not enrolled: Master's degree	Other	Total
		Mean	Mean	Mean	Mean	Mean	Mean	Mean
Mathematics	U.S.	666*	668	698	643	689	661	664
	Non-U.S.	746	786	784	759	791	750	763
	Difference**	80	118	86	116	102	89	99
Spanish	U.S.	500	509	551	504	560	565	511
	Non-U.S.	533	592	633	541	584	593	574
	Difference	33	83	82	37	24	28	63
French	U.S.	490	516	566	515	552	551	505
	Non-U.S.	527	543	560	537	545	553	540
	Difference	37	27	-06	22	-07	02	35
Physics	U.S.	613	653	664	612	644	613	616
	Non-U.S.	685	688	674	646	660	635	667
	Difference	72	35	10	34	16	22	51
Chemistry	U.S.	612	652	605	596	630	570	610
	Non-U.S.	624	632	673	630	654	631	637
	Difference	12	-20	68	34	24	61	27
Psychology	U.S.	528	535	580	540	539	548	535
	Non-U.S.	567	503	542	557	539	546	557
	Difference	39	-32	-38	17	00	-02	22
Music	U.S.	492	470	520	498	535	534	496
	Non-U.S.	511	480	549	508	589	504	513
	Difference	19	10	29	10	54	-30	17
Economics	U.S.	599	631	664	628	653	615	610
	Non-U.S.	619	636	653	637	612	623	628
	Difference	20	05	-11	09	-41	08	18
Computer Sci	U.S.	607	615	629	599	619	592	606
	Non-U.S.	629	610	642	593	605	602	616
	Difference	22	-05	13	-06	-14	10	10
Engineering	U.S.	624	592	594	581	589	556	610
	Non-U.S.	632	571	604	595	600	581	606
	Difference	08	-21	10	14	11	25	-04

Subject		Enrolled student: Undergraduate	Enrolled student: Graduate Year 1	Enrolled student: Graduate Year 2	Not enrolled: Bachelor's degree	Not enrolled: Master's degree	Other	Total
		Mean	Mean	Mean	Mean	Mean	Mean	Mean
Sociology	U.S.	435	497	532	456	497	441	445
	Non-U.S.	437	400	509	430	389	459	442
	Difference	02	-97	-23	-26	-108	18	-03
History	U.S.	505	513	524	543	532	526	516
	Non-U.S	518	464	538	488	481	493	504
	Difference	13	-49	14	-53	-51	-33	-12
Literature	U.S.	518	512	562	540	571	542	530
	Non.-U.S.	511	496	504	488	500	483	499
	Difference	-07	-16	-58	-52	-71	-59	-31
Biology	U.S.	618	617	664	646	632	641	627
	Non-U.S.	595	555	509	573	556	560	578
	Difference	-23	-62	-55	-73	-76	-81	-48
Geology	U.S.	571	596	648	570	621	586	576
	Non.-U.S.	549	543	545	543	529	504	537
	Difference	-22	-53	-103	-27	-92	-82	-39
Political Science	U.S.	459	478	509	485	504	489	468
	Non-U.S.	409	422	426	411	400	422	414
	Difference	-50	-56	-83	-74	-104	-67	-54
Education	U.S.	434	454	467	455	491	494	463
	Non-U.S.	402	422	411	422	424	414	416
	Difference	-32	-32	-56	-33	-67	-80	-47

Note. Subject Tests are listed in descending order with respect to the average performance of non-U.S. examinees relative to that of U.S. examinees, without regard to educational level. In determining order, the differences in scaled score means (shown in the last columns) were divided by the corresponding Subject Test reference group standard deviations (see Table 4 and related discussion).

* Underscored means are higher than the total mean (last column) for a row. For example, the Education means for non-U.S. citizens taking the test as 1st year graduate students (422), enrolled undergraduates (422), and unenrolled master's degree holders (424), were higher than the total non-U.S. Education mean (416).

** Negative signs indicate lower scaled-score means for foreign examinees. For example, Education means for non-U.S. citizens were lower than those for U.S. citizens at each educational level. Scaled-score differences are comparable within but not across Subject Tests.

ogy, Political Science, and Education tests. These are Subject Tests on which the average performance of non-U.S. examinees without regard to educational level compared least favorably with that of U.S. examinees.

Other Examinee Characteristics

Table 7 provides summary data (percentages or means) for selected examinee characteristics, by Subject Test and citizenship status. The base for percentages or means varied according to data availability. The range of base Ns involved is shown in the table. The data shown in Table 7 are as follows:

1. Percent with undergraduate major in the same or related field (U.G. major/Subject Test agree)
2. Percent naming a U.S. undergraduate school (U.S.UG Sch)
3. Percent female
4. Percent reporting better communication in English (BCE status)
5. Percent with Ph.D. goal or postgraduate status
6. Mean year of birth (inversely related to age).

Median values are shown, by citizenship status, for the more quantitatively oriented and the more verbally oriented sets or clusters of Subject Tests. For example, for U.S. and non-U.S. examinees taking the Engineering, Mathematics, Computer Science, Physics, Chemistry, Economics, Geology, or Biology Tests (the more quantitative cluster) the median percentages reporting undegraduate majors in the same or related field were 85.5 and 86.3, respectively. Comparable medians for the 9 Subject Tests in the more verbal Subject Test cluster were 91.1 and 73.9.

U.S. and non-U.S. examinees differed most with respect to undergraduate origins and reported English language communication status. Most U.S. examinees attended U.S. undergraduate schools (medians of approximately 96 percent for both the quantitative and the verbal fields) Comparable medians for non-U.S. examinees were 20 percent and 38 percent. The higher median is for the more verbal Subject Test cluster.

Similarly, most U.S. examinees reported better communicaton in English (BCE) status—the median across tests was about 96 percent. Among foreign examinees, percentages reporting BCE status tended to be higher for the more verbal Subject Tests (53 percent) than among those taking one of the more quantitative tests (about 34 percent). BCE status was reported by only 36 percent of non-U.S. French Test takers and by 28 percent of Spanish Test takers.

For Subject Tests in quantitative fields females were clearly in the minority, while the opposite tended to be true for Subject Tests in the more verbal fields. This pattern of sex differences in representation by field tended to be consistent across citizenship classifications. Non-U.S. examinees tended to be slightly older than their U.S. counterparts (mean year of birth was typically lower for non-U.S. Subject Test takers) and tended to be somewhat more Ph.D.-oriented.

Table 7

Selected Characteristics of Subject Test Takers, by Citizenship Status

Subject		N*	U.G. Major/ Subject Test agree** %	U.S.UG school %	Female %	BCE vs BCOL*** %	Ph.D. goal %	Yr of birth (Mean)
Engineering	U.S.	855,829	96.5	97.9	15.3	96.4	35.5	(59.1)
	Non-U.S.	4724,3760	94.6	21.7	5.2	33.7	47.5	(57.8)
Mathematics	U.S.	527,510	83.2	95.4	34.8	95.9	52.2	(59.6)
	Non-U.S.	1861,1401	58.6	17.1	20.2	24.6	62.7	(57.8)
Comp Sci	U.S.	511,494	71.9	96.9	21.3	96.6	42.9	(58.1)
	Non-U.S.	1826,1415	53.4	26.1	16.4	30.9	54.6	(57.9)
Physics	U.S.	521,503	85.7	96.0	11.8	94.4	82.7	(59.9)
	Non-U.S.	1624,1237	88.2	16.0	14.3	33.6	84.6	(58.3)
Chemistry	U.S.	704,686	85.2	95.9	34.5	95.3	80.9	(60.1)
	Non-U.S.	1821,1340	86.4	19.2	28.4	37.6	77.7	(57.8)
Economics	U.S.	1231,1170	86.0	96.7	30.1	96.3	52.4	(59.3)
	Non-U.S.	1394,1243	86.8	19.1	18.6	31.9	69.7	(57.1)
Geology	U.S.	664,635	93.5	99.0	27.8	98.6	26.5	(58.7)
	Non-U.S.	313,282	91.5	33.2	18.0	47.3	46.8	(56.8)
Biology	U.S.	1456,1390	75.6	94.9	49.1	96.4	60.9	(59.1)
	Non-U.S.	2139,1819	73.5	32.4	42.1	46.9	69.8	(57.4)
Education	U.S.	869,830	68.6	96.8	72.4	99.4	29.2	(52.2)
	Non-U.S.	243,217	53.0	42.8	55.6	53.1	42.9	(50.4)
Psychology	U.S.	1575,1503	61.3	96.2	65.5	98.0	77.7	(57.0)
	Non-U.S.	1691,1541	70.1	26.1	66.4	67.8	72.2	(57.2)
Music	U.S.	494,475	96.0	97.4	50.9	98.5	39.4	(58.0)
	Non-U.S.	219,196	94.1	37.4	53.0	59.4	43.2	(57.2)
Pol Sci	U.S.	459,441	86.8	97.6	39.4	96.4	52.4	(58.8)
	Non-U.S.	324,295	73.9	38.0	25.9	40.9	60.6	(56.8)

Table 7, continued

Subject		N*	U.G. Major/ Subject Test agree** %	U.S.UG school %	Female %	BCE vs BCOL*** %	Ph.D. goal %	Yr of birth (Mean)
Sociology	U.S.	603,577	82.8	95.0	60.7	96.4	40.0	(56.7)
	Non-U.S.	92,89	74.2	41.3	46.7	41.1	57.3	(55.4)
Spanish	U.S.	470,452	71.7	90.6	69.5	84.5	45.2	(57.7)
	Non-U.S.	105,88	51.1	60.0	67.3	27.7	52.1	(53.5)
French	U.S.	515,490	73.0	95.3	74.8	94.2	47.6	(58.3)
	Non-U.S.	99,83	63.9	47.5	76.5	36.0	54.7	(55.9)
History	U.S.	554,521	81.1	96.6	34.2	97.0	57.0	(56.6)
	Non-U.S.	134,124	76.6	35.8	33.1	55.3	60.2	(55.1)
Literature	U.S.	896,861	87.8	96.0	66.7	97.5	62.0	(57.1)
	Non-U.S.	489,443	88.7	31.2	62.0	56.7	62.8	(56.1)
Medians								
Engl-Biol	U.S.		85.5	96.3	29.4	96.3	52.3	(59.1)
	Non-U.S.		86.3	20.4	18.3	33.6	66.2	(57.8)
Educ-Lit	U.S.		81.1	96.0	65.5	97.0	47.6	(57.1)
	Non-U.S.		73.9	38.0	55.6	53.1	57.3	(56.1)

* Except for French and Spanish, all U.S. Subject Test data are for random samples of examinees. For both U.S. and non-U.S. examinees, the N colum shows the range of Ns with data for the several variables. Generally speaking, the first N is applicable for U.S.UG (reported a U.S. undergraduate school), sex, and year of birth; Ns for the other variables were equal to or slightly higher than the second N reported.

** Agreement between undergraduate field and Subject Test was defined as having an undergraduate major in the same field as the Subject Test or in a closely related field. Without regard to citizenship status, some of the variation across Subject Tests in percentage "agreement" is a function of initial decisions regarding the fields included as "closely related."

*** BCE = self-reported better communication in English than in any other language, and BCOL = better communication in a language other than English. BCE status is reported by both native speakers of English and speakers of English as a second language. Nonnative-English-speakers (NNS) who report BCE status typically are less proficient in English than native English-speakers (NS).

Test Performance in Relation to Examinee Characteristics

The relationship between each of these variables and Subject Test performance is indicated in Table 8. For the five categorical (nominally coded) variables, point biserial correlation coefficients indicate the direction and relative magnitude of differences between the Subject Test means of the categories. Positive coefficients indicate higher mean performance for the subgroup with the higher nominal code (for example, those with undergraduate major/Subject Test agreement, those who attended a U.S.UG, females, and so on), while negative coefficients indicate higher performance for examinees not in the designated subgroups. For year of birth, the continuous variable, positive coefficients indicate a tendency for younger examinees to earn higher Subject Test scores (an inverse relationship between age and test performance).

For degree goal, sex, and undergraduate origin, quite systematic trends in relationships were present for one or both citizenship groups across all (or almost all) Subject Tests.

o Ph.D. oriented examinees had higher means than did other examinees. This was true for each of the Subject Tests and for both citizenship categories. For U.S. examinees, coefficients ranged from .20 (Political Science) to .45 (Mathematics); for non-U.S. examinees the comparable range was .06 (Education) to .46 (Sociology).

o Males had higher means than did females. With one exception this was true for each Subject Test and for both citizenship categories. Only among non-U.S. citizens taking the Literature Test did females outperform males.

o Foreign test takers who reported U.S. undergraduate schools had lower Subject Test means than did those who did not do so. This was true for all tests except the Education Test. The greatest disparities in average performance were for Psychology ($r = -.31$) and for Subject Tests in the more quantitative fields (Mathematics [$r = -.29$], Engineering, Computer Science, Economics, Chemistry [$r = -.21$]). On most of the Subject Tests, U.S. examinees reporting U.S. institutions tended to perform about as well as or better than their counterparts not reporting U.S. undergraduate schools. The strongest deviation from this trend was $r = -.21$ for U.S.UG among U.S. Spanish Test takers.

For age, English language communication status, and agreement between undergraduate field and Subject Test, the patterns of correlation with Subject Test performance were not as consistent across Subject Tests and/or citizenship classifications as those for the other variables.

o The strongest direct relationship between age and test performance was indicated for Spanish, French, and Education Test takers (negative coefficients for year of birth in both citizenship categories ranged between -.12 and -.33); the strongest inverse relationship between age and test performance was indicated for Engineering and Computer Science Test takers (positive coefficients for year of birth ranged between .17 and .22).

o Undergraduate major/Subject Test agreement was a relatively weak correlate

Table 8

Selected Non-Test Correlates of GRE Subject Test Performance, by Citizenship Status

Subject		N*	Non-test variables: Correlation with Subject Test: UG Major Subj = Subj Test (1,0)	U.S. UG sch (1,0)	Sex F=2 M=1	Year of birth	Ph.D. goal (1,0)	BCE vs BCOL (1,0)
Engineering	U.S.	851/855	04	14	-19	17	22	06
	Non-U.S.	4680/4715	-09	-23	-07	20	13	04
Mathematics	U.S.	525/527	08	01	-35	11	45	01
	Non-U.S.	1849/1861	07	-29	-20	09	16	-11
Computer Sci	U.S.	508/511	-02	16	-21	22	26	03
	Non-U.S	1815/1826	-05	-23	-16	22	18	-02
Physics	U.S.	519/521	-05	-02	-22	04	28	-05
	Non-U.S.	1609/1624	00	-18	-16	09	13	-07
Chemistry	U.S.	701/704	08	06	-24	05	23	04
	Non-U.S.	1810/1821	02	-21	-10	07	11	-10
Economics	U.S.	1219/1231	-06	03	-15	-04	37	-03
	Non-U.S.	1383/1394	06	-23	-16	14	25	00
Geology	U.S.	663/664	-01	-06	-15	-07	30	03
	Non-U.S.	311/313	12	-06	-06	04	21	22
Biology	U.S.	1448/1456	04	21	-10	-01	21	12
	Non-U.S.	2126/2139	09	-09	-03	20	23	13
Education	U.S.	860/869	-14	-00	-06	-22	32	01
	Non-U.S.	241/243	02	06	-03	-17	06	34
Psychology	U.S.	1563/1575	03	10	-04	-01	21	05
	Non-U.S.	1678/1691	11	-31	-08	05	23	30
Music	U.S.	489/494	-01	05	-25	04	34	-06
	Non-U.S.	216/219	07	-19	-24	01	29	28
Political Sci	U.S.	454/459	-02	09	-23	-09	20	02
	Non-U.S.	321/324	10	-10	-20	10	30	03

Subject		N*	Non-test variables: Correlation with Subject Test: UG Major Subj = Subj Test (1,0)	U.S. UG sch (1,0)	Sex F=2 M=1	Year of birth	Ph.D. goal (1,0)	BCE vs BCOL (1,0)
Sociology	U.S.	599/603	-06	07	-14	03	33	-00
	Non-U.S.	92/92	17	-12	-26	04	47	-00
Spanish	U.S.	465/470	11	-22	-11	-16	27	-32
	Non-U.S.	104/105	-07	-04	-12	-33	22	-25
French	U.S.	512/515	07	08	-11	-12	37	-04
	Non-U.S.	98/99	-05	-08	-16	-12	29	-03
History	U.S.	549/554	01	00	-25	-02	27	02
	Non-U.S.	132/134	22	-13	-17	-02	13	29
Literature	U.S.	894/896	07	00	-05	-08	27	04
	Non-U.S.	484/489	10	-08	06	04	19	48

Note. The decimal has been omitted from all correlation coefficients. The variables, nominally coded as indicated, are (a) undergraduate major in same or closely related field vs other; (b) attended a U.S. undergraduate school vs other; (c) female vs male; (d) year of birth, inversely related to age; (e) Ph.D. degree-goal or postdoctoral vs other; and (f) BCE (better communication in English than in other language(s) vs BCOL (better communication in other language). The zero category for all "1,0" variables included the nonrespondents.

Positive coefficients for nominally coded variables indicate that the group with the higher code had higher ST means, while negative coefficients indicate the opposite. For example, non-U.S. citizens reporting a U.S. undergraduate school (1) tended to have lower average Subject Test scores than those not reporting a U.S. school (0)--most of the coefficients are negative; females (2) tended to earn lower average scores than males (1) on Subject Tests (coefficients largely negative for both U.S. and non-U.S. citizens); and so on. For year of birth, positive coefficients indicate that younger examinees tended to earn higher ST scores than older examinees. For U.S. Subject Test-takers, the coefficients for U.S. undergraduate school and BCE vs BCOL status are based on relatively extreme dichotomies.

