

THE EFFECT OF VIOLATING AN ESTABLISHED  
MULTIPLE-CHOICE ITEM WRITING PRINCIPLE  
ON TEST DIFFICULTY AND RELIABILITY

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B.S., Virginia Polytechnic Institute and State University, 1968

A MASTER'S THESIS

submitted in partial fulfillment of the  
requirements for the degree

MASTER OF SCIENCE

College of Education

KANSAS STATE UNIVERSITY

Manhattan, Kansas

1978

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2665  
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1978  
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## Chapter 1

### THE PROBLEM

#### Introduction

A review of major contemporary educational measurement textbooks reveals a great deal of emphasis on the principles of multiple-choice test item use and construction. These texts place primary interest on the rules for item-writing, and in most cases devote a major section with many illustrative examples on how, or how not, to construct acceptable test items.

Unfortunately, these rules have little empirical documentation or direct evidence to either support or refute such procedures. Despite this general lack of supportive data however, test designers continue to hold to such principles in an effort to enhance the critical test parameters of validity and reliability.

#### Purpose of the Study

The primary purpose of this study was to investigate the effect of violating a selected item-writing practice on test difficulty and reliability. The practice violated was taken from Gronlund (1976:201): "All of the alternatives should be grammatically consistent with the stem", and included such problems as tense of verbs and improper use of the articles "a" or "an". Gronlund supports this principle with the logical argument that most item writers pay attention only to the grammatical consistency of the correct answer while neglecting that of the distractors. The result of this carelessness is that some

distractors are grammatically inconsistent with the item stem, and are thus incorrect answers. Most authorities tend to agree with this reasoning (Board and Whitney, 1972).

### Statement of Hypotheses

For the purposes of this study the following hypotheses were formulated:

(1) A test comprised of multiple-choice items which reflect grammatical inconsistencies between the alternatives and item stems will be less difficult than the same test containing items which are all grammatically consistent throughout.

(2) Test reliability for a test comprised of items containing grammatical inconsistencies will be lower than that of the same test when the items are grammatically consistent.

Gronlund (1976:201) implied that items containing grammatical inconsistencies would be easier since they narrow the alternatives (and even in some cases give away the answer) that the examinee must consider in arriving at the correct answer. It should follow then that a test containing items with grammatical inconsistencies would be easier than that same test with the inconsistencies corrected.

### Limitations

It was not within the scope of this study to isolate such variables as the characteristics of the sample involved, subject content of the test instruments used, and the number or type of item faults addressed, and their impact on item performance. For this reason, generalizability of the results of this study were somewhat limited.

## Chapter 2

### REVIEW OF THE LITERATURE

A test can be no better than its component items. The objective test has inherent limitations, but it also has advantages which other measurement forms do not have. The challenge of test development is to obtain the maximum benefits of these advantages through improved test construction with major emphasis given to planning the test, writing the test item, and analysis of test items.

Of particular interest is the task of writing the test item. Many practical rules for effective item-writing have been developed over the years and measurement text books abound with chapters devoted to the do's and don'ts of test item construction (e.g. Ebel, 1972; Gronlund, 1976; Wesman, 1971). Empirical support of these rules however, is as conspicuously absent as the rules are present. A major collocation of item-writing principles appears in Wesman's chapter 4, "Writing the Test Item" of the 1971 edition of Educational Measurement and represents one of the more significant sources on this topic. In this chapter, Wesman (1971) points out that the literature on item-writing is considerably more extensive now than it was in the last two decades, and that the importance of this topic has now become generally recognized. Primary emphasis, however, is on the accepted rules and guidelines for item-writing with many examples of item types and characteristics. Very little information is reported on the research of inherent item-writing problems. Wesman (1971:84) attributes this absence of supportive data

to the fact that relatively little significant research has been published addressing the difficulties of test item-writing, and that the contributions of such research are relatively narrow and lack generalizable findings. The difficulty in determining the specific factors which impact on test item performance is further complicated by the lack of an apparent means of controlling all of the intervening variables. Because of this, most research reports the findings of a single writer with a single test, therefore greatly limiting the generalizability of such results.

Unable to uncover any empirical study which specifically addressed the influence of item-writing rules on multiple-choice achievement test difficulty, validity, or reliability, Dunn and Goldstein (1959) prepared and administered tests to military subjects in which various rules for item-writing were deliberately violated. The construction principles selected for study were as follows:

- (1) Exclusion versus inclusion of answer cues or specific determiners.
- (2) Question lead (stem) versus incomplete statement as lead (stem).
- (3) Equal-length alternatives versus extra-long alternatives.
- (4) Consistency versus inconsistency of grammar between lead (stem) and alternatives.

Their procedure for developing the experimental test instruments was to rewrite an acceptably constructed test item to violate one of the item-writing rules selected for study. They hypothesized that those violations which tend to "give away" the correct answer (i.e. inclusion of answer cues or specific determiners, extra-long alternatives, and

grammatical inconsistencies) would be easier than those items written to adhere to the traditional rule of good item construction. Certainly this was a logical assertion since their faulty items were constructed with only the one correct answer (alternative) conforming to the item-writing rule. Although this procedure allowed a tighter control on the various factors affecting test item performance, it perhaps does not represent a realistic situation since it is unlikely that a test writer would inadvertently violate a rule so grossly.

The findings of Dunn and Goldstein's (1959) research supported their hypothesis. Items containing cues to correct alternatives, extra-long correct alternatives, and grammatical inconsistencies between the lead (stem) and alternatives were found to be less difficult than those items written in conformance to the rules. The use of an incomplete statement or question as the item lead (stem) appeared to have no effect on test difficulty. In addition, no significant effect on test reliability was found which could be attributable to violations of any of the four principles studied.

