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INTERNATIONAL ROAD SIGNS: INTERPRETABILITY AND TRAINING TECHNIQUES

Douglas Griffith

and

Tomme R. Actkinson

ARI FIELD UNIT AT FORT HOOD, TEXAS

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September 1978

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Commander

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The drivers in a battalion about to be deployed to Germany were taught the meanings of international road signs using one of the following techniques: Sign Only, in which the road signs were presented via a slide projector and the names of the slides were provided orally by the instructor; Sign Elaboration, which was identical to the Sign Only condition except that a mnemonic cue was provided to facilitate retention of the sign's meaning; and a Standard Control condition, in which a lecture presentation was supplemented with

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standard training aids. No significant differences were obtained in the performances of the groups. The analyses of the interpretability of individual signs indicated that there was good reason to question the interpretability of many international road signs. Apparently, the more abstract the symbolic representation, the lower the interpretability. Training should stress selective instructional strategies for the more abstract signs and have a longer instruction period.

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(10) Douglas Griffith

~~and~~

Tomme R. Actkinson

ARI FIELD UNIT AT FORT HOOD, TEXAS

Submitted as complete and
technically accurate, by:
George M. Gividen
Field Unit Chief

(16) 2Q763743A775

Approved By:

A.H. Birnbaum, Acting Director
ORGANIZATIONS AND SYSTEMS
RESEARCH LABORATORY

Joseph Zeidner
TECHNICAL DIRECTOR (DESIGNATE)

U.S. ARMY RESEARCH INSTITUTE FOR THE BEHAVIORAL AND SOCIAL SCIENCES
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FOREWORD

A primary mission of the Fort Hood Field Unit of the Army Research Institute for the Behavioral and Social Sciences (ARI), under Army project 2Q763743A775, is to provide technical advisory services to local units. As a part of Brigade '75, units were routinely rotated from Fort Hood to USAREUR. The drivers in these units were required to obtain driver's licenses in Germany so that they could legally operate their vehicles. Half the driver's test was a test on international road signs. Because drivers were having difficulty passing this portion of the driver's test, the commander of the 2/67th Armor Battalion (2d AD) requested that ARI investigate the problem.

The study presented in this research report was conducted in response to that request. The results are pertinent to all commanders confronted with the problem of training on international road signs.

JOSEPH ZEIDNER
Technical Director (Designate)

78 11 28 011

INTERNATIONAL ROAD SIGNS: INTERPRETABILITY AND TRAINING TECHNIQUES

BRIEF

Requirement:

To evaluate the effectiveness of alternative techniques for training military drivers about to be deployed to Germany in the meaning of international road signs and to assess the interpretability of the international road signs used in Germany.

Procedure:

Two innovative instructional techniques employing slide presentation of road signs were used during normally scheduled classes. One technique (Sign Only) presented slides of individual road signs at a 10 seconds/slide rate with oral identification by the instructor. The second technique (Sign Elaboration) used the same procedure except that a mnemonic cue was provided to aid recognition of the sign. These two experimental techniques were compared with a standard instructional procedure (Standard Control condition) in which typical Army lesson plans were employed. Two measures were used to assess the relative effectiveness of the three training techniques. One measure was the number of signs correctly recognized during training. The second measure was the number of road signs correctly recognized on a criterion test administered approximately 1 week after training. The interpretability of the signs was assessed by determining the percentage of personnel who missed each road sign during training and by determining the percentage of personnel who missed each road sign presented during criterion testing.

Findings:

No significant differences emerged between the two slide presentation conditions during training, nor were significant differences obtained among the three conditions during criterion testing. Given that the percentages of errors on criterion testing were 9.0, 11.2, and 13.9 for the Sign Elaboration, Sign Only, and Standard Control conditions, respectively, it was concluded that these three training techniques were deficient.