Except for French and Spanish, Subject Test data for U.S. examinees are for random samples.

* Coefficients for sex and year of birth were based on slightly smaller Ns (initial entry in the N column) than coefficients for the other variables (second entry).

of Subject Test performance in both citizenship categories. Of the 34 coefficients computed, only six exceeded .10 in absolute value. Having an undergraduate major in the same or a related field was more consistently positively related to performance among non-U.S. citizens (positive coefficients for 13 of 17 Subject Tests) than among U.S. citizens (9 of 17 coefficients positive).

o **Relative level of English proficiency**, as defined by self-reported BCE status, was not a consistently positive correlate of Subject Test performance for foreign examinees. Better communication in English (BCE) status was clearly associated with better test performance in Literature ($r = .48$), Education, Psychology, History and Music ($r = .28$), and, to a lesser extent, in Geology ($r = .22$) and Biology ($r = .13$), the two most "verbal" (least quantitative) fields among those higher in quantitative relative to verbal emphasis.

For the Sociology and Political Science Tests, and Subject Tests in fields ranking highest in quantitative relative to verbal emphasis (Mathematics, Chemistry, Physics, Computer Science, Economics, and Engineering), the relationship between BCE status and test performance was weaker and not consistently positive—BCE coefficients ranged from -.11 to .04. For U.S. examinees, BCE status was generally very weakly correlated with test performance.

However, for both non-U.S. and U.S. examinees, performance on the Spanish Test, particularly ($r = -.32$ and $-.25$, respectively), and, to a lesser extent, the French Test ($r = -.04$ and $-.03$), was inversely related to BCE status. As will be shown later, based on country of origin, many of the non-U.S. examinees were native speakers of these languages.

Section V: Differences in Subject Test Performance Associated with Country of Citizenship

Previous sections have provided evidence regarding differences in Subject Test performance between U.S. examinees and all non-U.S. examinees without regard to country of origin, and the relationship between selected examinee characteristics and test performance within the two general populations. This section presents data on the Subject Test performance of foreign nationals in classifications that introduce a measure of control for differences in linguistic-cultural background--especially English-proficiency-related differences associated with country of origin.

Attention is focussed on regional-level rather than country-level data. The representation of individual countries in the respective Subject Test samples was not adequate to permit useful trend analysis. Regional-level data were also limited, epecially for Subject Tests in Geology, Education, Music, Political Science, Sociology, Spanish, French, History, and Literature.

Perspective for Evaluating Regional Differences in Subject Test Performance

As indicated earlier, English-proficiency-related considerations as well as geography were involved in defining the regional classifications employed in the study, namely, Europe I, Europe II, Mideast, America I, America II, Africa I, Africa II, Asia I, Asia II, and a collective "English" region. The countries included in each classification are listed in Exhibit C (Section II). Salient analytical elements in the regional classification model are reviewed below.

The "English" classification, based exclusively on common English-language heritage, includes Australia, New Zealand, Canada, England, Scotland, Wales, and Ireland. With few exceptions, GRE examinees from these countries report English as the native language. For example, in contingents of examinees (both General Test and Subject Test takers) tested during 1981-82, more than 90 percent reported English as the native language and/or better communication in English than in any other language (Wilson, 1984b, Appendix B.1 and Appendix B.2). Some 7 percent of Canadian examinees reported better communication in a language other than English, with French as the reported native language.

For working purposes, all other regional contingents are assumed to be composed primarily of examinees for whom English is a second language (ESL examinees). Some English proficiency deficit in verbal performance is assumed to be present (see Exhibit A and related discussion in Section I).

U.S.-bound students from countries in Group I regional classifications as compared to those in Group II tend to earn higher average scores on the Test of English as a Foreign Language and/or to have had more extensive practice in the use of English in academic and other settings.

A majority (from 50 percent to over 90 percent) of GRE examinees during 1981-82 from countries included in certain Group I regions (all but Europe I) reported BCE status, and U.S. bound nationals from these countries tend to earn relatively high average scores on TOEFL. The "high BCE, high TOEFL" regional groupings are:

Africa I, typified by Nigeria, Ghana, Kenya, Liberia;
America I, typified by Jamaica, Guyana, Trinidad, Bahamas, Cuba;
Asia I, composed of India, the Philippines, and Singapore.

English is an official language in many of these countries. However, non-native patterns of English language acquisition are assumed for most of these (and other Group I examinees) even though they report BCE status. These Group I Subject Test contingents are assumed to be made up primarily of BCE-ESL examinees. BCE-ESL examinees tend to be more proficient (as measured by higher means on TOEFL and the GRE verbal measure) than their BCOL-ESL counterparts but less proficient, on the average, than native English speakers (Wilson 1982a, 1984a, 1984b).

A "low BCE, low TOEFL" pattern is characteristic of examinees from several regions:

Europe II, typified by Greece and Turkey, with Cyprus, Finland, Poland, Yugoslavia, the USSR, and so on;

America II, typified by Mexico, Argentina, Brazil, Chile, Peru, and so on;

Africa II, typified by Algeria, Egypt, Ethiopia, Libya, and so on;

Asia II, typified by Japan, Taiwan, Thailand, People's Republic of China, Korea, and so on.

Mideast, typified by Iran, Jordan, Lebanon, Saudia Arabia.

U.S.-bound nationals from Europe I (western Europe, represented most prominently in the Subject Test samples by West Germany, France, Spain, and Italy, but including Belgium, the Netherlands, Sweden, Norway, Denmark, and so on) have high average TOEFL scores. However, in contrast to Africa I, Asia I, and America I examinees (who also tend to have above average TOEFL scores) very low percentages of Europe I GRE examinees report BCE status. Europe I, accordingly, is a "low BCE, high TOEFL" region.

Examinee contingents from countries in predominantly ESL regions, both Group I and Group II, tend to have much lower scores on the GRE General Test verbal measure than the scores expected for U.S. examinees with comparable quantitative scores (see Section I, Exhibit A and related discussion).

Regional Trends in Subject Test Performance

Subject Test means for all non-U.S. regional contingents represented by

at least 10 examinees are shown in Table 9; means of U.S. examinees are also shown. Table 10 provides means for 30 countries selected to represent the respective regions; no America I country is included since none was represented by 10 or more examinees. Blank cells in the tables indicate no examinees; asterisks indicate fewer than 10 examinees (see Table 2 and Table 3 for detail on Ns for Tables 9 and 10).

Exhibit E lists in rank order the six regions (of the 10 shown in Table 9) whose contingents had the highest means on each Subject Test. Leading countries of citizenship are also ranked. In ranking individual countries, the mean for the collective "English" contingent was used rather than the means of individual countries in the collective. Country-level means for all Subject Test samples with 10 or more examinees are shown in the appendix. Regional and country means higher than the mean for U.S. examinees are **highlighted.** Means enclosed in parentheses are lower than the grand mean for all non-U.S. examinees. For example, on the Mathematics Test, all of the six highest scoring non-U.S. contingents had higher means than did U.S. examinees, including some with lower than average means for non-U.S. examinees generally—for example, (Asia II).

Trend Analysis

For trend analysis, the regional-level scaled score means shown in Table 9 were expressed as deviations from the means of U.S. examinees in U.S. standard deviation units. The resulting profiles permit assessment of the relative standing of various non-U.S. examinee contingents on the respective tests.

Profiles of Subject Test means for three sets of regions are shown in Figure 1. The horizontal line represents the means for U.S. examinees. Tests are listed in descending order, left to right, with respect to quantitative relative to verbal emphasis, from Engineering through Literature. Regional profiles are not shown for the French and Spanish Tests, which call for separate consideration since they are not written in English.

- The left frame in Figure 1 shows profiles for Europe I (low BCE-higher TOEFL), Europe II (low BCE-lower TOEFL), and "English" examinees (native-English speakers).
- The middle frame shows profiles for America I and Asia I (high BCE-high TOEFL) vs America II and Asia II (low BCE-low TOEFL).
- The right frame of Figure 1 shows profiles for Mideast and Africa II (low BCE-low TOEFL) vs Africa I (high BCE-high TOEFL).

In a number of instances, profiles are not complete. For example, the Europe II profile has no points for Education, Music, Political Science, Sociology, and History; Europe I has no data point for Education; America I has no data points for Computer Science, Physics, Chemistry, Geology, and

Table 9. Subject Test Means for Non-U.S. Examinees, by World Region

	ENGIN	MATHE	COMP.	PHYSI	CHEMI	GEOLO	ECONO	BIOLO	EDUCA	PSYCH	MUSIC	POL.S	SOCIO	SPANI	FRENC	HISTO	LITER
ENGLISH	645	836	657	724	676	612	714	674	486	602	561	507	508	*	593	552	602
EUROPE I	632	806	645	680	651	577	659	636	*	553	526	461	538	630	592	512	486
EUROPEII	589	730	598	649	566	472	596	505	*	515	*	*	*	*	*	*	457
MIDEAST	535	669	578	598	541	430	550	513	321	517	*	358	*	*	*	*	416
AFRICA I	530	573	502	522	539	*	512	501	388	452	*	364	*	*		*	463
AFRICAII	514	702	566	603	561	426	550	406	*	*		374	*		*	*	372
AMER I	559	537	*	*	598	*	544	529	429	469	*	*	*	*	*	*	*
AMER II	552	741	600	653	617	586	625	571	398	406	468	439	*	593	475	*	460
ASIA I	636	686	640	615	611	517	600	574	*	529	*	405	*	*	*	*	514
ASIA II	608	768	599	688	659	511	616	576	379	510	469	399	417	*	*	457	419
OTHER	617	828	567	*	*		627	594	*	529	*	*					*
TOTAL	599	754	611	667	630	542	628	502	417	559	517	416	445	580	548	502	503
NOT LIST	630	790	631	668	656	510	621	556	409	532	485	400	*	544	496	515	471
GR TOT	606	763	616	667	617	537	628	578	416	557	513	414	442	574	540	504	499
U.S.	610	664	606	616	610	576	610	627	463	535	496	468	445	511	505	516	530

Table 10. Subject Test Means for Selected Countries

	ENGIN	MATHE	COMP.	PHYSI	CHEMI	GEOLO	ECONO	BIOLO	EDUCA	PSYCH	MUSIC	POL.S	SOCIO	SPANI	FRENC	HISTO	LITER
CANADA	648	833	668	711	679	621	688	678	482	604	564	513	*		*	568	602
ENGLAND	642	821	565	731	678	644	723	667	*	590	576	489	*	*	*	547	607
FRANCE	623	826	609	624	622	*	651	599		*	*	*	*	*	620	*	*
GERMANY	609	745	671	721	679	*	746	658	*	590	*	*		*	*	*	509
ITALY	618	846	630	617	*	*	641	607		*	*	*	*	*	*	*	*
SPAIN	618	*	*	*	*	*	650	587	*	504	*	*	*	676		*	*
GREECE	596	726	584	629	554	*	619	545		493	*	*				*	*
TURKEY	567	*	*	595	526	*	501	*		509		*	*				*
NIGERIA	481	566	482	*	518	*	503	474	372	445		357	*				*
EGYPT	485	*	593	*	533	*	*	459		*		*					*
IRAN	533	630	535	586	524	*	547	506	*	409		*	*	*	*	*	*
ISRAEL	641	836	673	774	*		*	537	*	581	*	*	*			*	*
BRAZIL	592	753	616	658	*	*	618	558	*	460		*	*	*		*	*
COLOMBIA	542	*	591	678	*	*	584	540	*	477	*	*	*	543	*	*	*
MEXICO	537	712	612	587	624	*	630	605	*	521	*	*		*	*		*
PERU	533	783	*	*	*	*	644	*	*	*			*	*			
VENEZUEL	512	*	*	*	585	*	*	544	*	489		*		*	*		*
INDIA	641	687	648	614	606	513	606	574	*	544	*	410	*	*	*	*	522
PHILIPPI	546	684	534	*	644	*	581	575	*	497	*	*	*			*	*
SINGAPOR	615	848	574	*	*		630	664	*	561	*	*					
SRI LANK	684	766	*	668	670		*	619		*							*
PAKISTAN	523	*	*	*	563	*	604	507		*		*					*
MALAYSIA	574	640	541	592	580	*	574	566	*	*	*	*			*	*	*
HONG KON	642	746	610	746	696	*	677	680	*	563	515	*	*			*	*
KOREA	613	827	608	763	705	532	675	622	*	521	460	430	*	*	*	*	410
TAIWAN	625	774	607	634	667	496	650	566	*	512	428	*	*	*	*	*	416
PEOPLE'S	628	773	589	765	628	*	*	519		*	*	*	*				*
INDONESI	518	663	546	*	*	*	517	425	*	*		*	*				
THAILAND	522	641	539	*	541	*	567	520	337	*	*	343	*			*	*
JAPAN	612	743	618	636	572	*	617	537	*	473	477	391	*	*		455	419
TOTAL	605	762	611	671	636	551	632	507	418	569	525	414	447	587	564	512	500

Exhibit E

Regional and National Trends in Subject Test Performance for Contingents of Non-U.S. GRE Subject Test Takers, 1982-1984*

Test	Regions (with N = 10+) listed in rank order of mean (1)	(2)	(3)	(4)	(5)	(6)
Engineering#	**English**	**Europe I**	**Asia I**	(Asia II)	(EuropeII)	(Amer II)
Mathematics**	**English**	**Europe I**	(**Asia II**)	(**Amer II**)	(**EuropeII**)	(**AfricaII**)
Computer Sci**	**English**	**Europe I**	**Asia I**	(Amer II)	(Asia II)	(EuropeII)
Physics**	**English**	**Asia II**	(**Europe I**)	(**Amer II**)	(**EuropeII**)	(**Asia I**)
Chemistry**	**English**	**Asia II**	(**Europe I**)	(**Amer II**)	(**Asia I**)	(Amer I)
Economics**	**English**	**Europe I**	**Asia II**	(**Amer II**)	(EuropeII)	(AfricaII)
Geology	**English**	**Amer II**	**Europe I**	(Asia I)	(Asia II)	(EuropeII)
Biology	**English**	**Europe I**	EuropeII	(Asia II)	(Asia I)	(Amer II)
Education	**English**	Amer I	(Amer II)	(Africa I)	(Asia II)	(Mideast)
Psychology**	**English**	(Europe I)	(Asia I)	(Mideast)	(EuropeII)	(Asia II)
Music**	**English**	**Europe** I	(Amer II)	(Asia II)		
Political Sci	**English**	Europe I	Amer II	(Asia I)	(Asia II)	(AfricaII)
Sociology#	**Europe I**	**English**	(Asia II)			
History	**English**	Europe I	(Asia I)			
Literature	**English**	Asia I	(Europe I)	(Africa I)	(Amer II)	(EuropeII)
Spanish**	**Europe I**	**Amer II**				
French**	**English**	**Europe I**	(Amer II)			

	Six highest-scoring country contingents in rank order of mean* (1)	(2)	(3)	4)	(5)	(6)
Engineering#	**Belgium**	**Sri Lanka**	**Sweden**	**South Afr**	**English**	**Hong Kong**
Mathematics**	**Singapore**	**Italy**	**English**	**Israel**	**Korea**	**France**
Computer Sci**	**Belgium**	**Israel**	**Germany**	**English**	**India**	**Italy**
Physics**	**Israel**	**PRChina**	**Korea**	**Hong Kong**	**Argentina**	**English**
Chemistry**	**Korea**	**Hong Kong**	**Germany**	**English**	**Sri Lanka**	**Taiwan**
Economics**	**Germany**	**Argentina**	**Belgium**	**English**	**Hong Kong**	**Chile**
Geology	**English**	(Korea)	(India)	(Taiwan)		
Biology	**Hong Kong**	**English**	**Singapore**	**Germany**	**Argentina**	**Korea**
Education	**English**	(Nigeria)	(Thailand)			
Psychology**	**English**	**Germany**	**Israel**	**Hong Kong**	**Singapore**	**India**
Music**	**English**	**Hong Kong**	(Japan)	(Korea)	(Taiwan)	
Political Sci	**English**	Korea	(India)	(Japan)	(Nigeria)	(Thailand)
Sociology#	No country with N = 10+					
History	**English**	(Japan)				
Literature	**English**	India	Germany	(Japan)	(Taiwan)	(Korea)
Spanish**	**Spain**	**Colombia**				
French**	**France**	**English**				

* Only the six regional or country contingents (N = 10+) with highest means are listed. For Education, Political Science, Geology, Literature, History, Sociology, Music, French, and Spanish Tests, only a few country contingents met this criterion. The mean for all "English" countries was used in the country listings--one or more individual English countries ranked higher in most instances. See Table 10 plus Appendix for complete data on all contingents with 10+ examinees. **Highlight** indicates mean equal to or higher than that for U.S. examinees; (parentheses) indicate mean lower than the grand mean for all non-U.S. examinees.

** Grand mean for non-U.S. examinees was greater than that for U.S. examinees;
# grand mean was approximately equal to that of U.S. examinees; others lower.