Dunn and Goldstein (1959) were quick to point out the content specificity of their test instruments and the uniqueness of their sample (i.e. tests of military subject matter administered to military personnel) and called for more research into the utility of item construction principles and their interaction with other variables before drawing a final conclusion.

Additional evidence concerning the violation of the same principles studied by Dunn and Goldstein (1959) is presented by McMorris, Brown, Snyder and Pruzek (1972) with similar results but utilizing a slightly different methodology. In an effort to present more

generalizable findings, these investigators examined the performance of secondary school students in an academic setting using an American History test as their experimental instrument. Item-writing procedure violations observed included:

(1) Use of cues.

(2) Grammatical inconsistencies between the item stem and the incorrect options.

(3) Extra-long correct responses.

Procedures similar to Dunn and Goldstein (1959) were utilized to develop the experimental test instruments, with the same criticism that faulty items were so constructed that only the correct option conformed to the item-writing principle (or nonconformed, as in the case of cues). Here again, this represents an exaggeration of the item-writing violations and is considered to be somewhat unrealistic.

The results reported by McMorris, Brown, Snyder and Pruzek (1972) supported in general that the faults under analysis did make the test items easier (more especially true of the cue and grammar faults). The use of cues, grammatical inconsistencies, or extra-long correct options did not appear to significantly jeopardize test reliability.

Board and Whitney (1972) investigated similar item-writing flaws but utilized college students enrolled in an undergraduate "Introduction of American Politics" course at a major midwestern university as their target sample. After carefully reviewing a list of item-writing principles by Ebel (1972), the following four (poor) practices were selected for investigation:

(1) Items having stems which contain "window dressing" or material not necessary to answer the item.

(2) Items having an incomplete stem (not expressing a complete statement or question).

(3) Items having a keyed response which was noticeably longer or shorter than the distractors.

(4) Items having keyed responses that were the only grammatically consistent answer with the stem.

Board and Whitney (1972) hypothesized that the first two practices were representative of stem-related flaws and would obscure the actual question making the item more difficult. The remaining two practices were thought to make items easier since they appeared to cue, or "give away," the correct answer.

The results of their study indicated that the use of "window dressing" had little overall effect on test difficulty, but did reduce test internal consistency reliability. Incomplete stems seemed to make test items generally more difficult. This practice also reduced the internal consistency of the test. Keyed responses which differed noticeably in length from the distractors did not appear to make the test items easier, but did reduce internal consistency. A finding contrary to previous studies was that grammatical inconsistencies did not have a major effect on test difficulty. That grammatical inconsistencies had little effect on test reliability, was supportive of earlier findings.

The Board and Whitney (1972) study was replicated in part by Schmeiser and Whitney (1975) in an effort to reexamine earlier results. This study addressed only two item-writing practices and used a slightly different methodology for developing the test instruments. Instead of rewriting good test items to reflect a poor item-writing practice, Schmeiser and Whitney (1972) reviewed several teacher-made examinations

for faulty items and then revised these items to eliminate the fault. Interestingly enough the two item-writing rules selected for study were:

- (1) Item stems containing "window dressing."
- (2) Item stems which do not express a complete statement or

question (incomplete stems).

It was anticipated that these faults, which affected only the item stem, would make the items more difficult. In an effort to present the faulted items in a more realistic atmosphere, faulty items were combined with other items which were not faulty. Results of the study were contrary to the expectations of the authors in respect to items containing "window dressing." Item stems containing material which was not necessary for the student to know in order to answer the item seemed to have no effect on test difficulty. Item stems which were incomplete made the test more difficult. Neither practice adversely affected test reliability.

Most of the research in support of item-writing rules appears to be at best inconclusive and contains many issues which must be addressed. One issue involves the type of items used for estimating the extent of use of the information contained in the faults (McMorris and others, 1972). When realistic test items, as opposed to content-free (or non-sense) items are employed in the research, the effects of faults are confounded with knowledge of content. This same point is established by Wesman (1971:86) in his brief but inclusive discussion of the inherent difficulties in the generalizability of current research findings. It seems however, that the use of realistic test items would allow for a greater duplication of the practical situation and contribute information which would be relevant to particular testing conditions.

Other considerations which must be addressed in reviewing the

research include the number of principles tested, uniqueness of the subject matter, and the characteristics of the sample utilized. Still the issues remain equivocal. Authorities disagree on the use of "all of the above" or "none of the above" alternatives (Wesman, 1971:118). Most do agree however, that, with respect to the positive or negative stem orientation, the negative aspect, if used, should always be emphasized to the examinee. It is generally accepted that negative items are more difficult because the respondent is required to shift mental set (Dudycha and Carpenter, 1973). In addition, most findings show that the use of negative stems has no appreciable effect on test reliability (Terranova, 1969). The results of research in this area must be considered at best, tentative. Most researchers acknowledge that more investigation will be required to isolate properly the conditions and variables under which item principles influence student performance.

#### Intent of the Study

The increasing dependence upon multiple-choice test in academic, industrial, and military settings as the basis for personnel and other managerial decisions, demands that the rules for constructing multiple-choice items be well established and empirically supported. Contemporary research in the area of empirical support for multiple-choice item rules has been very restricted and has suffered from a lack of the means to adequately control all the variables involved. For this reason most studies report the findings of a single writer and a single test. The generalizability of such findings, of course, is limited and will continue to be so until all the significant factors affecting item performance can be identified and controlled.

Discounting the problem of generalizable findings, perhaps a major

criticism of the majority of the research articles reviewed is the conspicuous lack of a realistic approach in the design of the test instruments. This is particularly true of those studies which investigated those item-writing principles which affected the alternatives of the item (e.g. grammatical inconsistencies, unusually long or short alternatives, cues). In all cases, only the correct alternative was consistent with the stem, or unusually long or short, it is difficult to accept that a test writer would exaggerate the violation of an item-writing principle so grossly.

It was the purpose of this study to select a single relatively common, poor item-writing practice and investigate its effect on test difficulty and test reliability. This study followed the general methodology and procedures established by previous studies (Schmeiser and Whitney, 1975) except for the design of the test instrument. Since it seemed more appropriate to present items in a basically realistic or natural setting, not all of the items on the experimental instrument were faulted, nor were the faults as exaggerated within each specific item as in previous studies. Item alternatives for the correct answer were narrowed but rarely was the correct answer given away.

## Chapter 3

### METHODOLOGY

#### Subjects

The subjects tested consisted of military personnel obtained as volunteers through arrangements with a major midwestern military installation. From a sample of 215 a total of 197 useable tests were collected. This difference is predominately attributable to personnel withdrawing from the study upon arrival at the test hall, several obvious patterned response answer sheets, and failure by a few respondents to complete at least half of the test. All personnel tested were below the enlisted grade of E-8.

#### Procedures

Item-Writing Flaw Studied. The specific item-writing flaw selected for study dealt with grammatical inconsistencies between the item stem and its alternatives. This flaw was selected because of its universal prevalence in established measurement texts and because it seemed to be generally thought by most experts to make test items easier.

Instruments. Two forms of a general level social studies test were developed for this study. One form contained faulty items (grammatical inconsistencies) while the other form was comprised of the identical items in their unfaulted form. Test items from which the two test forms were developed were extracted primarily from the following sources:

- (1) Test 1 (Social Studies) of the Tests of Academic Progress

(Form S), Houghton Mifflin Company, 1971.

(2) Test 7 (Social Studies Information) of the "Metropolitan Achievement Tests (Form Am/High School Battery)," Harcourt Brace & World, Inc., 1962.

(3) Social Studies subtest of the "Iowa Tests of Educational Development (Form X5)," Science Research Associates, Inc, 1972.

These sources, which represent the high school levels of multi-level batteries or tests designed specifically for high school students, were selected because of their suitability for testing general, unselected adult groups representative of the sample used for this study (Anastasi, 1976:313).

The basic procedure involved the construction of the unfaulted form (Version G) first. This was accomplished by reviewing the above sources and extracting enough four-choice items to construct a fifty item test. The experimental (faulty) test form (Version F) was developed by rewriting thirty-nine of the acceptably constructed items from Version G to reflect grammatical inconsistencies between the item alternatives and the item stem. To present a somewhat realistic approach to the study, eleven unfaulted items were placed on the experimental test form (Version F). This addition of unfaulted items followed a procedure similar to that of Schmeiser and Whitney (1975). These items were loaded toward the first half of the test. In addition, the grammatical inconsistencies were not exaggerated to the extent presented in other studies. The grammatical inconsistencies narrowed the possible alternatives but rarely did they enable the identification of the correct response as the only response which was grammatically consistent with the stem. Items appeared in identical order on both forms. At Appendix A

and B are annotated reproductions of both test forms which illustrate faulted items and the elimination of certain item alternatives. At Appendix C and D are copies of each test as they were administered to the sample.

The grammatical inconsistencies of the thirty-nine faulty items were developed from misuse or poor grammatical construction in the following general areas:

- (1) Infinitives
- (2) Gerunds
- (3) Participles
- (4) Articles - "a" or "an"
- (5) Subject/verb agreement

It was presumed that if the subjects possessed a general level of knowledge of English composition and grammatical construction in the above areas, they could eliminate some of the alternatives on the faulty items and increase their chances of selecting the correct answer. The following table (Table I) reports the distribution of grammatical inconsistencies within test Version F by number and indicates the number of item alternatives that could be eliminated if this fault were detected.

Table I

DISTRIBUTION OF GRAMMATICAL INCONSISTENCIES  
WITHIN TEST VERSION F

GRAMMATICAL INCONSISTENCY	NUMBER OF ITEM ALTERNATIVES ELIMINATED			TOTAL
	1	2	3	
Infinitives	11, 28, 29 (3)	2, 8, 19, 22, 37, 38, 39, 41, 42, 43, 45, 46, 47, 48 (14)		(17)
Gerunds	14, 35 (2)	25, 36 (2)		(4)
Participles		12 (1)		(1)
A/AN	3, 27, 44 (3)	5, 9, 15, 31, 34, 50 (6)	20 (1)	(10)
Subject/ Verb	21, 24, 33 (3)	7, 16, 17, 49 (4)		(7)
TOTAL	(11)	(27)	(1)	(39) (39)

NOTE: The circled numbers are the number of items assigned to each FAULT by NUMBER OF ALTERNATIVES ELIMINATED. Other numbers represent the individual question number for that item as it appears on the test. Eleven items on Test Version F remained unfaulted (1, 4, 6, 10, 13, 18, 23, 26, 30, 32, 40).

Administration. The tests were administered at the military installation during the normal work day. Since testing facility would accommodate only eighty subjects at a time, testing had to be conducted on three separate occasions. Tests were distributed systematically so that alternate subjects took each version of the test. Subjects were instructed to answer every item and given fifty minutes to complete the test.

### The Statistics

To analyze the data of this study, the null form of each hypothesis was tested:

(1) Tests comprised of multiple-choice items containing grammatical inconsistencies are no less difficult than tests containing multiple-choice items which are grammatically consistent throughout.

(2) Tests comprised of items containing grammatical inconsistencies are no less reliable than tests comprised of grammatically consistent items.

The statistic used in analyzing item difficulty was a single tailed t test (independent samples) analyzing the mean of the control group in comparison to the mean of the experimental group.