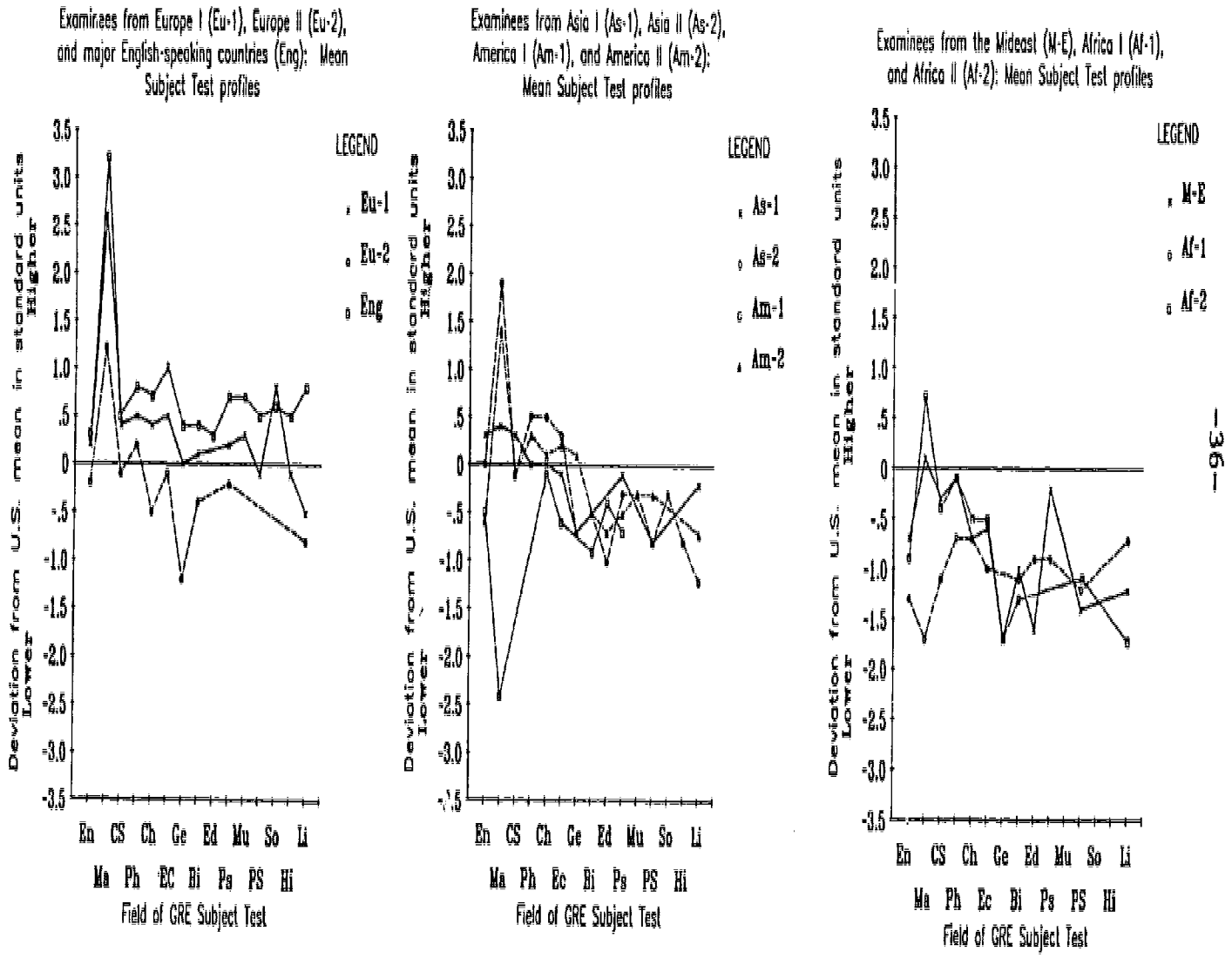


Figure 1. Average performance of contingents of non-U.S. examinees on GRE Subject Tests relative to the average performance of U.S. examinees

Music through Literature; and so on. Regional Subject Test samples differ in size and are relatively small for Geology and for Education through Literature. Despite these limitations, certain patterns are discernible.

- o Strongest overall average performance relative to that of U.S. examinees was registered by the "English" examinees and by the predominantly ESL Europe I examinees. "English" examinees outperformed both U.S. examinees (on all tests) and Europe I examinees (on all except the Sociology Test). Europe I examinees outperformed U.S. examinees except in Political Science, History, and Literature. They also performed better than their Europe II counterparts as well as other ESL contingents on all tests for which comparative data were available. Their ESL Europe II counterparts had means that were either approximately equal to or lower than those of ESL examinees generally for tests for which comparative data were available.

- o Lowest overall average performance relative to both U.S. examinees and ESL examinees generally was registered by examinees from Africa I, Africa II, and the Mideast. Africa II and Mideast examinees, but not Africa I examinees, performed comparatively well on the Mathematics Test. However, for all three contingents, average performance on other tests in the more quantitative fields was comparatively low. For the other tests a tendency toward comparatively low average performance appears to be present. Data points are missing for several tests, however.

For Mathematics, Chemistry, Physics, Computer Science, and Economics, the all ESL means (not shown in the figure) as well as the means for "English" and Europe I test-takers were higher than those of U.S. examinees; for Engineering, the ESL mean was slightly lower. The performance of non-U.S. citizens on the Mathematics Test was exceptionally strong relative to that of U.S. examinees; All but two regional contingents (America I and Africa I) had Mathematics means that at least equaled the mean for U.S. examinees.

In evaluating the relative standing of the various regional contingents on the Engineering, Mathematics, Computer Science, Chemistry, Physics, and Economics Tests, it is useful to recall (from Table 8, Section IV) that among individuals, relative proficiency in English as reflected in BCE status was essentially unrelated to performance on these tests; correlations ranged between .00 and -.11. Note, for example, that high means were registered by predominantly ESL contingents as well as by the "English" contingent, and that "high BCE" contingents (for example, Africa I, America I) sometimes had lower means than did ESL contingents generally.

For all of the remaining tests (Geology through Literature), ESL means were lower than those of U.S. examinees, although not to the same extent. ESL examinees performed comparatively better in Psychology, Music, and Sociology than in Geology, Biology, Education, Political Science, and Literature. The ESL Europe I contingent outperformed both U.S. examinees and "English" examinees in Sociology.

It may be recalled that BCE status was modestly associated with perform-

ance on all but the Sociology and Political Science Tests: Geology (r = .22), Biology (.13), Education (.34), Psychology (.30), Music (.28), History (.29), and Literature (r = .48). However, BCE status was essentially unrelated to performance in Sociology (r = .00) and Political Science (r = .03).

Based on the limited regional-level and country-level data available for the French and the Spanish Tests (not included in Figure 1), on which non-U.S. examinees typically outperformed their U.S. counterparts, a majority of the foreign examinees taking these tests were from countries in which the dominant native language was either French or Spanish.

- o Contingents from Europe I (predominantly Spanish nationals) and America II (led by Colombia, Mexico, and Peru) were strongest on the Spanish Test. At the regional level, on the French Test, both the small "English" contingent (N = 15) which included 7 Canadians (possibly native French speakers), and the Europe I contingent (N = 33), which included 23 French nationals, had high means. These trends are consistent with findings reported in the previous section indicating negative correlations between BCE status and performance on these tests for non-U.S. citizens (see Table 8 and related discussion).

Discussion

The findings that have been reviewed are consistent with the working hypothesis that the performance of non-U.S. examinees on Subject Tests in quantitative fields is relatively independent of linguistic-cultural background. ESL examinees typically outperformed U.S. examinees in Economics, Physics, Chemistry, Computer Science, and (especially) Mathematics, and had only a slightly lower mean in Engineering.

ESL examinees generally did not perform as well, comparatively, on Subject Tests in Geology and Biology, and in social science and humanities fields, as on the more quantitatively oriented tests. Yet, U.S. examinees were outperformed by the predominantly ESL contingent from Europe I in Geology, Biology, Psychology, Music, and Sociology.

Data for the "English" contingent are assumed to be completely free of effects associated with level of English proficiency. U.S.-"English" differences in performance, therefore, are attributable solely to factors other than language—for example, differences in (a) degree of selection on general academic ability and motivation, (b) the duration and intensity of concentration in the field of the test, (c) general rigor of instruction, (d) curriculum, and so on.

However, effects due to an English proficiency deficit and effects due to other factors (such as those suggested above) need to be considered in accounting for either U.S. vs non-U.S-ESL differences or differences among the various non-U.S. contingents in average Subject Test performance. The strong performance of the Europe I contingent on several of the more verbal subject-matter tests, relative to that of U.S. and "English" examinees, indicates that negative effects associated with less than native levels of general English

proficiency were more than offset by factors that were conducive to good performance on tests of subject-matter achievement.

Differences in educational and cultural as well as linguistic background are reflected in the regional classifications. For example, the content of Subject Tests in social science and humanities fields such as history, literature, political science, sociology, education, psychology, and music tends to reflect primarily U.S.-English-Western experience. The content of these tests may be thought of as being implicitly biased culturally toward U.S. examinees and non-U.S. examinees who have had the richest exposure to such experience. The French Test and the Spanish Test are similarly biased, culturally as well as linguistically, toward native speakers of these languages.

It is not possible, of course, to isolate language-related versus non-language-related effects in the data for ESL contingents. However, non-language related effects seem clearly to be primary in accounting for differences in performance on the tests in Mathematics, Engineering, Computer Science, Physics, Chemistry, and Economics. For Subject Tests in the social science and humanities fields as well, strong effects not due to English proficiency, per se, appear to be present and may be more important than effects associated with differences in general "English proficiency."

Additional perspective is provided by findings, reported in the following sections of this report, based on data for restricted samples of Subject Test takers with concurrent scores on the GRE General Test (SVQA samples). In these samples, ESL examinees were found to perform better, relative to U.S. examinees with comparable quantitative ability, on Subject Tests (requiring extensive discipline-specific English-language processing) than on the GRE verbal ability measure (requiring equally extensive processing of English-language content that is more general in nature).

Section VI: Comparative Performance on GRE Subject Tests and the GRE General Test

A majority subgroup of examinees in each of the Subject Test (S) samples had concurrent (same administration date) verbal (V), quantitative (Q), and analytical (A) ability scores from the GRE General Test. Based on data for these SVQA samples, this section provides information regarding (a) the level of performance of non-U.S. examinees relative to that of U.S. examinees on the GRE General Test verbal, quantitative, and analytical ability measures as compared to performance on the discipline-specific Subject Tests, and (b) for non-U.S. citizens, the relationship of selected English-proficiency-related background variables (BCE status and TOEFLEVL) to Subject Test scores and GRE verbal, quantitative, and analytical scores (S, V, Q, and A).

The average performance of non-U.S. examinees on the verbal and analytical ability measures was found to be systematically lower than that of their U.S. counterparts. However, this was not true for either the quantitative ability measure or the GRE Subject Tests. For those Subject Tests on which non-U.S. means were lower than U.S. means (except for the Education Test) the Subject Test means of non-U.S. examinees were relatively less depressed than their general verbal or analytical ability means.

BCE status (better communication in English) and TOEFLEVL (historical TOEFL means of U.S.-bound national contingents ascribed to current examinees from the respective nations) were found to be more closely related to performance on the verbal and analytical ability measures than to performance on either the Subject Tests or the quantitative ability test.

Subject Test versus General Test Performance

Table 11 shows the number of examinees in each SVQA sample, and the means and standard deviations of Subject Test and General Test scores (S, V, Q, and A) for U.S. and non-U.S. examinees. The total number of Subject Test takers is also shown. Due to sampling considerations, the Subject Test means shown in Table 11 tend to differ from the total Subject Test sample means that were the focus of the analyses in the preceding sections. Except for the Computer Science and Sociology Tests, the direction of the difference between Subject Test means was the same in the selected SVQA sample as in the total Subject Test samples.

The scales of the respective Subject Tests are not comparable, and Subject Test and General Test scales are not comparable. Accordingly, the means of non-U.S. examinees on the respective tests were expressed as deviations from the means of U.S. examinees, in U.S. standard deviation units. For the Engineering Test, for example, non-U.S. and U.S. means were 583 and 612, respectively, and the U.S. standard deviation was 103; the difference (-29 scaled score points) was divided by the standard deviation (103) to obtain a deviation score of -0.28. The comparable V-score mean difference was -152 scaled score points; the U.S. verbal score standard deviation was 103, hence a deviation score mean of -1.50; and so on.

Table 11

GRE Subject Test Takers with Concurrent Scores on the GRE General Test: Summary Test Statistics by Citizenship Status

Subject Test		N(s)*	N(svqa)**	Mean S	Mean V	Mean Q	Mean A	Standard deviation S	Standard deviation V	Standard deviation Q	Standard deviation A
Engineering	U.S.	(855)	(766)	612	547	703	633	103	103	69	109
	Non-U.S.	(4724)	(2689)	583	392	678	497	110	113	86	118
Mathematics	U.S.	(527)	(388)	669	556	690	639	158	125	102	129
	Non-U.S.	(1861)	(1103)	757	409	704	534	150	127	77	126
Comp Sci	U.S.	(511)	(390)	612	566	679	643	99	123	96	120
	Non-U.S.	(1826)	(1039)	604	414	692	549	90	121	77	117
Physics	U.S.	(521)	(392)	621	587	696	639	136	111	81	111
	Non-U.S.	(1624)	(931)	674	432	687	529	154	133	84	133
Chemistry	U.S.	(704)	(539)	612	531	647	605	98	107	94	113
	Non-U.S.	(1821)	(877)	615	390	621	473	112	116	105	120
Economics	U.S.	(1231)	(750)	612	549	620	601	99	116	109	121
	Non-U.S.	(1394)	(1065)	623	436	626	497	115	127	119	128
Geology	U.S.	(664)	(486)	572	522	601	567	86	95	96	110
	Non.U.S.	(313)	(214)	545	442	585	485	116	130	122	136
Biology	U.S.	(1456)	(1077)	627	522	582	577	110	104	103	117
	Non-U.S.	(2139)	(1374)	583	427	567	478	126	125	120	126
Education	U.S.	(869)	(614)	456	441	442	469	81	104	113	107
	Non-U.S.	(243)	(164)	417	396	463	405	103	120	141	113
Psychology	U.S.	(1575)	(1093)	526	509	503	522	91	108	116	117
	Non-U.S.	(1691)	(1189)	560	493	526	503	103	122	115	122
Music	U.S.	(494)	(359)	500	511	505	539	84	110	117	118
	Non-U.S.	(219)	(129)	526	442	514	482	94	139	109	112
Political Sci	U.S.	(459)	(369)	470	550	539	564	80	125	130	130
	Non-U.S.	(324)	(259)	417	428	525	448	81	131	146	126

Subject Test		N(s)*	N(svqa)**	Mean S	Mean V	Mean Q	Mean A	Standard deviation S	Standard deviation V	Standard deviation Q	Standard deviation A
Sociology	U.S.	(603)	(351)	453	462	455	495	118	127	137	131
	Non-U.S.	(92)	(68)	457	405	506	442	121	135	140	137
Spanish	U.S.	(470)	(261)	512	521	487	511	99	122	120	124
	Non-U.S.	(105)	(38)	567	424	431	412	116	94	120	96
French	U.S.	(515)	(319)	510	573	531	545	84	118	111	116
	Non-U.S.	(99)	(46)	552	490	478	478	94	138	145	120
History	U.S.	(554)	(411)	521	565	509	549	78	116	126	124
	Non-U.S.	(134)	(97)	506	496	520	505	77	144	129	123
Literature	U.S.	(896)	(673)	529	596	510	559	93	107	116	116
	Non-U.S.	(489)	(334)	514	537	514	491	116	137	126	127

Note. Data tabled are for Subject Test takers who took the General Test on the same testing date. U.S. data are for spaced samples of Subject Test takers (except for Spanish and French with all cases represented). For non-U.S. Subject Test takers all eligible cases are included.

* N(s) indicates the number of Subject Test takers in the respective samples.

** N(svqa) indicates the number of cases with Subject and General Test data. The Subject Test (S) and General Test Verbal (V), Quantitative (Q), and Analytical (A) ability means and standard deviations reported are for these samples.

Table 12 shows the means of non-U.S. examinees expressed as deviations from the means of U.S. examinees in standard units, as described above. Subject Tests are listed in descending order in terms of quantitative relative to verbal emphasis as defined by the mean discrepancy between GRE-Q and GRE-V means of U.S. undergraduate majors in the corresponding fields.

The French and Spanish Tests, on which non-U.S. citizens clearly outperformed U.S. citizens, are treated separately, out of Q/V order, since they test knowledge of languages and literatures that are foreign to native speakers of English. As indicated in the previous section, many of the non-U.S. citizens taking these tests were from French-speaking or Spanish-speaking societies and, by inference, had a "native language" advantage over their native English-speaking counterparts or native speakers of languages other than French or Spanish. On all three general ability measures, French Test and Spanish Test takers had substantially lower average scores than ddid their U.S. counterparts.

For the other Subject Test/General Test (SVQA) samples, the average performance of non-U.S. examinees on the GRE verbal ability measure and, to a lesser extent, the analytical ability measure was consistently lower relative to the means for U.S. examinees than was their average performance on either the quantitative test or the Subject Test.

- For the Engineering-Biology and Education-Literature clusters, the mean deviation-score medians for GRE Verbal were -1.21 and -0.55, respectively. Comparable medians for GRE quantitative and the GRE Subject Tests were -0.13 and 0.09, and -0.03 and -0.16, respectively.

These findings, especially those for the Education-Literature cluster, indicate that foreign examinees tended to perform better relative to U.S. examinees on tests involving extensive discipline-specific English-language verbal processing than on the verbal measure.

Correlations of Selected English-Proficiency-Related Variables with Subject Test Scores and General Test Scores

Self-reported BCE status (better communication in English, coded "1", vs other status, coded "0") was employed as an index of relative proficiency in English. The BCE category includes not only native English speakers from countries classified as "English" but also nonnative speakers, typically from countries with a strong English-speaking academic tradition (for example, India, the Philippines). The TOEFLEVL variable was derived by ascribing to each examinee from a given country the mean TOEFL total score for all U.S.-bound TOEFL takers from that country (Educational Testing Service, 1983). Examinees from all "English" countries were assigned a TOEFLEVL score of 625, higher than that reported for any TOEFL contingent. TOEFLEVL reflects both English-proficiency-related background differences and other background differences associated with country of origin. For example, U.S. bound nationals from more highly developed countries—with strong educational systems and academic heritages—tend to earn higher TOEFL means than do contingents from less highly developed countries.

Table 12

Subject Test and General Test Means of Non-U.S. Examinees Expressed as Deviations from the Means of U.S. Examinees, in U.S. Standard Deviation Units

Subject Test	Deviation of foreign examinee mean from U.S. mean on tests designated in U.S. standard deviation units				
	(N)*	GRE-S	GRE-V	GRE-Q	GRE-A
Engineering	(766,2689)	-0.28	-1.50	-0.36	-1.25
Mathematics	(388,1103)	0.56	-1.18	0.11	-0.81
Computer Sci	(390,1039)	-0.08**	-1.24	0.14	-0.78
Physics	(392,931)	0.39	-1.40	-0.11	-0.99
Chemistry	(539,877)	0.03	-1.32	-0.28	-1.17
Economics	(750,1065)	0.11	-0.97	0.06	-0.86
Geology	(486,214)	-0.31	-0.84	-0.17	-0.75
Biology	(1077,1374)	-0.40	-0.91	-0.15	-0.85
Education	(614,164)	-0.48	-0.43	0.19	-0.60
Psychology	(1093,1189)	0.37	-0.15	0.20	-0.16
Music	(359,129)	0.31	-0.63	0.08	-0.48
Political Sci	(369,259)	-0.66	-0.98	-0.11	-0.89
Sociology	(351,68)	0.03**	-0.45	0.37	-0.40
History	(411,97)	-0.19	-0.59	0.09	-0.35
Literature	(673,334)	-0.16	-0.55	0.03	-0.59
Spanish	(261,38)	0.56	-0.80	-0.47	-0.80
French	(319,46)	0.50	-0.70	-0.48	-0.58
Median deviation					
Engin - Biology		-0.03	-1.21	-0.13	-0.85
Educ - Literature		-0.16	-0.55	0.09	-0.48

Note. The data in this table are for the SVQA-sample--Subject Test (S) takers with concurrent verbal (V), quantitative (Q), and analytical ability (A) scores on the GRE General Test. For each test, the mean for foreign examinees was subtracted from the mean for U.S. examinees, and then divided by the standard deviation of scores for U.S. examinees. For foreign nationals taking the GRE Political Science Test, for example, the mean was 0.66 standard deviations (-0.66) lower than that for U.S. examinees; their GRE Verbal mean was 0.98 standard deviations lower (-0.98), and so on. The direction and/or the magnitude of observed differences between Subject Test means in the SVQA sample may not be the same as that reported for the S-samples in previous sections.

* The initial entry is the number of U.S. examinees, and the second entry is the number of non-U.S. examinees, in the SVQA-samples.

** Change in direction of difference from that in the S-sample.

Correlations of BCE status and TOEFLEVL, respectively, with Subject Test, verbal, quantitative, and analytical ability scores (S, V, Q, and A) are shown in Table 13. For all Subject Test takers, the correlation between BCE status and TOEFLEVL was r = .46.

- For the French and Spanish samples (both comparatively small), BCE status was associated with lower average performance on the Subject Tests involved (r = -.15 and -.40, respectively), but higher performance on V, Q, and A (all coefficients were positive). It is useful to recall (from Table 12) that the French and Spanish Test takers had substantially lower means on all three general ability measures than did their U.S. counterparts, almost exclusively BCE examinees.

- In the other Subject Test/General Test samples, there was a clear tendency for both of these background variables to be more closely associated with performance on the verbal and analytical ability measures than with performance on either the Subject Tests or the quantitative ability test; performance on the quantitative ability measure was more independent of language background than performance on Subject Tests.

- BCE status and TOEFLEVL were typically more highly correlated with performance on Subject Tests in the Education-Literature cluster (more verbally oriented) than in the Engineering-Biology cluster (more quantitatively oriented). These variables were less highly correlated with the Subject Test scores than with general verbal test scores, however.

- Although the foregoing pattern was common to both background variables, the TOEFLEVL variable typically was more highly correlated than BCE status with Subject Test performance, as well as with performance on the GRE verbal and analytical ability measures. This was especially true for samples involving Subject Tests in Economics, Political Science, and Sociology. For these samples, BCE status, the more direct measure of individual differences in relative English proficiency, was negligibly correlated with Subject Test scores (.01, .07, and -.00). TOEFLEVL, which reflects both English proficiency and other background differences associated with national origin, correlated .29, .43, and .44 with these Subject Test scores. In each of these instances, examinee contingents from western Europe (Europe I) had comparatively high Subject Test means (see Figure 1). Europe I is a "low BCE - high TOEFLEVL" region composed of countries with a very strong academic tradition.

The higher correlations for TOEFLEVL than for BCE status suggest that Subject Test performance may be more sensitive to, say, academic background factors linked to country of origin than to similarly-linked differences in level of "general English proficiency" per se.

Table 13

Correlation of Two English-Proficiency-Related Variables with Scores on the GRE Subject Test and the GRE General Test: Foreign Examinees

Subject Test (S)	Variable correlated with test scores: Better communication in English = 1 vs other = 0*					TOEFLEVL (TOEFL country-means ascribed to citizens)**				
	N	GRE S	GRE V	GRE Q	GRE A	N	GRE S	GRE V	GRE Q	GRE A
Engineering	2689	00	34	-03	09	2371	19	47	14	29
Mathematics	1103	-04	42	03	20	956	20	57	17	40
Computer Sci	1039	-04	33	-07	11	880	20	49	10	30
Physics	931	-10	45	-01	22	800	09	52	12	34
Chemistry	877	-06	34	-04	15	732	14	43	12	30
Economics	1005	01	38	-07	16	976	29	56	08	39
Geology	214	29	50	11	32	187	43	51	21	42
Biology	1374	18	38	-02	21	1202	37	47	10	35
Education	164	31	31	-01	28	144	46	55	12	35
Psychology	1280	33	43	10	31	1189	29	39	09	25
Music	129	19	54	-05	40	120	26	53	02	38
Political Sci	259	07	24	-29	09	231	43	45	-06	29
Sociology	68	-00	28	-23	06	66	44	61	-05	31
History	97	34	50	-04	33	86	40	58	-11	26
Literature	370	47	49	-03	27	334	58	57	-05	40
Spanish	38	-40	46	26	09	32	-01	31	-05	-02
French	46	-15	40	30	44	43	23	47	21	39
Median coefficient										
Engin - Biology		-02	38	-02	18		20	50	12	34
Educ - Literature***		31	43	-04	28		43	55	-01	31

* The BCE (better communication in English) category includes both native-English speakers (NS) and non-native speakers of English (NNS) who reported better communication in English than in any other language. Positive point biserial correlation coefficients (decimal omitted throughout) indicate that examinees reporting "better communication in English" had higher means on the designated tests; negative coefficients indicate the opposite.

** The TOEFL Total mean for large contingents of U.S.-bound nationals from a given country (ETS, 1983) was ascribed to GRE examinees from that country. An arbitrarily selected (highest) TOEFLEVL score of 625 was ascribed to (predominantly NS) GRE examinees from Great Britain, Canada, Australia, and New Zealand. Positive coefficients indicate that examinees from countries whose U.S.-bound nationals typically obtain higher average scores on TOEFL tended to have higher scores on the designated GRE test than those from typically lower-scoring country-contingents; a negative coefficient indicates the opposite. Individuals without data on country could not be included.

*** Data for the French and Spanish Test takers were not included in computing these median coefficients.

Section VII: Performance on GRE Subject Tests and the GRE Verbal Test Relative to Expectancy for U.S. Examinees: Regression Analysis

The principal themes in findings that were reported in the preceding section may be summarized as follows:

- o Non-U.S. examinees performed comparatively better on the GRE Subject Tests, regardless of verbal/quantitative emphasis, and on the GRE quantitative ability measure, than on the GRE verbal and analytical ability measures.
- o English-proficiency-related background variables were found to more highly correlated with verbal and analytical test performance than with performance on the quantitative test or with Subject Test performance, regardless of degree of quantitative relative to verbal emphasis.
- o Performance on the GRE quantitative ability measure was essentially unrelated to BCE status—the measure of relative proficiency in English.
- o Performance on some, but not all, GRE Subject Tests in primarily verbal fields appeared to be more sensitive to language-related background differences than performance on the more quantitative Subject Tests.

The analyses reported in this section extended lines of inquiry related to these themes by examining discrepancies between the observed Subject Test scores of non-U.S. examinees and the scores that would be expected for U.S. examinees with comparable General Test scores. These analyses, like those in the preceding section, were based on the restricted SVQA-samples—that is, Subject Test (S) takers with concurrent verbal (V), quantitative (Q), and analytical (A) ability scores from the GRE General Test.

Methodological Rationale and Analytic Procedure

It has been established that the average performance of foreign ESL examinees on the GRE verbal ability measure is much lower than expected for U.S. examinees with comparable scores on the quantitative ability measure. The depressed verbal performance is assumed to reflect an English proficiency deficit (EPD). The Relative Verbal Performance Index (RVPI) has been used in previous studies (Wilson, 1984a, 1985) as a measure of degree of EPD in the verbal test performance of non-U.S. examinees.

(1) RVPI = the discrepancy V-V.q, where V = the observed verbal ability score and V.q is the score expected for U.S. examinees with comparable quantitative scores, using U.S. regression equations.

Underlying interpretation of the RVPI is the working assumption that although the verbal scores of foreign ESL examinees are depressed, relative to those of U.S. and other native English-speaking examinees, by less than native levels of English proficiency, this is not true for their GRE quantitative

scores. The GRE-Q scores of ESL examinees are assumed to provide basically valid indicators of level of general quantitative reasoning ability regardless of linguistic or other background differences. It is assumed further that the verbal (and analytical) scores as well as the quantitative scores of non-U.S. examinees from major English-speaking societies are comparable to those of U.S. examinees.

Given these assumptions, non-U.S. "English" examinees are expected to have mean RVPI values approaching zero, and the RVPI means of contingents of non-U.S. ESL examinees are expected to be negative. For national contingents of ESL examinees, RVPI means should vary directly with general English-language background differences associated with country of origin.

The logic underlying development and interpretation of the RVPI was applied in assessing the performance of foreign examinees on Subject Tests relative to expectation for U.S. examinees. The analyses were designed primarily to evaluate the working hypothesis that foreign ESL examinees should perform better, relative to U.S. examinees, on Subject Tests with discipline-specific English content than on the GRE verbal ability measure.

To evaluate this hypothesis, Relative Subject (Test) Performance Indices (RSPI) analogous to the RVPI were employed in the analysis.

(2) RSPI = S - S.q = where S is a Subject Test score and S.q is the score predicted using the regression equation for a U.S. sample.

The discrepancy between S and S.vqa (S-S.vqa), where S.vqa = S predicted from V, Q, and A, using a U.S. regression equation, is also of interest. Both V and A scores for ESL examinees are depressed by factors associated with general English proficiency deficit (EPD). **If Subject Test performance is less sensitive to English proficiency than is Verbal Test or Analytical Test performance, U.S. equations employing all three General Test scores are expected to underestimate Subject Test performance systematically in samples of ESL examinees, but not in samples of native English-speaking foreign nationals.**

Procedure

In each of the 17 U.S. SVQA-samples, regression equations for V.q, S.q, and S.vqa were derived.* Predicted scores and the relevant discrepancy values were computed for individuals in the corresponding non-U.S. SVQA-samples. Mean RVPI (mean V-V.q) and mean RSPI (mean S-S.q) values and mean S-S.vqa residual values (or mean discrepancies between observed and predicted scores) were computed for various subgroups of examinees within each non-U.S. Subject Test/General Test sample: (a) non-U.S. "English" examinees, (b) all other non-U.S. examinees (predominantly ESL examinees), and (c) regional and national contingents with Ns equal to or greater than 10.

*Detailed results of the regression analyses in the U.S. samples and data on the patterns of correlations between Subject Test and General Test scores for U.S. and non-U.S. samples are provided in the appendix.

To facilitate comparison of the various mean discrepancy indices (mean RVPI, mean RSPI, and mean S-S.vqa), the computed mean "observed minus predicted score" discrepancies or residuals (which were in scaled-score units, not comparable across tests) were transformed into standard units. Each mean residual was divided by the standard error of estimate (SEest) associated with the U.S. regression equation used to develop the relevant predicted score (see appendix for the equations and the associated standard errors of estimate).

These mean "residual" values indicate the direction and the average extent of deviation of observed scores on the dependent test variables from expectation for U.S. examinees with comparable scores on the General Test predictor(s) involved.

Comparison of RVPI (Relative Verbal Performance Index) and RSPI (Relative Subject Test Performance Index) means for contingents known to differ in English language background provided the primary basis for assessing the hypothesis that there should be less English proficiency deficit in the Subject Test performance than in the GRE verbal test performance of ESL examinees--that is, mean RSPI should tend to be greater (algebraically) than mean RVPI.

Findings

RVPI, RSPI, and S-S.vqa means, in SEest units, are shown in Table 14 for all ESL examinees and for non-U.S. "English" examinees. For the predominantly ESL contingents of French and Spanish Test takers, means for "English" test takers ($N < 10$ for both tests) are not shown; the ESL means for these tests include data for the small "English" contingents for which Ns are shown.

In evaluating these data it is important to keep in mind that all the comparisons are "relative to expectation for U.S. examinees with comparable scores on designated General Test predictors." Positive means indicate average test performance equal to or better than expected for U.S. examinees, while negative means indicate the opposite.

"English" Examinees versus ESL Examinees

Data for the "English" contingent are assumed to be completely free of effects due to English proficiency deficit. Some EPD effects (for example, diminished speed of verbal processing) are assumed to be present for contingents of ESL examinees. As expected, the RVPI (Relative Verbal Performance Index) means for the ESL examinees were consistently negative, ranging from -0.8 down to -1.9. For "English" examinees the RVPI means fluctuated around 0.0, ranging from 0.7 to -0.3. These findings support the assumption regarding English proficiency deficit effects in ESL data but not in the "English" data.

For "English" examinees, all Relative Subject Test Performance Index (RSPI) means were positive, ranging from 0.1 (Education) through 1.0 (Mathematics) indicating that Subject Test means were higher than expected for U.S. examinees with comparable quantitative ability by between 0.1 and 1.0 standard

Table 14

Subject Test and Verbal Test Performance of Non-U.S. ESL Examinees, and of Non-U.S. "English" Examinees, Relative to Expectation for U.S. Examinees with Similar General Test Scores*

Subject	Non-U.S. "English" examinees				Non-U.S. ESL examinees			
	N	RVPI mean	RSPI mean	S-S.VQA mean	N	RVPI mean	RSPI mean	S-S.vqa mean
Engineering	170	-0.3	0.3	0.4	2519	-1.6	-0.1	0.5
Mathematics	102	0.0	1.0	1.0	1001	-1.8	0.6	1.1
Computer Sci	91	-0.1	0.5	0.6	948	-1.8	-0.4	0.4
Physics	154	-0.3	0.6	0.8	777	-1.9	0.6	1.0
Chemistry	56	-0.1	0.5	0.5	821	-1.5	0.2	0.6
Economics	127	0.0	0.9	1.0	938	-1.5	-0.1	0.8
Geology	57	0.3	0.5	0.4	157	-1.5	-0.6	0.0
Biology	228	0.2	0.3	0.2	1146	-1.2	-0.5	0.2
Education	51	0.0	0.1	0.1	113	-1.0	-1.1	-0.5
Psychology	728	0.1	0.7	0.8	552	-0.8	-0.2	0.3
Music	59	0.0	0.8	0.8	70	-1.5	-0.0	0.8
Political Sci	33	0.4	0.5	0.4	226	-1.5	-1.0	-0.2
Sociology	10	0.7	0.3	-0.1	58	-1.4	-0.4	0.6
History	49	0.2	0.3	0.2	56	-1.5	-0.7	0.2
Literature	124	0.3	0.8	0.8	246	-1.2	-0.7	0.2
Spanish	2				38	-0.5	0.6	0.9
French	8				46	-0.5	0.8	1.3

Note. ESL Ns and means shown for French and Spanish are for all non-U.S. examinees, including the small "English" contingents.

* **RVPI = Relative Verbal Performance Index = V-V.q**, the discrepancy between the observed verbal score (V) and the V score predicted from GRE-Q (V.q) using U.S. regression equations (from appendix B-1). The difference between observed and predicted scaled-score means was divided by the standard error of estimate associated with the regression equation used.

RSPI = Relative Subject Test Performance Index = S-S.q, a discrepancy index involving the difference beteen Subject Test score and score predicted from GRE-Q using a U.S. regression equation. Computed scaled-score mean differences were transformed into SEest units, as for the RVPI.