The statistic used in analyzing test reliability (internal consistency) was a single tailed test (independent samples) between the Kuder-Richardson Formula 20 reliability coefficients of the experimental (faulted) and control (unfaulted) tests.

## Chapter 4

### ANALYSIS OF THE DATA

#### Test Difficulty

The comparative analysis of the difficulty of the two test forms is presented in Table II. Since only the effects of grammatical inconsistencies were being evaluated, only the thirty-nine faulty items on test Version F and their unfaulted counterparts on test Version G were considered in the analysis. Table II presents a  $t$  test between the sample mean scores (based on the thirty-nine items) of test Versions F and G.

Table II

$t$  Test  
(one-tailed)

#### EFFECT OF GRAMMATICAL INCONSISTENCIES ON TEST DIFFICULTY

TEST VERSION	N	MEAN	SD
F (faulted)	101	18.34	7.86
G (unfaulted)	96	18.86	7.52

$t = 0.439$  (to be significant at the .05 level a  $t$  of 1.645 is required)  
 $df = 195$

The results of the "t" test on the collected data support the null hypothesis and indicate that grammatical inconsistencies of the type used in this study appear to have had no effect on test difficulty. This analysis was based on a one-tailed test at a .05 level of significance.

Test Reliability

Analysis of test reliability is presented in Table III. Kuder-Richardson 20 internal consistency reliability coefficients were computed for each test form based on the thirty-nine altered items. A test for the difference between independent correlations was then conducted.

Table III

EFFECT OF GRAMMATICAL INCONSISTENCIES  
ON TEST RELIABILITY

TEST VERSION	N	r <sub>20</sub>	Z <sub>r</sub>
F (faulted)	101	.862	1.301
G (unfaulted)	96	.847	1.245

$Z_{obs} = .384$  (Critical value of  $Z_{obs}$  at the .05 level of significance for a one-tailed test is 1.645)

df = 191

The results of the analysis depicted in Table III support the null hypothesis and indicate that test reliability seems to be unaffected by the presence of test items containing grammatical inconsistencies.

This analysis was based upon a one-tailed test at a .05 level of significance.

## Chapter 5

### DISCUSSION

#### Conclusions

The data collected in this study did not support the initial hypothesis statements. Poorly constructed test items which were used in the present study reflecting grammatical inconsistencies had no demonstrable effect on test difficulty or reliability.

#### Implications.

The implications of this study should perhaps be considered in light of the findings of previous research. In regard to the effects of grammatically inconsistent items on test difficulty, only one of the cited previous studies has reported similar findings. The observation that violation of this item-writing principle has little effect on test reliability was totally supportative of earlier studies.

It seems reasonable to expect that faulty items containing grammatical inconsistencies which give away or narrow the alternatives to the correct answer would be easier. Most of the previous studies support this assumption but it must be pointed out that the experimental instruments of these studies exaggerated the fault by having only the correct alternative grammatically consistent with the item stem. A major premise of the present study is that it is unrealistic to assume that even the incompetent item writer would consistently violate this principle so grossly. Although there are other implications involved, it appeared that in the current study, where the experimental items only

narrowed the plausible alternatives, that either the examinees did not detect these clues as easily as in other studies, or the other grammatically consistent distractors were plausible enough to lure the examinee away from the correct answer.

#### Interpretation.

The results of this research should not be interpreted as a general renunciation of the requirement to write grammatically consistent test items. As previously discussed, the inherent problems of generalizing results from studies of this type are many. Consideration must be given to those variables to name a few, which affect the uniqueness of the subject matter, characteristics of the sample tested, and the principle violated. It is the confounding effects of the above considerations which must be estimated before final conclusions can be drawn.

#### Recommendations

The results of this and previous studies suggest a requirement for comprehensive and systematic research to investigate the significant factors of item-writing principles. Such research may prove significant in providing empirical support to generally accepted principles. It is hoped that the ultimate results of such research will be to provide the basis for improved construction principles for the development of more efficient test instruments.

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#### APPENDICES

- A. Test Version F (faulted) Annotated
- B. Test Version G (unfaulted) Annotated
- C. Test Version F (faulted) as administered
- D. Test Version G (unfaulted) as administered

APPENDIX A

Test Version F (faulted) Annotated

## SOCIAL STUDIES

## Test Version F

DIRECTIONS:

This is a test of your knowledge, understanding, and skill in the area of social studies. This test consists of multiple choice questions for which four possible answers are provided. You should read each question and decide which answer is correct or clearly better than the others. Then on the separate answer sheet provided you should circle the letter which corresponds to the answer you have chosen. You will have 50 minutes to complete this test. Since your score is the number right, be sure to answer every item.

- \*1. Which of the following actions is inconsistent with the principal of federalism as applied in the United States?
- A. A state court declares a federal law null and void
  - B. A national court declares a state law null and void
  - C. The national government prosecutes a state citizen
  - D. A state governor orders the National Guard to duty
2. Most states and the federal government place restrictions on political contributions to
- A. control the amount which can be claimed as an income tax deduction
  - B. reduced the length and amount of campaigning
  - C. prevents dishonest candidates from getting rich
  - D. limit the amount of influence of any one contributor
3. A factor which contributed least to our continuous development of more effective ways of solving our many problems is an
- A. accumulation and use of knowledge or previous generations
  - B. exchange of ideas and knowledge between different cultures
  - C. greater use of experimentation as a tool of research
  - D. increase in our native intelligence