S-S.vqa = Subject Test score predicted from all three General Test scores, using U.S. regression equations. Computed mean discrepancies were expressed in SEest units.

Positive means indicate better than predicted performance while negative means indicate the opposite.

error of estimate (SEest) units. The findings when Subject Test score (S) was estimated by equations that employed GRE-V and GRE-A, as well as GRE-Q, were almost identical with findings when S was estimated from GRE-Q alone. This means that level of Subject Test (S) performance estimated from GRE-Q alone was quite similar to the level estimated from an equation including GRE-V and GRE-A, as well as GRE-Q.

Such was not the case, however, for the ESL examinees. RSPI means were systematically lower than S-S.vqa means.

- For example, the Engineering Test mean for ESL examinees was lower than expected for U.S. examinees with similar GRE-Q scores by 0.1 SEest units (mean RSPI = -0.1); when GRE verbal and analytical scores were added as predictors, Engineering performance was better than expected by 0.5 SEest units (mean S-S.vqa = 0.5); for Music, ESL examinees performed about as well as expected for U.S. examinees with similar GRE-Q scores (mean RSPI = -0.0), but much better than expected for examinees with similar GRE-V, GRE-A, and GRE-Q scores (mean S-S.vqa = 0.8); and so on.

By inference from this pattern of findings for ESL examinees, use of equations that included the depressed GRE-V and GRE-Q scores as predictors resulted in systematically lower estimates of Subject Test scores than use of equations including only the GRE-Q score as a predictor—that is, S.vqa was lower than S.q. The similarity between S.vqa and S.q in the "English" sample and the systematic differences between these two predicted values for the ESL sample have interpretive implications.

- The differences in findings reflect primarily the presence of EPD (English proficiency defict) effects in verbal and analytical performance for ESL examinees but not for "English" examinees. In EPD-free samples, estimates of Subject Test (S) scores based solely on GRE-Q (that is, S.q) were comparable to estimates based on V, Q, and A (S.vqa). However, in the ESL samples, the use of V, Q, and A as predictors resulted in systematic underestimates of Subject Test scores. This suggests that for ESL contingents, S.q (an estimate of Subject Test performance based solely on GRE-Q) provides a more valid basis than does S.vqa (an estimate based on all three General Test scores) for comparisons with U.S. examinees "of comparable general ability."

For the all-ESL sample, RSPI means were positive for Mathematics, Physics, Chemistry, Economics and Music. This indicates average performance equal to or better than expected for U.S. examinees with comparable GRE-Q scores. RSPI means were slightly negative for Engineering (-0.1) and Psychology (-0.2), somewhat more negative for Computer Science and Sociology (-0.4), and increasingly more negative for Biology, Geology, History, Literature, Political Science, and Education (from -0.5 to -1.1). However, in each case (except Education), the negative Relative Subject Test Performance (RSPI) mean was higher algebraically than the corresponding Relative Verbal Performance Index mean—RVPI means were -1.0 to -1.9, except for the Psychology, -0.8, French, and Spanish Test samples, both -0.5).

Regional Trends: RSPI vs RVPI

Relative Subject Test Performance Index and Relative Verbal Performance Index means for regional SVQA contingents with at least 10 examinees, and Ns for all contingents, are shown in Table 15. Except for the Mideastern and "English" contingents, intra-regional classification (I versus II) was based on distinctions associated with country of origin in characteristic patterns of English language acquisition and usage and/or TOEFLEVL (see discussion in Section III and Section V).

Group I includes countries whose U.S. bound nationals, typically, were judged to have higher levels of proficiency in English and/or richer English-language backgrounds than examinees from countries in Group II. Inspection of the RVPI means indicates that, according to this index, the distinction is a valid one—that is, Group I RVPI means were generally higher than Group II RVPI means. However, as was true for ESL examinees generally, mean RSPI values were higher than the corresponding mean RVPI values (except for Education) in both Group I and Group II contingents. This was true for the more quantitatively oriented Subject Tests as well as the more verbally oriented tests.

Evaluation of trends by region is limited by the absence of means for many regions, especially for Subject Tests in social science or humanities fields on which ESL examinees generally performed below expectancy for U.S. examinees (Education, Political Science, Sociology, History, and Literature in English). "English" examinees had positive RSPI means on all these tests, indicating performance better than expected for U.S. examinees with comparable GRE-Q scores. For Literature, Asia I examinees (from India, Singapore, the Philippines) also had a positive RSPI mean. In Sociology the Europe I contingent was very strong (RSPI mean = 0.4). Other regional RSPI means among the limited number available were negative.

For most of the Subject Tests, regardless of quantitative or verbal emphasis, performance better than expected for U.S. examinees was registered not only by the "English" SVQA contingents but also by the ESL west European (Europe I) contingents. Europe I also had better than expected means for Psychology and Sociology as well as for the French and Spanish Tests. RSPI means were negative only for the Political Science, History, and Literature Tests (-0.1, -0.2, and -0.3, respectively).

For Mathematics, Physics, and Chemistry, better-than-expected average performance was registered by almost all regional contingents. RSPI means were positive for regional contingents differing widely in mean RVPI and associated English-proficiency-related background variables—from Asia II, with mean RVPI typically below -2.0 to "English," with no EPD (English proficiency deficit).

On the Economics Test, only contingents from Europe I, America I, and America II had positive RSPI means. Among the major regional Engineering and Computer Science contingents, only the "English" and Europe I examinees performed above expectancy for U.S. examinees with comparable "general ability" as indexed by the GRE-Q score. For other regions, average performance on the Computer Science Test was lower relative to expectancy than performance on the Engineering Test.

Table 15

Summary of RSPI and RVPI Means for Non-U.S. SVQA Examinees
Classified by World Region (N = 10+ only)

Number of SVQA examinees

	ENGINE	MATHEM	COMP.S	PHYSIC	CHEMYS	GEOLOG	ECONOM	BIOLOG	EDUCAT	PSYCH.	MUSIC	POL.SC	SOCIOL	SPANYS	FRENCH	HISTOR	LITERA
ENGLISH	170	102	91	154	56	57	127	228	51	728	59	33	10	2	8	41	124
EUROPE I	167	155	93	94	67	29	145	103	5	62	6	24	10	11	15	15	47
EUROPEII	206	82	41	58	52	17	53	54	3	46	3	5	2	0	0	2	15
MIDEAST	282	55	64	38	44	14	28	96	6	52	2	14	5	0	1	1	9
AFRICA I	75	20	12	12	35	8	55	67	13	21	3	21	7	1	0	4	7
AFRICAII	97	21	22	24	19	6	27	44	3	7	0	7	1	0	1	2	7
AMER I	31	5	4	6	14	3	13	33	7	32	1	5	2	3	5	3	3
AMER II	213	71	88	81	56	20	147	140	15	100	9	15	3	10	7	4	8
ASIA I	372	75	121	108	17[illegible]	13	91	173	6	47	2	17	5	0	1	1	42
ASIA II	744	364	317	225	218	20	285	260	37	88	33	87	22	5	5	16	75
OTHER	22	12	29	2	2	0	9	14	3	19	3	3	0	0	0	0	0
TOTAL	2379	962	882	802	737	187	980	1212	149	1202	121	231	67	32	43	89	337
NOT LIST	310	141	157	129	140	27	85	162	15	78	8	28	1	6	3	8	33
GR TOT	2689	1103	1039	931	877	214	1065	1374	164	1280	129	259	68	38	46	97	370

Relative Subject Test Performance Index (RSPI) means

	ENGINE	MATHEM	COMP.S	PHYSIC	CHEMIS	GEOLOG	ECONOM	BIOLOG	EDUCAT	PSYCH.	MUSIC	POL.SC	SOCIOL	SPANIS	FRENCH	HISTOR	LITERA
ENGLISH	0.3	1.0	0.5	0.6	0.5	0.5	0.9	0.3	0.1	0.7	0.8	0.5	0.3	*	*	0.3	0.8
EUROPE I	0.4	1.1	0.2	0.6	0.5	0.2	0.5	0.2	*	0.2	*	-0.1	0.4	1.0	1.5	-0.2	-0.3
EUROPEII	-0.1	0.6	-0.3	0.3	-0.2	-1.4	-0.1	-0.2	*	-0.2	*	*	*			*	-0.5
MIDEAST	-0.1	0.2	-0.2	0.5	-0.2	-1.3	-0.5	-1.0	*	-0.4	*	-0.9	*		*	*	*
AFRICA I	-0.1	-0.2	-0.8	0.1	-0.0	*	-0.1	-0.5	-0.2	-0.6	*	-0.5	*	*		*	*
AFRICAII	-0.1	0.6	-0.4	0.4	0.3	*	-0.2	-0.9	*	*		*	*		*	*	*
AMER I	-0.1	*	*	*	0.3	*	0.1	-0.4	*	-0.3	*	*	*	*	*	*	*
AMER II	-0.0	0.8	0.0	0.5	0.6	0.3	0.4	0.0	-0.7	-0.2	*	-0.5	*	1.2	*	*	*
ASIA I	-0.2	0.1	-0.5	0.2	0.2	-0.2	-0.2	-0.2	*	0.1	*	-0.7	*		*	*	0.1
ASIA II	-0.2	0.5	-0.5	0.7	0.2	-0.9	-0.3	-1.1	-1.5	-0.9	-0.3	-1.6	-1.1	*	*	-1.2	-1.5
OTHER	0.4	1.0	-0.8	*	*		*	-0.1	*	-0.1	*	*					
TOTAL	-0.1	0.6	-0.3	0.5	0.2	-0.2	0.1	-0.3	-0.6	0.3	0.3	-0.7	-0.3	0.6	0.8	-0.2	-0.2
NOT LIST	-0.1	0.9	-0.3	0.7	0.4	-0.5	-0.1	-0.8	-1.2	0.0	*	-1.0	*	*	*	*	-0.3
GR TOT	-0.1	0.6	-0.3	0.6	0.2	-0.3	0.1	-0.4	-0.7	0.3	0.3	-0.8	-0.3	0.6	0.8	-0.3	-0.2

Relative Verbal Performance Index (RVPI) means

	ENGINE	MATHEM	COMP.S	PHYSIC	CHEMIS	GEOLOG	ECONOM	BIOLOG	EDUCAT	PSYCH.	MUSIC	POL.SC	SOCIOL	SPANIS	FRENCH	HISTOR	LITERA
ENGLISH	-0.3	0.0	-0.1	-0.3	-0.1	0.3	0.0	0.2	0.0	0.1	0.0	0.4	0.7	*	*	0.2	0.3
EUROPE I	-1.1	-1.3	-1.4	-1.4	-1.0	-0.8	-1.1	-0.6	*	-0.6	*	-1.0	-0.6	-0.6	-0.3	-1.1	-0.8
EUROPEII	-2.0	-2.2	-1.7	-2.0	-1.5	-2.4	-1.8	-1.4	*	-1.3	*	*	*			*	-1.5
MIDEAST	-1.8	-1.6	-2.1	-2.0	-1.6	-1.8	-2.0	-1.7	*	-1.7	*	-1.5	*		*	*	*
AFRICA I	-0.8	-1.5	-1.5	-1.1	-1.1	*	-1.0	-0.9	-0.3	-0.5	*	-0.9	*	*		*	*
AFRICAII	-1.7	-1.9	-2.1	-2.0	-1.5	*	-1.9	-1.6	*	*		*	*		*	*	*
AMER I	-0.3	*	*	*	-0.4	*	-0.5	-0.5	*	-0.3	*	*	*	*	*	*	*
AMER II	-1.1	-1.1	-1.2	-1.5	-0.8	-0.9	-1.3	-0.5	-0.2	-0.6	*	-0.7	*	0.1	*	*	*
ASIA I	-0.9	-0.8	-1.1	-1.1	-1.0	-0.6	-0.1	-0.7	*	-0.1	*	-0.0	*		*	*	-0.4
ASIA II	-2.2	-2.3	-2.4	-2.5	-2.1	-2.3	-2.3	-2.2	-2.0	-2.0	-2.4	-2.5	-2.5	*	*	-2.9	-2.2
OTHER	-1.0	-1.9	-1.7	*	*		*	-1.5	*	-1.1	*	*					
TOTAL	-1.5	-1.6	-1.6	-1.5	-1.3	-0.9	-1.3	-1.0	-0.7	-0.3	-0.9	-1.3	-1.1	-0.6	-0.5	-0.8	-0.7
NOT LIST	-1.6	-1.8	-1.7	-2.2	-1.8	-1.0	-1.4	-1.3	-0.6	-0.4	*	-1.5	*	*	*	*	-0.6
GR TOT	-1.5	-1.6	-1.6	-1.6	-1.4	-0.9	-1.3	-1.0	-0.7	-0.3	-0.8	-1.3	-1.1	-0.6	-0.5	-0.8	-0.7

In Psychology, other than the "English" and Europe I contingents, only the Asia I contingent had a positive RSPI mean. For Biology, only the "English," Europe I, and America II contingents had positive RSPI means; a similar pattern obtained for the Geology Test although comparative data were not available for all regions. These are the two least quantatively oriented Subject Test fields.

On the French and Spanish Tests, the Europe I and America II contingents registered very strong performance relative to expectancy for U.S. examinees.

Discussion

Non-U.S. regional contingents are assumed to differ among themselves and from U.S. examinees not only with respect to levels of general "English proficiency," but also with respect to degree of selection on academic and motivational variables and educational background variables such as, for example, duration and intensity of concentration in the field of the Subject Test, curricular content of educational programs, and so on.

On balance, the findings suggest that the amount of between-means variance in Subject Test scores that can be attributed to differences in English proficiency, per se, is comparatively limited for most of the tests, especially for the tests involving more quantitatively oriented subject matter. This is clearly the case for the tests on which ESL examinees outperformed U.S. examinees with comparable "ability" as reflected in GRE-Q scores.

Depressing effects due to English proficiency deficit (EPD), per se, that may be present in data for tests in which ESL examinees typically performed below expectancy for U.S. examinees cannot be differentiated clearly from other effects.

For tests in the social sciences and humanities fields, cultural-linguistic background undoubtedly tends to be more important than for tests in the more quantitatively oriented fields. The findings for Asia I and Asia II are illustrative. For Subject Tests in Engineering, Mathematics, Computer Science, Physics, and Chemistry (the five most quantitatively oriented fields), Asia I and Asia II examinees had comparable RSPI means. However, on the Geology and Biology Tests, and on the social science and humanities tests (for which comparative data were available), Asia I examinees performed much better relative to expectancy than did Asia II examinees. On the Literature in English Test, for example, RSPI means were 0.1 and -1.5, for Asia I (including India and the Philippines) and Asia II examinees (from Japan, Korea, Taiwan, and so on), respectively.

The Subject Tests in the social science and humanities fields emphasize knowledge, understanding, and concepts that stem primarily from U.S.-"English"-"Western" experience, shared more by Asia I than by Asia II examinees. Subject matter in the basic sciences on the other hand is inherently structured; thus, the Subject Tests in these fields are free of comparable bias.

References

Bridgeman, B., & Carlson, S. (1983). Survey of academic writing tasks required of graduate and undergraduate foreign students (TOEFL Research Report No. 15; also ETS RR-83-18). Princeton, NJ: Educational Testing Service.

Educational Testing Service (1983). TOEFL test and score manual. Princeton, NJ: Author.

Educational Testing Service (1984). GRE guide to the use of the Graduate Record Examinations 1983-84. Princeton, NJ: Author.

Educational Testing Service (1984a). The GRE information bulletin, 1984-85. Princeton, NJ: Author.

Educational Testing Service (1984b). GRE Subject Tests descriptive booklet. Princeton, NJ: Author.

Erickson, M., and Molloy, J. (1983). "ESP test development for engineering students," in Oller, J. W. (ed.). Issues in language testing research. Rowley, MA: Newbury House Publishers.

Powers, D. E. (1980). The relationship between scores on the Graduate Management Admission Test and the Test of English as a Foreign Language (TOEFL Research Report No. 5). Princeton, NJ: Educational Testing Service.

Vardon, J. (1985). Panelist, cited in Bales, J. (July 1985), "Educational excellence push assailed," APA Monitor: Washington, D.C.: The American Psychological Association.

Wilson, K. M. (1982a). GMAT and GRE Aptitude Test performance in relation to primary language and scores on TOEFL (TOEFL Research Report No. 12; also ETS RR-82-28). Princeton, NJ: Educational Testing Service.

Wilson, K. M. (1982b). A comparative analysis of TOEFL examinee characteristics (TOEFL Research Report No. 11; also ETS RR-82-27). Princeton, NJ: Educational Testing Service.

Wilson, K. M. (1984a). Foreign nationals taking the GRE General Test: Highlights of a study (GRE Board Professional Report No. 81-23aRP; also ETS RR-84-23). Princeton, NJ: Educational Testing Service.

Wilson, K. M. (1984b). Foreign nationals taking the GRE General Test during 1981-82: Selected characteristics and test performance (GRE Board Professional Report No. 81-23bP; also ETS RR-84-39). Princeton, NJ: Educational Testing Service.

Wilson, K. M. (1985). Factors affecting GMAT predictive validity for foreign MBA students: An exploratory study (ETS RR-85-17). Princeton, NJ: Educational Testing Service.

Appendix

A-1. Number of GRE Subject Test takers, 1982-84, by Country of Citizenship, and Subject Test Means for Contingents with 10 or More Examinees

These tables are detailed extensions of Table 3 (Section III), and Table 10 (Section V), respectively.

A-2. Number of SVQA Examinees, Selected Countries, and Relative Subject Test Performance Index (RSPI) and Relative Verbal Test Performance Index (RVPI) Means for Contingents with 10 or More Examinees

These tables provide data for selected countries representing an extension of regional-level analyses reported in Section VII (Table 15). SVQA examinees were Subject Test (S) takers with concurrent verbal (V), quantitative (Q), and analytical ability (A) scores from the GRE General Test.

B-1. Regression Equations for Estimating S.vqa, S.q, and V.q, Based on Data for U.S. SVQA Samples

B-2. Correlation of Subject Test Scores with GRE General Test Verbal (V), Quantitative (Q), and Analytical (A) Ability Scores, and Correlation of Verbal with Quantitative Scores, for U.S. and Non-U.S. Examinees

These tables provide detailed data on analyses alluded to in the discussion of procedures in Section VII.

N'S FOR SUBJECT

	ENGIN	MATHE	COMP.	PHYSI	CHEMI	GEOLO	ECONO	BIOLO	EDUCA	PSYCH	MUSIC	POL.S	SOCIO	SPANI	FRENC	HISTO	LITER	ALL S
AFGHANIS	0	0	0	1	0	0	0	2	0	0	0	0	0	0	0	0	0	3
ALBANIA	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
ALGERIA	38	10	6	19	1	1	4	1	0	0	0	0	0	0	0	0	0	80
AMERICAN	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
ANDORRA	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
ANGOLA	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	1
ANTIGUA	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	1	2
ARGENTIN	16	6	7	11	2	0	18	14	2	9	1	3	0	5	0	1	0	95
AUSTRALI	12	10	12	13	4	5	22	12	4	13	0	2	0	0	0	3	15	126
AUSTRIA	3	1	9	3	4	0	3	3	0	2	0	1	0	0	0	3	4	36
AZORES	0	0	0	0	0	0	0	0	0	2	0	0	0	0	0	0	0	2
BAHAMAS	1	0	0	0	1	0	1	3	3	4	0	2	0	0	0	0	0	15
BAHRAIN	1	1	1	0	0	0	0	3	1	0	0	0	0	0	0	0	0	7
BANGLADE	8	4	0	13	4	1	9	12	0	0	0	1	0	1	0	0	6	59
BARBADOS	0	3	0	0	0	0	0	3	0	4	0	0	0	1	0	1	1	13
BELGIUM	17	3	11	7	0	0	13	8	1	5	0	1	1	0	1	0	1	69
BELIZE	0	0	0	0	0	0	1	0	0	0	0	1	1	0	0	0	0	3
BENIN	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
BERMUDA	1	0	1	0	2	0	0	0	1	1	0	0	0	0	0	2	1	9
BHUTAN	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
BOLIVIA	0	0	1	0	0	0	10	3	0	2	1	0	0	1	0	0	0	18
BOTSWANA	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0	1
BRAZIL	37	23	19	24	3	9	14	23	1	13	0	1	2	1	0	1	3	174
BRUNEI	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
BULGARIA	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	1
BURMA	3	1	0	2	2	2	2	5	0	1	0	0	0	0	0	0	0	18
BURUNDI	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
CAMEROON	3	0	0	1	3	0	1	4	0	0	0	1	0	0	0	0	0	13
CANADA	116	43	60	91	44	41	73	164	54	747	72	22	8	0	7	20	55	1617
CANARY I	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
CAPE VER	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
CAROLINE	0	0	0	0	0	0	0	2	0	0	0	0	0	0	0	0	0	2
CAYMAN I	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
CENTRAL	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
CHAD	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
CHILE	10	2	7	6	2	0	12	7	2	7	1	2	0	3	2	0	0	63
COLOMBIA	51	5	20	13	7	3	24	28	1	28	1	2	1	11	2	2	1	200
COMOROS	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
CONGO	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
COSTA RI	2	2	3	4	1	1	5	6	4	2	1	0	1	2	0	0	0	34
CUBA	2	2	0	4	5	0	1	8	0	20	3	0	1	2	2	0	2	52
CYPRUS	21	8	1	3	2	0	11	2	1	7	0	1	0	0	0	0	1	58
CZECHOSL	0	3	0	0	0	0	0	1	0	0	0	0	0	0	0	1	0	5
DENMARK	3	1	1	3	2	1	2	3	0	4	0	2	0	0	0	0	1	23
DJIBOUTI	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
DOMINICA	2	1	0	0	3	1	2	4	0	3	0	0	0	2	1	1	0	20
ECUADOR	10	0	3	1	0	1	1	8	0	6	0	0	0	2	1	0	0	33
EGYPT	42	9	11	6	12	6	6	23	0	3	0	1	0	0	0	0	5	124
EL SALVA	3	0	1	3	0	0	1	4	0	3	0	1	0	0	1	0	0	17
ENGLAND	34	30	19	44	11	14	27	50	2	41	12	10	4	2	4	21	55	380

N'S FOR SUBJECT

	ENGIN	MATHE	COMP.	PHYSI	CHEMI	GEOLO	ECONO	BIOLO	EDUCA	PSYCH	MUSIC	POL.S	SOCIO	SPANI	FRENC	HISTO	LITER	ALL S
EQUATORI	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
ETHIOPIA	5	3	1	2	5	2	5	9	1	0	0	3	0	0	0	0	0	36
FIJI	0	0	0	0	0	0	0	1	1	0	0	0	0	0	0	0	1	3
FINLAND	5	1	2	3	4	0	2	3	0	4	0	0	0	0	0	1	2	27
FRANCE	52	100	21	15	12	9	25	15	0	7	1	5	2	2	23	2	9	300
FRENCH P	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
FRENCH G	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
GABON	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
GAMBIA	1	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	2
GERMAN D	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
GERMANY	17	33	21	38	21	8	13	35	3	32	3	4	0	3	1	2	13	247
GHANA	7	3	3	1	5	1	14	12	0	1	0	2	2	0	0	1	0	52
GREECE	115	62	26	35	33	7	29	32	0	23	1	2	0	0	0	2	4	371
GREENLAN	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0	1
GRENADA	0	0	0	1	0	0	0	1	0	1	0	0	0	0	0	0	0	3
GUADALOU	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0	1
GUAM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
GUATEMAL	6	2	1	0	2	0	0	7	0	5	1	2	1	0	0	0	0	27
GUINEA	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
GUINEA-B	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
GUYANA	4	2	0	1	3	0	2	5	1	5	0	1	0	0	0	0	2	26
HAITI	2	0	0	0	0	1	1	3	0	3	0	0	0	0	2	0	0	12
HONDURAS	2	0	0	0	0	0	1	3	0	4	0	1	0	0	0	0	0	11
HONG KON	155	69	126	61	37	3	20	46	4	22	16	2	3	0	0	2	6	572
HUNGARY	2	1	0	1	0	0	0	0	0	0	0	0	0	0	0	1	0	5
ICELAND	13	1	3	1	3	5	4	8	2	3	0	0	0	0	0	0	3	46
INDIA	765	91	248	178	238	20	96	204	4	43	1	13	6	2	4	2	43	1958
INDONESI	59	11	17	6	5	2	13	11	6	6	0	2	2	0	0	0	0	140
IRAN	194	28	35	27	27	7	10	64	3	17	0	2	3	1	3	1	1	423
IRAQ	7	3	2	3	0	3	1	6	1	0	0	1	0	0	0	1	2	30
IRELAND	17	11	5	6	1	4	11	20	0	18	2	0	1	0	2	4	11	113
ISRAEL	29	14	28	11	4	0	7	16	1	44	3	3	1	0	0	1	2	164
ITALY	21	12	12	20	3	5	38	18	0	5	1	3	2	1	3	2	8	154
IVORY CO	1	2	3	0	0	0	3	2	0	0	0	0	0	0	0	0	1	12
JAMAICA	9	1	3	1	8	1	1	11	6	15	0	1	0	4	2	1	2	66
JAPAN	161	92	37	33	46	3	97	45	7	29	15	48	9	4	0	11	30	667
JORDAN	31	13	5	5	7	0	5	7	3	5	0	3	0	0	0	0	1	85
KAMPUCHE	1	0	0	1	0	0	0	2	0	0	0	0	0	0	0	0	0	4
KENYA	4	6	0	3	3	0	7	4	3	8	1	0	2	0	0	1	0	42
KIRIBATI	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
KOREA	293	184	87	131	173	13	175	110	6	27	11	31	8	1	1	7	30	1288
KUWAIT	3	0	1	1	0	1	3	2	0	1	0	1	0	0	0	0	0	13
LAOS	4	1	0	0	0	0	0	1	0	1	0	0	0	0	1	0	0	8
LEBANON	62	9	10	2	10	1	7	18	2	5	0	4	0	0	1	0	3	134
LESOTHO	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0	1
LIBERIA	2	1	0	2	1	1	5	3	0	0	0	0	0	0	0	1	2	18
LIBYA	9	6	0	3	4	3	6	8	1	2	0	0	0	0	0	2	2	46
LIECHTEN	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1
LUXEMBOU	1	2	1	0	0	0	0	4	0	0	0	0	1	0	0	0	0	9
MACAO	0	1	4	1	1	0	0	0	0	1	0	0	0	0	0	0	0	8

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N'S FOR SUBJECT

	ENGIN	MATHE	COMP.	PHYSI	CHEMI	GEOLO	ECONO	BIOLO	EDUCA	PSYCH	MUSIC	POL.S	SOCIO	SPANI	FRENC	HISTO	LITER	ALL S
MADAGASC	0	0	0	0	0	0	0	1	0	0	0	0	0	0	1	0	0	2
MADEIRA	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1
MALAWI	0	0	0	1	0	0	1	5	1	1	0	0	0	0	0	0	0	9
MALAYSIA	53	26	32	24	24	8	17	39	7	6	1	2	0	0	1	1	4	245
MALDIVES	1	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	2
MALI	0	0	0	0	0	0	2	0	0	1	0	0	0	0	0	0	0	3
MALTA	0	0	2	0	0	0	0	0	1	1	0	0	0	0	0	0	0	4
MARIANA	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
MARSHALL	1	0	2	1	2	0	0	3	1	3	0	1	0	0	0	0	0	14
MARTINIQ	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0	1
MAURITAN	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
MAURITIU	2	1	2	1	0	0	0	1	0	0	0	0	0	0	0	0	0	7
MEXICO	40	18	18	15	21	5	40	30	3	26	1	6	0	8	1	0	1	233
MIDWAY I	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
MONACO	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
MONGOLIA	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
MOROCCO	4	2	1	0	0	0	3	1	0	1	0	0	0	0	0	1	0	13
MOZAMBIQ	2	1	1	0	1	0	1	1	0	0	0	0	1	0	0	0	0	8
NAURU	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
NEPAL	3	0	2	1	2	0	3	4	0	0	0	0	0	0	0	0	0	15
NETHERLA	7	4	2	6	6	6	7	9	2	7	1	3	3	1	3	3	7	77
NETHERLA	1	0	0	0	1	0	1	2	0	4	0	0	0	0	0	0	0	9
NEW CALE	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
PAPUA NE	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0	1
NEW ZEAL	4	11	0	12	2	1	6	3	0	8	5	1	0	0	0	0	2	55
NICARAGU	1	0	2	0	0	0	2	0	0	2	0	0	0	0	0	0	0	7
NIGER	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
NIGERIA	53	16	10	4	20	5	30	43	10	14	0	23	4	0	0	0	4	236
NIVE ISL	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0	1
NORTHERN	2	0	2	2	0	1	2	1	0	0	0	0	0	0	0	0	0	10
NORWAY	4	3	6	1	4	0	5	0	1	5	1	0	0	0	0	1	2	33
OKINAWA	2	2	0	0	0	0	0	2	0	2	0	0	0	0	0	0	0	8
OMAN	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
PAKISTAN	34	5	5	9	19	3	10	12	0	5	0	3	0	0	0	0	3	108
PANAMA	5	1	4	2	4	0	3	10	1	7	2	0	0	2	0	1	1	43
PARAGUAY	0	0	0	0	1	0	1	1	0	0	0	0	0	0	0	0	0	3
PEOPLE'S	32	27	24	34	13	1	4	10	0	1	3	3	2	0	0	0	6	160
PERU	36	10	6	6	4	1	27	6	6	7	0	0	1	4	0	0	0	114
PHILIPPI	42	18	18	8	32	2	27	48	3	21	1	6	1	0	0	1	6	234
POLAND	4	9	3	7	6	0	0	6	0	2	1	0	0	0	0	0	5	43
PORTUGAL	5	5	2	8	1	2	5	8	0	4	1	0	0	0	1	0	2	44
PUERTO R	0	0	0	1	1	0	0	3	0	0	0	0	0	0	0	0	0	5
QATAR	0	0	0	0	2	1	0	0	0	0	0	0	0	0	0	0	0	3
ZIMBABWE	1	1	0	0	3	0	0	1	0	0	0	1	0	0	0	0	0	7
ROMANIA	0	3	1	1	0	1	0	1	0	1	0	0	0	0	1	0	0	9
UNION OF	1	2	1	1	2	0	0	1	0	2	1	0	0	1	0	0	0	12
RWANDA	0	0	0	0	0	0	0	1	0	0	0	0	1	0	0	0	0	2
SAN MARI	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
SAO TOME	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
SAUDI AR	18	2	3	7	4	1	1	3	2	2	0	2	0	0	0	1	3	49

N'S FOR SUBJECT

	ENGIN	MATHE	COMP.	PHYSI	CHEMI	GEOLO	ECONO	BIOLO	EDUCA	PSYCH	MUSIC	POL.S	SOCIO	SPANI	FRENC	HI	STO	LITER	ALL S
SCOTLAND	2	1	3	3	3	2	2	10	1	7	0	0	0	0	2	1	3	40	
SENEGAL	1	0	0	1	0	0	1	0	0	0	0	0	0	0	0	0	0	3	
SEYCHELL	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	
SICILY	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	
SIERRA L	1	0	0	1	1	0	0	6	0	0	0	5	1	0	0	1	3	19	
SINGAPOR	28	13	32	2	2	0	12	12	3	14	3	2	0	0	0	0	0	[redacted]23	
SOLOMON	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	
SOMALIA	1	0	0	0	0	0	1	1	0	1	0	0	0	0	0	0	0	4	
SOUTH AF	25	1	1	3	6	0	2	6	4	8	4	2	1	1	0	1	5	65	
SPAIN	30	3	6	4	8	4	32	18	2	15	1	1	1	13	0	3	7	[redacted]48	
SRI LANK	32	27	2	29	50	0	7	35	0	3	0	0	0	0	0	0	1	[redacted]86	
SUDAN	0	1	0	1	0	0	0	0	0	0	0	0	0	0	0	1	0	3	
SURINAME	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	1	
SWAZILAN	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	
SWEDEN	13	6	3	5	5	3	7	5	0	3	1	5	1	0	0	1	2	60	
SWITZERL	14	0	4	2	8	1	6	1	0	1	0	3	1	0	1	0	2	44	
SYRIA	14	2	3	0	3	1	3	8	0	1	0	0	0	0	0	0	0	35	
TAHITI	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	
TAIWAN	441	185	214	115	186	10	30	161	9	34	13	6	3	2	2	1	13	14[redacted]25	
TANZANIA	6	2	0	0	3	1	3	3	1	0	0	0	0	0	0	0	0	19	
THAILAND	53	10	15	3	10	1	23	31	12	7	2	12	2	0	0	1	7	1[redacted]89	
TOGO	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	
TONGA	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	
TRINIDAD	12	2	0	4	0	0	3	9	2	9	0	0	1	0	1	0	1	[redacted]44	
TUNISIA	4	0	1	1	0	0	0	0	0	0	0	1	0	0	1	0	1	9	
TURKEY	79	8	8	14	12	7	19	5	0	12	0	1	2	0	0	0	2	1[redacted]69	
UGANDA	1	2	1	0	2	0	1	3	1	1	0	0	0	0	0	0	1	[redacted]13	
UNITED A	1	1	0	0	1	0	1	1	0	0	0	1	0	0	0	0	0	6	
UNITED S	1	1	1	1	0	0	4	3	4	10	2	0	0	0	0	0	1	[redacted]28	
UPPER VO	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	
URUGUAY	6	1	2	2	2	0	3	2	0	0	0	0	0	1	1	0	1	[redacted]21	
VATICAN	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	
VENEZUEL	23	9	7	4	13	5	4	14	2	10	0	2	0	3	1	0	1	[redacted]98	
VIETNAM	37	15	13	6	11	0	2	9	0	0	0	1	1	0	3	0	1	[redacted]99	
VIRGIN I	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	
WALES	0	0	0	1	0	1	0	2	0	0	0	0	0	0	0	0	1	5	
WEST BAN	3	1	0	2	3	0	0	1	0	0	0	0	1	0	0	0	0	[redacted]31	
WEST IND	2	0	0	1	1	0	1	4	0	1	1	0	0	0	0	0	1	[redacted]32	
WESTERN	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	
YEMEN	0	0	0	0	0	0	1	1	0	0	0	0	0	0	0	0	0	2	
YUGOSLAV	9	3	5	12	0	0	3	4	0	1	1	1	0	0	0	0	2	[redacted]41	
ZAIRE	2	0	1	2	0	0	2	1	0	0	0	0	0	0	0	0	0	8	
ZAMBIA	0	0	0	0	0	1	1	4	0	0	0	0	0	0	0	0	0	6	
TOTAL	3688	1399	1366	1237	1277	262	1238	1761	212	1537	194	283	90	87	84	[redacted]20	432	15[redacted]67	
NOT LIST	1036	462	460	387	544	51	156	378	31	154	25	41	2	18	15	[redacted]14	57	38[redacted]51	
GR TOT	4724	1861	1826	1624	1821	313	1394	2139	243	1691	219	324	92	105	99	[redacted]34	489	190[redacted]18	