\*unfaulted item

Circled alternatives are grammatically inconsistent with the item stem

- \*4. In which of the following ways were the Athenians and Spartans most alike?
- A. Love of beauty
  - B. Concern for individual freedom
  - C. Interest in a broad education
  - D. Loyalty to their own city-state
5. Many of the nations that have come into existence since World War II have adopted a socialist philosophy. This is evidenced by a
- A. government ownership of major industries
  - B. restriction of emigration and immigration
  - C. existence of a single political party
  - D. imposition of high tariffs
6. For what reason initially did American businesses first form corporations?
- A. High taxes on partnerships
  - B. High cost of individual advertising
  - C. Need for large sums of money
  - D. Restrictive nature of patent laws
7. The forced industrialization of the Soviet Union under the Five-Year Plan and the industrialization of England in the early nineteenth century were similar in that both countries
- A. use almost identical machinery
  - B. stressed plant expansion at the expense of the worker's welfare
  - C. use privately owned and managed factories
  - D. based their programs on the same political beliefs

8. Four of the steps in a systematic process of solving social problems are listed below in random order. The first step in the procedure should be to
- A. stating various possible solutions for the problem
  - B. define and state the problem
  - C. formulate tentative conclusions
  - D. gathering and interpreting all available data
9. A court order which requires that a certain action be performed or discontinued is called an
- A. appeal
  - B. injunction
  - C. supoena
  - D. warrant
- \*10. The struggle for power between which of the following groups was most important in the development of Western democracy?
- A. Kings and clergy
  - B. Clergy and nobility
  - C. Nobility and middle classes
  - D. Middle classes and lower classes
11. The main reason that social scientists study human behavior is to
- A. learn why people act as they do
  - B. change human nature
  - C. develop theories about the origin of man
  - D. modifying our inherited characteristics

12. The price of a product would increase most in a situation of
- (A) decrease demand and declining supply
  - B. increasing demand and increasing supply
  - C. increasing demand and declining supply
  - (D) decrease demand and increase supply
- \*13. The pyramids of Egypt stand as visible proof that the Egyptians believed
- A. slavery was not wrong
  - B. good rulers should have a monument
  - C. there is life after death
  - D. every civilization should provide lasting records
14. President Washington favored progress and welfare against the status quo by
- A. advocating social security
  - (B) agreed that elected officials should have unlimited power
  - C. upholding popular sovereignty
  - D. opposing the formation of a federal government
15. A person who agreed to work without wages for periods of two to seven years in return for free transportation to America was known as an
- A. indebted artisan
  - (B) slave
  - C. indentured servant
  - (D) serf

16. A major criticism of county governments in the United States is that they
- A. lack a centralized executive power
  - B. has too many officials who are appointed rather than elected
  - C. fails to represent the interest of rural areas
  - D. exercise control in too large a geographical area
17. The outbreak of the Revolutionary War occurred in Massachusetts because the
- A. British resented support given to Massachusetts by the Continental Congress
  - B. Intolerable Acts had placed Massachusetts under military rule
  - C. Minutemen being the only organized American military force
  - D. Massachusetts colonists equipped to fight both on land and on sea
- \*18. All of the following have been suggested as benefits which the consumer gets from advertising. Which is generally most valid?
- A. It enables one to compare the quality of products
  - B. It informs one of available products
  - C. It increases demand and thus decreases production costs
  - D. It sponsors entertainment without cost to the consumer
19. The primary goal of any country's foreign policy is to
- A. promote its own self-interests
  - B. defeating its enemies
  - C. civilize less fortunate people
  - D. acquiring colonies

20. Columbus sailed west in order to discover an:
- (A.) new continent
  - (B.) new market for Italian merchants
  - C. all-water route between Europe and Asia
  - (D.) new lands for Spanish conquest
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  - B. secure an adjournment until enough members were convinced of their viewpoint
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  - D. monopolize the floor until the members agree to postpone the vote on the measure
25. A famous United States scientist who was born a slave had a significant effect on American agriculture. He did this, in part, by
- A. established an agricultural college in Alabama
  - B. invented a machine that could harvest cotton efficiently
  - C. developing new uses for crops that would grow in the south
  - D. developing cheap fertilizers that made cultivation of marginal land profitable
- \*26. Which statement best describes what the general public thought about early trade unions in America?
- A. Undesirable organizations which hurt business
  - B. Charitable organizations which cared for needy workers
  - C. A part of the communist conspiracy
  - D. The best vehicle for eliminating city slums
27. A member of a labor union who works for wages is called a
- A. apprentice
  - B. steward
  - C. journeyman
  - D. mechanic

28. The North Atlantic Treaty Organization is an alliance of free nations established to
- A. assure mutual aid in event of natural disaster
  - B. exchanges cultural benefits
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  - D. pool atomic knowledge and resources
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  - B. traded with all nations
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31. US Supreme Court justices are selected by an
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- \*32. Of the following actions, which best illustrates the meaning of judicial review?
- A. A judge tells an administrator that a proposed course of action violates the First Admendment
  - B. A jury considers all the evidence before finding the accused guilty
  - C. A court rules that a statute violates a provision of the Constitution
  - D. The Senate examines judicial appointments before approving them
33. According to the idea of minority rights, if a minority in the United States considers a law unjust it can
- A. carry arms to prevent enforcement of the law
  - B. try to get the law changed
  - C. appealing to the United Nations for aid
  - D. try to evade the law without getting caught
34. In constrast with earlier technological developments which made mass production possible, automation is most likely to lead to an
- A. increase in the productivity of workers
  - B. substitution of capital for labor
  - C. emphasis on skilled, rather than semi-skilled, labor
  - D. change in the geographical location of important industries
35. The continual introduction of new manufacturing methods and machines has effected the labor force by
- A. weakened the power of labor unions
  - B. greatly increasing the need for all types of labor
  - C. decreasing the demand for skilled laborers and technicians
  - D. increasing the level of training needed in most jobs