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MEANS FOR SUBJECT

	ENGIN	MATHE	COMP.	PHYSI	CHEMI	GEOLO	E	ECONO	BIOLO	EDUCA	PSYCHO	MUSIC	POL.S	SOCIO	SPANI	FRENC	HISTO	LITER
AFGHANIS				*					*									
ALBANIA																		
ALGERIA	505	665	*	602	*	*	*	*										
AMERICAN																		
ANDORRA																		
ANGOLA						*												
ANTIGUA					*													
ARGENTIN	603	*	*	734	*		698	646	*	*	*	*		*		*		*
AUSTRALI	671	680	771	804	*	*	773	678	*	590		*				*		613
AUSTRIA	*	*	*	*	*		*	*		*		*				*		*
AZORES										*								
BAHAMAS	*				*		*	*	*	*		*						
BAHRAIN	*	*	*					*	*									
BANGLADE	*	*		495	*	*	*	477				*		*				*
BARBADOS		*						*		*				*		*		*
BELGIUM	727	*	715	*			690	*	*	*		*	*		*			*
BELIZE							*					*	*					
BENIN																		
BERMUDA	*		*		*				*	*							*	*
BHUTAN																		
BOLIVIA			*				564	*		*	*			*				
BOTSWANA								*										
BRAZIL	592	753	616	658	*	*	618	558	*	460		*	*	*		*	*	
BRUNEI																		
BULGARIA				*														
BURMA	*	*		*	*	*	*	*		*								
BURUNDI																		
CAMEROON	*			*	*		*	*				*						
CANADA	648	633	668	711	679	621	688	678	482	604	564	513	*		*	568	602	
CANARY I																		
CAPE VER																		
CAROLINE								*										
CAYMAN I																		
CENTRAL																		
CHAD																		
CHILE	599	*	*	*	*		675	*	*	*	*	*		*	*			
COLOMBIA	542	*	591	678	*	*	584	540	*	477	*	*	*	543	*	*	*	
COMOROS																		
CONGO																		
COSTA RI	*	*	*	*	*	*	*	*	*	*	*		*	*				
CUBA	*	*		*	*		*	*		499	*		*	*	*			*
CYPRUS	571	*	*	*	*		576	*	*	*		*						*
CZECHOSL		*						*										
DENMARK	*	*	*		*	*	*	*		*		*						*
DJIBOUTI																		
DOMINICA	*	*			*	*	*	*		*				*	*	*		
ECUADOR	536		*	*		*	*	*		*				*	*			
EGYPT	485	*	593	*	533	*	*	459		*		*						*
EL SALVA	*		*	*			*	*		*		*				*		
ENGLAND	642	821	565	731	678	644	723	667	*	590	576	489	*	*	*	547	607	

MEANS FOR SUBJECT

	ENGIN	MATHE	COMP.	PHYSI	CHEMI	GEOLO	ECONO	BIOLO	EDUCA	PSYCH	MUSIC	POL.S	SOCIO	SPANI	FRENC	HISTO	LITER
EQUATORI																	
ETHIOPIA	*	*	*	*	*	*	*	*	*			*					
FIJI								*	*								*
FINLAND	*	*	*	*	*		*	*		*						*	*
FRANCE	623	826	609	624	622	*	651	599		*	*	*	*	*	620	*	*
FRENCH P																	
FRENCH G																	
GABON																	
GAMBIA	*						*										
GERMAN D																	
GERMANY	609	745	671	721	679	*	746	658	*	590	*	*		*	*	*	509
GHANA	*	*	*	*	*	*	522	518		*		*	*			*	
GREECE	596	726	584	629	554	*	619	545		493	*	*				*	*
GREENLAN								*									
GRENADA				*				*		*							
GUADALOU												*					
GUAM																	
GUATEMAL	*	*	*		*			*		*	*	*	*				
GUINEA																	
GUINEA-B																	
GUYANA	*	*		*	*		*	*	*	*		*					*
HAITI	*					*	*	*		*					*		
HONDURAS	*						*	*		*		*					
HONG KON	642	746	610	746	696	*	677	680	*	563	515	*	*			*	*
HUNGARY	*	*		*												*	
ICELAND	628	*	*	*	*	*	*	*	*	*							*
INDIA	641	687	648	614	606	513	606	574	*	544	*	410	*	*	*	*	522
INDONESI	518	663	546	*	*	*	517	425	*	*		*	*				
IRAN	533	630	535	586	524	*	547	506	*	409		*	*	*	*	*	*
IRAQ	*	*	*	*		*	*	*	*			*				*	*
IRELAND	623	827	*	*	*	*	750	666		589	*		*		*	*	582
ISRAEL	641	836	673	774	*		*	537	*	581	*	*	*			*	*
ITALY	618	846	630	617	*	*	641	607		*	*	*	*	*	*	*	*
IVORY CO	*	*	*				*	*									*
JAMAICA	*	*	*	*	*	*	*	533	*	467		*		*	*	*	*
JAPAN	612	743	618	636	572	*	617	537	*	473	477	391	*	*		455	419
JORDAN	497	609	*	*	*		*	*	*	*		*					*
KAMPUCHE	*			*				*									
KENYA	*	*		*	*		*	*	*	*	*		*			*	
KIRIBATI																	
KOREA	613	827	608	763	705	532	675	622	*	521	460	430	*	*	*	*	410
KUWAIT	*		*	*		*	*	*		*		*					
LAOS	*	*						*		*					*		
LEBANON	539	*	507	*	573	*	*	566	*	*		*			*		*
LESOTHO										*							
LIBERIA	*	*		*	*	*	*	*								*	*
LIBYA	*	*		*	*	*	*	*	*	*						*	*
LIECHTEN		*															
LUXEMBOU	*	*	*					*					*				
MAC		*	*	*	*					*							

MEANS FOR SUBJECT

	ENGIN	MATHE	COMP.	PHYSI	CHEMI	GEOLO	ECONO	BIOLO	EDUCA	PSYCH	MUSIC	POL.S	SOCIO	SPANI	FRENC	HISTO	LITER
MADAGASC								*							*		
MADEIRA		*															
MALAWI							*	*	*								
MALAYSIA	574	640	541	594	580	*	574	566	*		*	*			*	*	*
MALDIVES	*	*															
MALI							*										
MALTA			*						*								
MARIANA																	
MARSHALL	*		*		*			*	*			*					
MARTINIQ									*								
MAURITAN																	
MAURITIU	*	*	*					*									
MEXICO	537	712	612	587	624	*	630	605	*	521	*	*		*		*	
MIDWAY I																	
MONACO																	
MONGOLIA																	
MOROCCO	*	*	*				*	*								*	
MOZAMBIQ	*	*	*		*		*	*					*				
NAURU																	
NEPAL	*		*		*		*	*									
NETHERLA	*	*	*		*	*	*	*	*		*	*	*	*		*	
NETHERLA	*				*		*	*									
NEW CALE																	
PAPUA NE																	
NEW ZEAL	*	871		778	*	*	*	*			*	*					*
NICARAGU	*		*				*										
NIGER																	
NIGERIA	481	566	482		518	*	503	474	372	445		357	*				*
NIVE ISL								*									
NORTHERN	*		*			*	*	*									
NORWAY	*	*	*		*		*		*		*					*	*
OKINAWA	*	*						*									
OMAN																	
PAKISTAN	523	*	*		563	*	604	507				*					*
PANAMA	*	*	*		*		*	519	*		*				*	*	*
PARAGUAY					*		*	*									
PEOPLE'S	628	773	589	765	628	*	*	519			*	*	*				*
PERU	533	783	*		*	*	644	*	*				*	*			
PHILIPPI	546	604	534		644	*	581	575	*	407	*	*	*			*	*
POLAND	*	*	*		*			*			*						*
PORTUGAL	*	*	*		*	*	*	*			*						*
PUERTO R					*			*									
QATAR						*											
ZIMBABWE	*	*						*					*				
ROMANIA		*	*			*		*									
UNION OF	*	*	*		*			*			*						
RWANDA								*									
SAN MARI																	
SAO TOME																	
SAUDI AR	481	*	*		*	*	*	*	*				*			*	*

A-1, Mean

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MEANS FOR SUBJECT

	ENGIN	MATHE	COMP.	PHYSI	CHEMI	GEOLO	ECONO	BIOLO	EDUCA	PSYCH	MUSIC	POL.S	SOCIO	SPANI	FRENC	HISTO	LITER
SCOTLAND	*	*	*	*	*	*	*	678	*	*					*	*	*
SENEGAL	*			*			*										
SEYCHELL																	
SICILY																	
SIERRA L	*			*	*			*				*	*			*	*
SINGAPOR	615	848	574	*	*		630	664	*	561	*	*					
SOLOMON																	
SOMALIA	*						*	*		*							
SOUTH AF	650	*	*	*	*		*	*	*	*	*	*	*	*		*	*
SPAIN	618	*	*	*	*	*	650	587	*	504	*	*	*	676		*	*
SRI LANK	684	766	*	668	670		*	619		*							*
SUDAN		*		*												*	
SURINAME							*										
SWAZILAN		*															
SWEDEN	652	*	*	*	*	*	*	*		*	*	*	*			*	*
SWITZERL	641		*	*	*	*	*	*		*		*	*		*		*
SYRIA	545	*	*		*	*	*	*		*							
TAHITI																	
TAIWAN	625	774	607	634	667	496	650	566	*	512	428	*	*	*	*	*	416
TANZANIA	*	*			*	*	*	*	*								
THAILAND	522	641	539	*	541	*	567	520	337	*	*	343	*			*	*
TOGO																	
TONGA		*															
TRINIDAD	597	*		*			*	*	*	*			*		*		*
TUNISIA	*		*	*								*			*		*
TURKEY	567	*	*	595	526	*	581	*		509		*	*				*
UGANDA	*	*	*		*		*	*	*	*							*
UNITED A	*	*			*		*	*				*					
UNITED S	*	*	*	*			*	*	*	509	*						*
UPPER VO																	
URUGUAY	*	*	*	*	*		*	*						*	*		*
VATICAN																	
VENEZUEL	512	*	*	*	585	*	*	544	*	489		*		*	*		*
VIETNAM	557	683	562	*	559		*	*				*	*		*		*
VIRGIN I																	
WALES				*		*		*									*
WEST BAN	*	*		*	*			*					*				
WEST IND	*			*	*		*	*		*	*						*
WESTERN																	
YEMEN							*	*									
YUGOSLAV	*	*	*	645			*	*		*	*	*					*
ZAIRE	*		*	*			*	*									
ZAMBIA						*	*	*									
TOTAL	600	755	610	667	630	542	628	582	417	559	517	416	445	580	548	503	502
NOT LIST	630	789	631	668	655	510	620	557	409	529	485	400	*	544	496	511	476
GR TOT	606	763	616	667	637	537	628	578	416	557	513	414	442	574	540	504	499
U.S.	610	664	606	616	610	576	610	627	463	535	496	468	445	511	505	516	530

SUBJECT TEST ANALYSES--FOREIGN STUDENTS : ONLY
SPECIFIC COUNTRIES

Ns for SVQA Samples*

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N'S

	ENGINE	MATHEM	COMP.S	PHYSIC	CHEMIS	GEOLOG	ECONOM	BIOLOG	EDUCAT	PSYCH.	MUSIC	MI.SC	SOCIOL	SPANIS	FRENCH	HISTOR	LITERA
CANADA	104.0	41.0	53.0	77.0	38.0	37.0	64.0	142.0	42.0	648.0	45.0	10.0	7.0	0.0	3.0	18.0	49.0
ENGLAND	31.0	20.0	16.0	40.0	10.0	9.0	23.0	42.0	1.0	32.0	9.0	10.0	2.0	2.0	2.0	17.0	46.0
FRANCE	47.0	97.0	20.0	12.0	9.0	7.0	21.0	14.0	0.0	5.0	1.0	4.0	1.0	0.0	10.0	2.0	8.0
GERMANY	16.0	28.0	20.0	31.0	20.0	7.0	13.0	28.0	1.0	18.0	2.0	3.0	0.0	1.0	0.0	2.0	11.0
ITALY	16.0	8.0	10.0	17.0	3.0	5.0	36.0	14.0	0.0	4.0	1.0	2.0	2.0	1.0	2.0	1.0	5.0
SPAIN	28.0	1.0	5.0	5.0	7.0	3.0	31.0	12.0	1.0	12.0	0.0	1.0	1.0	8.0	0.0	3.0	6.0
GREECE	98.0	55.0	21.0	27.0	28.0	6.0	21.0	26.0	0.0	19.0	1.0	2.0	0.0	0.0	0.0	0.0	3.0
TURKEY	61.0	6.0	5.0	9.0	10.0	6.0	15.0	2.0	0.0	12.0	0.0	1.0	2.0	0.0	0.0	0.0	2.0
NIGERIA	40.0	11.0	8.0	4.0	18.0	4.0	23.0	37.0	7.0	10.0	0.0	16.0	4.0	0.0	0.0	0.0	3.0
EGYPT	34.0	6.0	11.0	5.0	7.0	4.0	5.0	16.0	0.0	2.0	0.0	1.0	0.0	0.0	0.0	0.0	2.0
IRAN	150.0	21.0	23.0	19.0	17.0	6.0	9.0	42.0	0.0	16.0	0.0	2.0	3.0	0.0	0.0	1.0	1.0
ISRAEL	25.0	11.0	25.0	8.0	4.0	0.0	5.0	14.0	1.0	27.0	2.0	2.0	1.0	0.0	0.0	0.0	1.0
BRAZIL	31.0	21.0	14.0	21.0	1.0	8.0	13.0	18.0	0.0	12.0	0.0	1.0	1.0	0.0	0.0	1.0	2.0
COLOMBIA	48.0	5.0	17.0	12.0	7.0	2.0	22.0	24.0	1.0	21.0	0.0	2.0	1.0	3.0	0.0	2.0	1.0
MEXICO	31.0	15.0	16.0	13.0	18.0	3.0	34.0	28.0	2.0	17.0	1.0	5.0	0.0	0.0	1.0	0.0	1.0
PERU	33.0	9.0	6.0	6.0	4.0	1.0	23.0	5.0	5.0	6.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
VENEZUEL	18.0	6.0	6.0	3.0	12.0	4.0	3.0	10.0	0.0	5.0	0.0	1.0	0.0	1.0	1.0	0.0	1.0
INDIA	335.0	60.0	107.0	101.0	146.0	11.0	67.0	133.0	3.0	33.0	1.0	12.0	5.0	0.0	1.0	1.0	38.0
PHILIPPI	37.0	15.0	14.0	7.0	28.0	2.0	24.0	40.0	3.0	14.0	1.0	5.0	0.0	0.0	0.0	0.0	4.0
SINGAPOR	18.0	10.0	28.0	2.0	1.0	0.0	8.0	8.0	2.0	13.0	3.0	2.0	0.0	0.0	0.0	0.0	0.0
SRI LANK	20.0	3.0	2.0	4.0	6.0	0.0	4.0	9.0	0.0	3.0	0.0	0.0	0.0	0.0	0.0	0.0	1.0
PAKISTAN	23.0	4.0	4.0	5.0	11.0	2.0	9.0	8.0	0.0	3.0	0.0	1.0	0.0	0.0	0.0	0.0	3.0
MALAYSIA	43.0	21.0	27.0	19.0	19.0	4.0	15.0	32.0	6.0	6.0	1.0	2.0	0.0	0.0	1.0	1.0	4.0
HONG KON	120.0	62.0	100.0	47.0	28.0	1.0	14.0	30.0	2.0	17.0	14.0	2.0	3.0	0.0	0.0	2.0	4.0
KOREA	189.0	120.0	52.0	81.0	71.0	7.0	111.0	63.0	5.0	19.0	3.0	24.0	6.0	1.0	1.0	3.0	21.0
TAIWAN	61.0	23.0	17.0	7.0	15.0	0.0	5.0	17.0	2.0	3.0	3.0	1.0	0.0	0.0	0.0	0.0	0.0
PEOPLE'S	16.0	20.0	15.0	20.0	11.0	1.0	4.0	9.0	0.0	1.0	2.0	2.0	2.0	0.0	0.0	0.0	5.0
INDONESI	44.0	7.0	15.0	5.0	5.0	2.0	13.0	10.0	5.0	5.0	0.0	0.0	2.0	0.0	0.0	0.0	0.0
THAILAND	37.0	9.0	13.0	3.0	6.0	0.0	18.0	20.0	11.0	7.0	0.0	11.0	1.0	0.0	0.0	0.0	6.0
JAPAN	151.0	81.0	15.0	24.0	32.0	2.0	82.0	35.0	6.0	22.0	10.0	42.0	8.0	3.0	0.0	10.0	26.0
TOTAL	1905.0	804.0	725.0	630.0	592.0	144.0	735.0	888.0	106.0	1012.0	100.0	177.0	52.0	20.0	22.0	64.0	254.0

* See Section VI for detail on SVQA samples.

SUBJECT TEST ANALYSES--FOREIGN STUDENTS ONLY
SPECIFIC COUNTRIES

Relative Verbal Performance Index

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MEANS FOR RES III

RVPI Means*

	ENGINE	MATHEM	COMP.S	PHYSIC	CHEMIS	GEOLOG	ECONOM	BIOLOG	EDUCAT	PSYCH.	MUSIC	POL.SC	SOCIOL	SPANIS	FRENCH	HISTOR	LITERA
CANADA	-0.2	-0.2	-0.1	-0.4	-0.3	0.3	-0.3	0.2	0.0	0.1	-0.1	0.5	*		*	-0.0	0.2
ENGLAND	-0.5	0.3	-0.6	-0.3	0.5	*	0.6	0.4	*	0.6	*	-0.1	*	*	*	0.4	0.4
FRANCE	-1.3	-1.2	-1.4	-1.5	*	*	-0.8	-0.9		*	*	*	*		-0.5	*	*
GERMANY	-1.6	-1.8	-1.4	-1.6	-0.9	*	-1.2	-0.6	*	-0.5	*	*		*		*	-0.6
ITALY	-0.7	*	-1.1	-0.7	*	*	-0.9	-0.5		*	*	*	*	*	*	*	*
SPAIN	-0.9	*	*	*	*	*	-1.1	-0.8	*	-0.5		*	*	*		*	*
GREECE	-1.9	-2.3	-1.7	-2.3	-1.6	*	-1.7	-1.4		-1.3	*	*					*
TURKEY	-2.2	*	*	*	-2.0	*	-2.1	*		-1.4		*	*				*
NIGERIA	-0.7	-1.6	*	*	-1.3	*	-1.0	-1.0	*	-0.2		-0.8	*				*
EGYPT	-2.0	*	-2.7	*	*	*	*	-2.2		*		*					*
IRAN	-1.8	-1.7	-2.0	-1.4	-1.5	*	*	-1.6		-1.9		*	*			*	*
ISRAEL	-1.9	-1.5	-2.4	*	*		*	-2.4	*	-1.7	*	*	*				*
BRAZIL	-1.3	-1.1	-1.0	-1.9	*	*	-1.2	-0.6		-0.5		*	*			*	*
COLOMBIA	-1.1	*	-1.1	-1.3	*	*	-1.0	-0.5	*	-0.8		*	*	*		*	*
MEXICO	-1.0	-1.4	-1.2	-1.7	-0.9	*	-1.5	-0.6	*	-0.3	*	*			*		*
PERU	-1.4	*	*	*	*	*	-1.7	*	*	*							
VENEZUEL	-0.9	*	*	*	-0.7	*	*	-0.8		*		*		*	*		*
INDIA	-1.0	-0.8	-1.2	-1.1	-1.2	-0.6	-0.2	-0.8	*	0.0	*	0.0	*		*	*	-0.5
PHILIPPI	-0.5	-0.6	-0.2	*	-0.2	*	-0.1	-0.3	*	-0.4	*	*					*
SINGAPOR	-0.9	-1.7	-1.7	*	*		*	*	*	-1.0	*	*					
SRI LANK	-1.5	*	*	*	*		*	*		*							*
PAKISTAN	-1.0	*	*	*	-1.6	*	*	*		*		*					*
MALAYSIA	-1.0	-1.5	-1.4	-1.1	-1.1	*	-0.8	-1.3	*	*	*	*			*	*	*
HONG KON	-2.2	-2.3	-2.2	-2.7	-1.8	*	-2.2	-2.3	*	-2.1	-2.0	*	*			*	*
KOREA	-2.3	-2.3	-2.6	-2.7	-2.2	*	-2.3	-2.4	*	-2.1	*	-2.3	*	*	*	*	-2.6
TAIWAN	-2.1	-2.4	-2.5	*	-2.4		*	-2.2	*	*	*	*					
PEOPLE'S	-2.5	-2.5	-2.6	-2.6	-2.5	*	*	*		*	*	*	*				*
INDONESI	-2.0	*	-2.6	*	*	*	-2.2	-2.3	*	*			*				
THAILAND	-2.2	*	-2.2	*	*		-2.3	-2.8	-1.7	*		-1.5	*				*
JAPAN	-2.9	-2.8	-3.0	-3.1	-3.1	*	-2.9	-3.0	*	-2.9	-2.8	-3.2	*	*		-3.2	-2.7
TOTAL	-1.6	-1.7	-1.7	-1.6	-1.4	-0.8	-1.4	-1.0	-0.8	-0.3	-0.9	-1.5	-1.2	-0.8	-0.5	-0.8	-0.8

* See Table 14 and Table 15, and related discussion.

SUBJECT TEST ANALYSES--FOREIGN STUDENTS ONLY
SPECIFIC COUNTRIES

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Relative Subject Test Performance Index

MEANS FOR RES II

RSPI Means*

	ENGINE	MATHEM	COMP.S	PHYSIC	CHEMIS	GEOLOG	ECONOM	BIOLOG	EDUCAT	PSYCH.	MUSIC	POL.SC	SOCIOL	SPANIS	FRENCH	HISTOR	LITERA
CANADA	0.3	1.0	0.7	0.5	0.5	0.5	0.5	0.4	0.1	0.7	0.8	0.6	*		*	0.2	0.7
ENGLAND	0.1	0.7	-0.4	0.7	0.7	*	1.1	0.2	*	0.6	*	0.2	*	*	*	0.3	1.0
FRANCE	0.4	1.2	-0.3	0.4	*	*	0.3	-0.2		*	*	*	*		1.9	*	*
GERMANY	0.1	0.7	0.7	1.0	0.7	*	1.6	0.7	*	0.4	*	*		*		*	-0.1
ITALY	-0.1	*	0.1	0.1	*	*	0.2	-0.3		*	*	*	*	*	*	*	*
SPAIN	0.5	*	*	*	*	*	0.4	-0.4	*	-0.1		*	*	*		*	*
GREECE	-0.2	0.5	-0.5	0.2	-0.4	*	-0.1	-0.7		-0.3	*	*					*
TURKEY	-0.1	*	*	*	-0.6	*	-0.5	*		-0.3		*	*				*
NIGERIA	-0.2	-0.1	*	*	-0.0	*	-0.0	-0.7	*	-0.4		-0.4	*				*
EGYPT	-0.4	*	-0.2	*	*	*	*	-1.6		*		*					*
IRAN	-0.1	-0.0	-0.7	0.4	-0.3	*	*	-0.9		-1.3		*	*			*	*
ISRAEL	0.3	0.9	0.5	*	*		*	-1.3	*	0.2	*	*	*				*
BRAZIL	0.0	0.6	0.0	0.6	*	*	0.2	-0.2		-0.3		*	*			*	*
COLOMBIA	-0.1	*	-0.1	0.5	*	*	0.1	-0.2	*	-0.3		*	*	*		*	*
MEXICO	0.0	0.8	0.2	0.1	0.7	*	0.6	0.2	*	0.3	*	*			*		*
PERU	-0.2	*	*	*	*	*	0.2	*	*	*							
VENEZUEL	0.3	*	*	*	0.6	*	*	-0.0		*		*		*	*		*
INDIA	-0.2	0.1	-0.4	0.1	0.1	-0.3	-0.2	-0.3	*	0.3	*	-0.6	*		*	*	0.1
PHILIPPI	-0.3	-0.0	-1.1	*	0.7	*	0.0	0.1	*	-0.3	*	*					*
SINGAPOR	0.2	1.2	-0.8	*	*		*	*	*	0.0	*	*					
SRI LANK	0.7	*	*	*	*		*	*		*							*
PAKISTAN	-0.2	*	*	*	0.4	*	*	*		*		*					*
MALAYSIA	-0.1	-0.1	-0.9	0.1	0.0	*	0.0	-0.7	*	*	*	*			*	*	*
HONG KON	0.2	0.2	-0.4	1.1	0.6	*	0.4	-0.3	*	-0.3	-0.1	*	*			*	*
KOREA	-0.3	0.9	-0.6	1.0	0.5	*	-0.1	-1.3	*	-0.8	*	-1.3	*	*	*	*	-1.9
TAIWAN	-0.4	0.1	-0.6	*	0.7		*	-1.1	*	*	*	*					
PEOPLE'S	0.4	0.9	-0.6	1.5	0.5	*	*	*		*	*	*	*				*
INDONESI	-0.5	*	-1.2	*	*	*	-0.8	-2.2	*	*			ø				
THAILAND	-0.5	*	-0.7	*	*		-0.7	-1.5	-1.7	*		-1.4	*				*
JAPAN	-0.3	0.3	-0.3	-0.2	-1.0	*	-0.6	-1.8	*	-1.6	-0.3	-2.0	*	*		-1.4	-1.7
TOTAL	-0.1	0.6	-0.3	0.5	0.2	-0.1	0.0	-0.4	-0.8	0.4	0.4	-0.9	-0.4	0.6	1.0	-0.2	-0.3

* See Table 14 and Table 15, and related discussion.

Table B-1

Regression Equations For Estimating S.vqa, S.q, and V.q, Based on Data for U.S. SVQA Samples*

Subject	N	S.vqa regression					S.q regression			V.q regression		
		V	Q	A	Const term	SE est	Q	Const term	SE est	Q	Const term	SE est
Engineering	766	.22	**.66**	.13	-58.56	(74)	.96	-64.3	(79)	.76	12.3	(89)
Mathematics	388	.32	**.88**	-.05	-84.94	(110)	1.08	-78.9	(114)	.78	16.0	(97)
Comp Sci	390	.14	**.47**	.18	100.29	(63)	.73	113.5	(67)	.76	51.5	(98)
Chemistry	539	.28	**.47**	-.07	205.56	(78)	.59	232.1	(81)	.63	120.7	(89)
Physics	392	.41	**.81**	-.14	-93.19	(103)	1.01	-83.8	(109)	.81	19.8	(90)
Economics	750	.29	**.38**	.08	173.37	(64)	.64	215.2	(70)	.69	119.9	(88)
Geology	486	**.31**	.30	.03	213.57	(67)	.49	276.0	(72)	.55	189.2	(79)
Biology	1077	**.51**	.31	.07	140.05	(73)	.67	236.9	(86)	.59	177.1	(84)
Education	614	**.49**	.08	.06	175.93	(53)	.54	284.9	(68)	.54	202.8	(84)
Psychology	1093	**.43**	.17	.04	199.48	(65)	.44	304.2	(75)	.56	228.2	(86)
Music	359	**.35**	.15	.02	233.05	(66)	.35	321.4	(73)	.53	242.2	(91)
Polit Sci	369	**.38**	.11	.01	191.61	(53)	.38	263.8	(63)	.68	182.5	(88)
Sociology	351	**.55**	.15	.11	75.77	(66)	.61	175.1	(83)	.68	151.3	(86)
History	411	**.37**	.10	-.04	276.85	(60)	.29	375.6	(69)	.56	282.0	(92)
Literature	673	**.66**	.04	-.02	123.72	(58)	.37	341.6	(82)	.51	336.9	(90)
Spanish	261	**.48**	.01	-.26	389.60	(90)	.13	447.1	(98)	.68	191.7	(92)
French	319	**.46**	.02	.00	232.56	(62)	.31	343.4	(76)	.63	239.8	(96)

* The data tabled are regression weights, constant terms, and standard errors of estimate (SEest) for equations used to estimate S and V scores: S.vqa = S predicted from V, Q, and A; S.q = S predicted from Q; V.q = RVPI = V predicted from Q. The weight for the major contributor to the S.vqa predictive composite is **highlighted.**

The multiple correlation coefficients associated with S.vqa are shown in Table B-2 which also provides simple correlations of V, Q, and A with S, and of V with Q, in these U.S. SVQA samples and in the non-U.S. SVQA samples.

Table B-2

Correlation of Subject Test Scores with GRE General Test Verbal (V), Quantitative (Q), and Analytical Ability (A) Scores, and Correlation of Verbal with Quantitative Scores, for U.S. and Non-U.S. Examinees

Subject Test	Correlation of Subject Test with General Test								Correlation of GRE-Q with GRE-V	
	U.S.				Non-U.S.				U.S.	Non-U.S.
	V	Q	A	(R)*	V	Q	A	(r)**	(r)	(r)
Engineering	.53	**.64**	.54	(.69)	.47	**.69**	.60	(.74)	.51	.40
Mathematics	.58	**.59**	.56	(.72)	.37	**.66**	.50	(.64)	.64	.43
Computer Sci	.60	**.74**	.67	(.77)	.45	**.64**	.61	(.71)	.61	.36
Physics	.55	**.59**	.39	(.66)	.31	**.63**	.42	(.57)	.59	.44
Chemistry	.50	**.56**	.39	(.61)	.38	**.58**	.44	(.59)	.56	.39
Economics	.67	**.71**	.61	(.76)	.59	**.69**	.64	(.76)	.65	.44
Geology	**.56**	.55	.45	(.63)	**.74**	.58	.69	(.77)	.56	.49
Biology	**.70**	.63	.57	(.75)	**.71**	.57	.68	(.78)	.59	.42
Education	**.74**	.54	.54	(.75)	**.76**	.48	.63	(.78)	.59	.47
Psychology	**.68**	.57	.50	(.70)	**.73**	.55	.61	(.76)	.60	.50
Music	**.60**	.49	.45	(.63)	**.65**	.43	.51	(.68)	.57	.42
Political Sci	**.74**	.62	.56	(.75)	**.73**	.42	.63	(.76)	.71	.32
Sociology	**.81**	.71	.70	(.83)	**.71**	.56	.68	(.78)	.74	.34
History	**.62**	.46	.41	(.63)	**.74**	.34	.52	(.75)	.60	.30
Literature	**.78**	.46	.45	(.78)	**.85**	.26	.59	(.84)	.55	.35
Spanish	**.37**	.15	.08	(.44)	**.22**	-.08	.14	(.19)	.66	.46
French	**.68**	.42	.39	(.67)	**.50**	.37	.46	(.51)	.59	.63
Median***										
Engin-Biol	.57	**.59**	.55	(.70)	.46	**.63**	.60	(.72)	.59	.42
Educ -Lit	**.74**	.54	.50	(.75)	**.73**	.43	.61	(.76)	.60	.34

Note. The data in this table are for Subject Test takers with concurrent verbal (V), quantitative (Q), and analytical ability (A) scores on the GRE General Test—that is, examinees who took both a Subject Test and the GRE General Test on the same test-administration date.

* This is the multiple correlation of the best-weighted (regression) composite of V, Q, and A (Rs.vqa) with Subject Test scores for U.S. examinees. The highest simple correlation coefficient is **highlighted.**

** U.S. regression equations associated with R(s.vqa)) were used to estimate Subject Test scores for non-U.S. examinees. The coefficients in this column indicate the simple correlation the U.S.-weighted VQA composite with Subject Test scores for non-U.S. examinees. The highest simple correlation coefficient (V, Q, or A) for non-U.S. examinees is **highlighted.**

*** Coefficients for French and Spanish were not considered in computing medians.

Notes on Tables B-1 and B-2

In each of the 17 U.S. SVQA-samples, three regression equations were derived, namely, an equation for V.q (GRE Verbal score predicted from GRE Quantitative score), S.q (GRE Subject Test score predicted from GRE Quantitative score), and S.vqa (GRE Subject Test score predicted from all three General Test scores—V, Q, and A). These equations, shown in Table B-1, were used to generate predicted scores for non-U.S. examinees.

The weights for V, Q, and A in the table are not standardized. However, the pattern of relative weights is quite consistent with that observed for the pattern of standardized weights (not shown). Thus, the regression weights used to compute predicted scores reflect realistically trends in the relative contribution of the verbal, quantitative, and analytical ability scores, when treated as a battery, to prediction of Subject Test scores.

Table B-2 shows the simple correlations of V, Q, and A with S, and of V with Q, for non-U.S. as well as U.S. examinees. This table also shows the multiple correlation coefficient for S.vqa in the U.S. SVQA samples. For non-U.S. samples, the simple correlation of the U.S.-weighted S.vqa composite with S is shown.

In both tables, Subject Tests are listed in descending order of quantitative relative to verbal emphasis as defined by differences in the quantitative and verbal test means (Q - V) of general samples of U.S. examinees reporting an undergraduate major in the field of a Subject Test.

o Trends in the patterns of regression weights and simple correlations indicate that general quantitative ability was most closely associated with performance on Subject Tests in Engineering, Mathematics, Computer Science, Physics, and Economics—the five fields with greatest Q vs V emphasis as defined by mean differences. A shift toward greater balance in emphasis is indicated by coefficients for Geology and Biology. General verbal skills were more important than general quantitative skills in predicting performance on Subject Tests in the Education-Literature cluster, as well as on the French and Spanish Tests.

o Patterns of simple correlations between the three General Test measures and Subject Tests (Table B-2) were similar in both the non-U.S. and the U.S. samples. Moreover, the simple correlations of the U.S.-weighted composites of V, Q, and A with Subject Test scores for non-U.S. examinees were quite comparable to the multiple correlations obtained in the U.S. samples.

o Judging from the patterns of simple correlations in Table B-2, "verbal" and "quantitative" tests were typically more highly correlated for U.S. than for non-U.S. examinees regardless of whether Subject or General Test scores were included in the correlated sets.

For example, median V/Q correlations for U.S. examinees (.59 and .60 for the more quantitative and the more verbal Subject Test clusters, respectively) were higher than comparable medians for non-U.S. examinees (.42 and .34). For the more quantitative Subject Tests, S/V correlations tended to be higher for

U.S. examinees (median = .57) than for non-U.S. examinees (median = .46). For the more verbal Subject Tests, S/Q correlations (analogous to V/Q correlations) were higher for U.S. examinees (median = .54) than for non-U.S. examinees (median = .43).