36. The growth of town life contributed most to the development known as the Renaissance by
- A. making possible the establishment of large libraries
  - B. reduced the influence of the church
  - C. decreased political power of the peasants
  - D. facilitating the growth of a wealthy middle class
37. The primary reason the Federal Reserve System occasionally changes the cash reserves required of commercial banks is to
- A. help banks get more depositors
  - B. controlling the profits of banks
  - C. controlling the size of banks
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38. The policy of the Constitution makers concerning the Executive branch was to
- A. established an office similar to the British Prime Minister
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39. The Constitution does not give the President power to
- A. appoint ambassadors
  - B. granting reprieves and pardons
  - C. negotiating treaties
  - D. declare war

- \*40. In the development of language, which of the following symbols occurred first?
- A. Written words representing objects
  - B. Paintings representing actions
  - C. Drawings representing ideas
  - D. Hand signs representing objects or actions
41. In the opinion of President Lincoln, the primary goal of the North in the Civil War was
- A. to keep the United States as one nation
  - B. freeing the slaves
  - C. to prevent the South from shipping cotton to England
  - D. forced the Confederacy to adopt a constitution more acceptable to the North
42. Of the following, the most important purpose of a political party's national convention is to
- A. raising money for campaign expenses
  - B. selecting the party's national chairman
  - C. formulate the party platform
  - D. plan campaign strategy for the coming election
43. One direct effect of the widespread use of injunction in labor disputes in the United States was
- A. protected workers against arbitrary discharge from their jobs
  - B. to strengthen national labor unions
  - C. made the courts impartial arbiters in labor-management disputes
  - D. to strengthen the employer's position in dealing with labor

44. A church which was officially recognized and supported by the government was called an
- (A.) national church
  - B. established church
  - C. accepted church
  - D. international church
45. Dependence on one item of export such as coffee or cotton, generally causes a nation's economy to
- A. fluctuate according to world demand and price changes
  - B. stabilize because activities are centered on one area of production
  - (C.) improving due to increased prestige on the international market
  - (D.) remaining in a continually depressed state
46. A protective tariff is one which is enacted to
- (A.) raised revenue
  - B. aid domestic industry
  - C. protect shipping interests
  - (D.) supported a foreign policy
47. The primary reason why the United States tried to improve relations with Latin America during the 1890's was to
- A. increase the sale of products to Latin America
  - (B.) encouraged United States tourists to visit Latin America
  - C. improve the working conditions of Latin American laborers
  - (D.) encouraged Latin Americans to move to the United States

48. Congress is most able to exercise some control over administrative agencies because of its power to
- A. ratify treaties
  - B. initiating constitutional amendments
  - C. vote appropriations
  - D. declaration of war
49. Both the Wagner and Taft-Hartley Acts
- A. favors labor
  - B. increased the role of government in labor-management relations
  - C. definitely favors management
  - D. sought to eliminate communists from labor leadership
50. The granting to an inventor the exclusive right to the profits from an idea for a specified period of years is called a
- A. copyright
  - B. exclusive franchise
  - C. patent
  - D. excise tariff

APPENDIX B

Test Version G (unfaulted) Annotated

## SOCIAL STUDIES

## Test Version G

DIRECTIONS:

This is a test of your knowledge, understanding, and skills in the area of social studies. This test consists of multiple choice questions for which four possible answer are provided. You should read each question and decide which answer is correct or clearly better than the others. Then on the separate answer sheet provided you should circle the letter which corresponds to the answer you have chosen. You will have 50 minutes to complete this test. Since your score is the number right, be sure to answer every item.

- \*1. Which of the following actions is inconsistent with the principal of federalism as applied in the United States?
- A. A state court declares a federal law null and void
  - B. A national court declares a state law null and void
  - C. The national government prosecutes a state citizen
  - D. A state governor orders the National Guard to duty
2. Most states and the federal government place restrictions on political contributions to
- A. control the amount which can be claimed as an income tax deduction
  - B. reduce the length and amount of campaigning
  - C. prevent dishonest candidates from getting rich
  - D. limit the amount of influence of any one contributor
3. A factor which contributed least to our continuous development of more effective ways of solving our many problems is
- A. an accumulation and use of knowledge of previous generations
  - B. an exchange of ideas and knowledge between different cultures
  - C. a greater use of experimentation as a tool of research
  - D. an increase in our native intelligence

\*item appears on test Version F (faulted) as an unfaulted item

- \*4. In which of the following ways were the Athenians and Spartans most alike?
- A. Love of beauty
  - B. Concern for individual freedom
  - C. Interest in a broad education
  - D. Loyalty to their own city-state
5. Many of the nations that have come into existence since World War II have adopted a socialist philosophy. This is evidenced by
- A. a government ownership of major industries
  - B. a restriction of emigration and immigration
  - C. an existence of a single political party
  - D. an imposition of high tariffs
6. For what reason initially did American businesses first form corporations?
- A. High taxes on partnerships
  - B. High cost of individual advertising
  - C. Need for large sums of money
  - D. Restrictive nature of patent laws
7. The forced industrialization of the Soviet Union under the Five-Year Plan and the industrialization of England in the early nineteenth century were similar in that both countries
- A. used almost identical machinery
  - B. stressed plant expansion at the expense of the worker's welfare
  - C. used privately owned and managed factories
  - D. based their programs on the same political beliefs

8. Four of the steps in a systematic process of solving social problems are listed below in random order. The first step in the procedure should be to
- A. state various possible solutions for the problem
  - B. define and state the problem
  - C. formulate tentative conclusions
  - D. gather and interpret all available data
9. A court order which requires that a certain action be performed or discontinued is called
- A. an appeal
  - B. an injunction
  - C. a supoena
  - D. a warrant
- \*10. The struggle for power between which of the following groups was most important in the development of Western democracy?
- A. Kings and clergy
  - B. Clergy and nobility
  - C. Nobility and middle classes
  - D. Middle classes and lower classes
11. The main reason that social scientists study human behavior is to
- A. learn why people act as they do
  - B. change human nature
  - C. develop theories about the origin of man
  - D. modify our inherited characteristics

12. The price of a product would increase most in a situation of
- A. decreasing demand and declining supply
  - B. increasing demand and increasing supply
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- \*13. The pyramids of Egypt stand as visible proof that the Egyptians believed
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  - B. good rulers should have a monument
  - C. there is life after death
  - D. every civilization should provide lasting records
14. President Washington favored progress and welfare against the status quo by
- A. advocating social security
  - B. agreeing that elected officials should have unlimited power
  - C. upholding popular sovereignty
  - D. opposing the formation of a federal government
15. A person who agreed to work without wages for periods of two to seven years in return for free transportation to America was known as
- A. an indebted artisan
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16. A major criticism of county governments in the United States is that they
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19. The primary goal of any country's foreign policy is to
- A. promote its own self-interests
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APPENDIX C

Test Version F (faulted) as Administered

## SOCIAL STUDIES

## Test Version F

DIRECTIONS:

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- A. weakened the power of labor unions
  - B. greatly increasing the need for all types of labor
  - C. decreasing the demand for skilled laborers and technicians
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- A. fluctate according to world demand and price changes
  - B. stabilize because activities are centered on one area of production
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  - B. aid domestic industry
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47. The primary reason why the United States tried to improve relations with Latin America during the 1890's was to
- A. increase the sale of products to Latin America
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48. Congress is most able to exercise some control over administrative agencies because of its power to
- A. ratify treaties
  - B. initiating constitutional amendments
  - C. vote appropriations
  - D. declaration of war
49. Both the Wagner and Taft-Hartley Acts
- A. favors labor
  - B. increased the role of government in labor-management relations
  - C. definitely favors management
  - D. sought to eliminate communists from labor leadership
50. The granting to an inventor the exclusive right to the profits from an idea for a specified period of years is called a
- A. copyright
  - B. exclusive franchise
  - C. patent
  - D. excise tariff

APPENDIX D

Test Version G (unfaulted) as Administered

## SOCIAL STUDIES

## Test Version G

DIRECTIONS:

This is a test of your knowledge, understanding, and skills in the area of social studies. This test consists of multiple choice questions for which four possible answers are provided. You should read each question and decide which answer is correct or clearly better than the others. Then on the separate answer sheet provided you should circle the letter which corresponds to the answer you have chosen. You will have 50 minutes to complete this test. Since your score is the number right, be sure to answer every item.

1. Which of the following actions is inconsistent with the principal of federalism as applied in the United States?
  - A. A state court declares a federal law null and void
  - B. A national court declares a state law null and void
  - C. The national government prosecutes a state citizen
  - D. A state governor orders the National Guard to duty
2. Most states and the federal government place restrictions on political contributions to
  - A. control the amount which can be claimed as an income tax
  - B. reduce the length and amount of campaigning
  - C. prevent dishonest candidates from getting rich
  - D. limit the amount of influence of any one contributor
3. A factor which contributed least to our continuous development of more effective ways of solving our many problems is
  - A. an accumulation and use of knowledge of previous generations
  - B. an exchange of ideas and knowledge between different cultures
  - C. a greater use of experimentation as a tool of research
  - D. an increase in our native intelligence

4. In which of the following ways were the Athenians and Spartans most alike?
- A. Love of beauty
  - B. Concern for individual freedom
  - C. Interest in a broad education
  - D. Loyalty to their city-state
5. Many of the nations that have come into existence since World War II have adopted a socialist philosophy. This is evidenced by
- A. a government ownership of major industries
  - B. a restriction of emigration and immigration
  - C. an existence of a single political party
  - D. an imposition of high tariffs
6. For what reason initially did American businesses first form corporations?
- A. High taxes on partnerships
  - B. High cost of individual advertising
  - C. Need for large sums of money
  - D. Restrictive nature of patent laws
7. The forced industrialization of the Soviet Union under the Five-Year Plan and the industrialization of England in the early nineteenth century were similar in that both countries
- A. used almost identical machinery
  - B. stressed plant expansion at the expense of the worker's welfare
  - C. used privately owned and managed factories
  - D. based their programs on the same political beliefs

8. Four of the steps in a systematic process of solving social problems are listed below in random order. The first step in the procedure should be to
- A. state various possible solutions for the problem
  - B. define and state the problem
  - C. formulate tentative conclusions
  - D. gather and interpret all available data
9. A court order which requires that a certain action be performed or discontinued is called
- A. an appeal
  - B. an injunction
  - C. a supoena
  - D. a warrant
10. The struggle for power between which of the following groups was most important in the development of Western democracy?
- A. Kings and clergy
  - B. Clergy and nobility
  - C. Nobility and middle classes
  - D. Middle classes and lower classes
11. The main reason that social scientists study human behavior is to
- A. learn why people act as they do
  - B. change human nature
  - C. develop theories about the origin of man
  - D. modify our inherited characteristics

12. The price of a product would increase most in a situation of
- A. decreasing demand and declining supply
  - B. increasing demand and increasing supply
  - C. increasing demand and declining supply
  - D. decreasing demand and increasing supply
13. The pyramids of Egypt stand as visible proof that the Egyptians believed
- A. slavery was not wrong
  - B. good rulers should have a monument
  - C. there is life after death
  - D. every civilization should provide lasting records
14. President Washington favored progress and welfare against the status quo by
- A. advocating social security
  - B. agreeing that elected officials should have unlimited power
  - C. upholding popular sovereignty
  - D. opposing the formation of a federal government
15. A person who agreed to work without wages for periods of two to seven years in return for free transportation to America was known as
- A. an indebted artisan
  - B. a slave
  - C. an indentured servant
  - D. a serf

16. A major criticism of county governments in the United States is that they
- A. lack a centralized executive power
  - B. have too many officials who are appointed rather than elected
  - C. fail to represent the interest of rural areas
  - D. exercise control in too large a geographical area
17. The outbreak of the Revolutionary War occurred in Massachusetts because the
- A. British resented support given to Massachusetts by the Continental Congress
  - B. Intolerable Acts had placed Massachusetts under military rule
  - C. Minutemen were the only organized American military force
  - D. Massachusetts colonists were equipped to fight both on land and on sea
18. All of the following have been suggested as benefits which the consumer gets from advertising. Which is generally most valid?
- A. It enables one to compare the quality of products
  - B. It informs one of available products
  - C. It increases demand and thus decreases production costs
  - D. It sponsors entertainment without cost to the consumer
19. The primary goal of any country's foreign policy is to
- A. promote its own self-interests
  - B. defeat its enemies
  - C. civilize less fortunate people
  - D. acquire colonies

20. Columbus sailed west in order to discover:
- A. a new continent
  - B. a new market for Italian merchants
  - C. an all-water route between Europe and Asia
  - D. a new land for Spanish conquest
21. The Point Four Program and the Alliance for Progress are similar in that both
- A. are chiefly recovery rather than developmental programs
  - B. are limited to the Latin American nations
  - C. require the gradual outlay of huge sums of money
  - D. are intended to assist underdeveloped countries
22. A government may deprive an individual of property under the right of "eminent domain" to
- A. prevent illegal use of it
  - B. put it to a beneficial public use
  - C. prevent a nuisance detrimental to the public
  - D. transfer it to another individual who will use it more profitably
23. Generally, who makes the decisions and policies of large American corporations?
- A. Stockholders
  - B. Company officials
  - C. Owners of bonds
  - D. Government planning boards

24. If a minority of senators strongly opposed a pending bill, to block its passage they might
- A. appeal to the President to adjourn congress
  - B. secure an adjournment until enough members were convinced of their viewpoint
  - C. refuse to attend the sessions, thereby preventing the quorum necessary to do business
  - D. monopolize the floor until the members agree to postpone the vote on the measure
25. A famous United States scientist who was born a slave had a significant effect on American agriculture. He did this, in part, by
- A. establishing an agricultural college in Alabama
  - B. inventing a machine that could harvest cotton efficiently
  - C. developing new uses for crops that would grow in the South
  - D. developing cheap fertilizers that made cultivation of marginal land profitable
26. Which statement best describes what the general public thought about early trade unions in America?
- A. Undesirable organizations which hurt business
  - B. Charitable organizations which cared for needy workers
  - C. A part of the communist conspiracy
  - D. The best vehicle for eliminating city slums
27. A member of a labor union who works for wages is called
- A. an apprentice
  - B. a steward
  - C. a journeyman
  - D. a mechanic

28. The North Atlantic Treaty Organization is an alliance of free nations established to
- A. assure mutual aid in event of natural disaster
  - B. exchange cultural benefits
  - C. protect the security of its members
  - D. pool atomic knowledge and resources
29. Under the "colonial system" developed by England and France in the 1700's, colonies were expected to
- A. produce raw materials
  - B. trade with all nations
  - C. engage in manufacturing
  - D. receive criminals and paupers as settlers
30. What was the most critical factor that allowed an ancient great civilization to develop in what is now Egypt?
- A. Distance from the nomadic tribes of Europe
  - B. Invention and use of irrigation
  - C. Abundance of rainfall
  - D. Supplies of coal and iron
31. US Supreme Court justices are selected by
- A. an election of the voters
  - B. a selection by a committee of congress
  - C. an appointment by the President with the approval of the Senate
  - D. a nomination by the state legislatures and appointment by the President

32. Of the following actions, which best illustrates the meaning of judicial review?
- A. A judge tells an administrator that a proposed course of action violates the First Admendment
  - B. A jury considers all the evidence before finding the accused guilty
  - C. A court rules that a statute violates a provision of the Constitution
  - D. The Senate examines judicial appointments before approving them
33. According to the idea of minority rights, if a minority in the United States considers a law unjust it can
- A. carry arms to prevent enforcement of the law
  - B. try to get the law changed
  - C. appeal to the United Nations for aid
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THE EFFECT OF VIOLATING AN ESTABLISHED  
MULTIPLE-CHOICE ITEM-WRITING PRINCIPLE  
ON TEST DIFFICULTY AND RELIABILITY

by

JOHN C. HELMICK, JR.

B.S., Virginia Polytechnic Institute and State University, 1968

AN ABSTRACT OF A MASTER'S THESIS

submitted in partial fulfillment of the

requirements for the degree

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College of Education

KANSAS STATE UNIVERSITY  
Manhattan, Kansas

1978

The purpose of this study was to investigate the effect of violating a selected multiple-choice item-writing practice on test difficulty and reliability. The principle investigated was the requirement that all of the alternatives should be grammatically consistent with the stem.

Two forms of a general high school level social studies test were developed for this study. One form contained faulty items (grammatical inconsistencies) while the other form was comprised of the identical items in their unfaulted form.

The subjects tested consisted of 197 military enlisted personnel obtained as volunteers through arrangements with a major midwestern military installation. Tests were distributed systematically so that alternate subjects took each version of the test.

The results of a single tailed  $t$  test (independent samples) between the mean scores on the faulted and unfaulted tests revealed no significant difference at the 0.05 level in test difficulty.

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