The percentage of personnel missing a given sign ranged from 0 to 86% during the training phase. Ten of the 128 signs were missed by more than half the personnel in at least one of the conditions. Interpretability appeared to be an inverse function of abstraction, i.e., the more abstract the pictorial representation, the lower the interpretability.

Utilization of Findings:

Road sign instruction for military drivers deployed or about to be deployed overseas will be more effective if selective instructional strategies are used to teach the more difficult abstract signs.

INTERNATIONAL ROAD SIGNS: INTERPRETABILITY AND TRAINING TECHNIQUES

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INTERNATIONAL ROAD SIGNS: INTERPRETABILITY AND TRAINING TECHNIQUES

INTRODUCTION

Military drivers frequently must drive in foreign countries. International road signs are used in many countries and extensively throughout Europe. Accordingly, an understanding of these road signs is important for drivers operating overseas. Pictorial symbols are used in international road signs in an effort to transcend language barriers. Presumably, these symbols are readily interpreted, regardless of the driver's cultural background. A variety of studies have attested to the high interpretability of international road signs and the general superiority of symbols to words. But in spite of special training on international road signs, military drivers were failing the road sign portion of European drivers' tests. The present research examines this problem.

OBJECTIVES

Two objectives were central to the present research:

1. To evaluate the effectiveness of alternative instructional techniques for teaching international road signs; and

2. To assess the interpretability of individual international road signs.

METHOD

Army drivers in the 2/67th Armor Battalion about to be deployed to Germany served as the experimental subjects. The experimental conditions were Sign Only, Sign Elaboration, and Standard Control condition.

The Standard Control condition, which used the typical lecture format supplemented with training aids, was regarded as the baseline condition.

The Sign Only condition involved a visual slide presentation of road signs along with oral naming of the sign. In addition, a study test procedure was used during training that tested the driver's recognition of the meaning of the signs after he had been given an opportunity to study the sign. The comparison of the Sign Only condition with the Standard Control condition allowed the assessment of the effects of systematic audiovisual presentation that required the active participation of the students.

The Sign Elaboration condition was identical to the Sign Only condition except that a memory cue was provided to enhance the recognition of the meaning of the sign. The memory cue was a particular characteristic of the road sign (e.g., for "Autobahn Detour," ". . . concentrate on the U in the sign. Think of the U detouring you around something."). The comparison of the Sign Elaboration condition with the Sign Only condition allowed the assessment of the effects of systematic mnemonic elaboration to road sign training. The experiment used 128 signs.

RESULTS

Although there was a very small advantage during training for the Sign Elaboration group and a slightly larger advantage of both the experimental conditions over the Standard Control condition on the criterion test (see Figure 1), data analyses showed that the experimental techniques were not necessarily more effective than the standard instructional technique. The differences may have been due to spurious and unrelated factors.

Perhaps of more use to the trainer are the data relating to the signs missed most frequently. In general, the more readily recognized road signs fell into two categories: (a) signs having direct counterparts in the United States (e.g., STOP), and (b) signs using direct pictorial representations (e.g., low-flying aircraft).

CONCLUSIONS

With respect to the initial objectives of this research, two basic conclusions emerged: (a) the obtained differences among the alternative instructional programs were not significant statistically, and (b) there is reason to question the ready interpretability of many international road signs.

Although the two innovative training techniques did not necessarily result in significant increments in performance, it was still concluded that techniques can be developed that would help drivers learn and retain the meanings of road signs. It was quite clear that 2 hours of instruction is inadequate for effective road sign training. Pending further research, it is recommended that a minimum of 4 hours be devoted to this subject. As a result of the limitations in training time and available resources, the experimenters were skeptical at the outset that effective training techniques could be developed under the prevailing conditions. However, given what was learned in the present experiment in addition to more training resources, it is thought that cost-effective training techniques could be developed if further research were to be conducted on the topic of road sign training. Such research would help to develop theories of cognition as well as more effective training programs. The problem of learning and remembering pictogram meanings has received scant attention in the psychological literature.

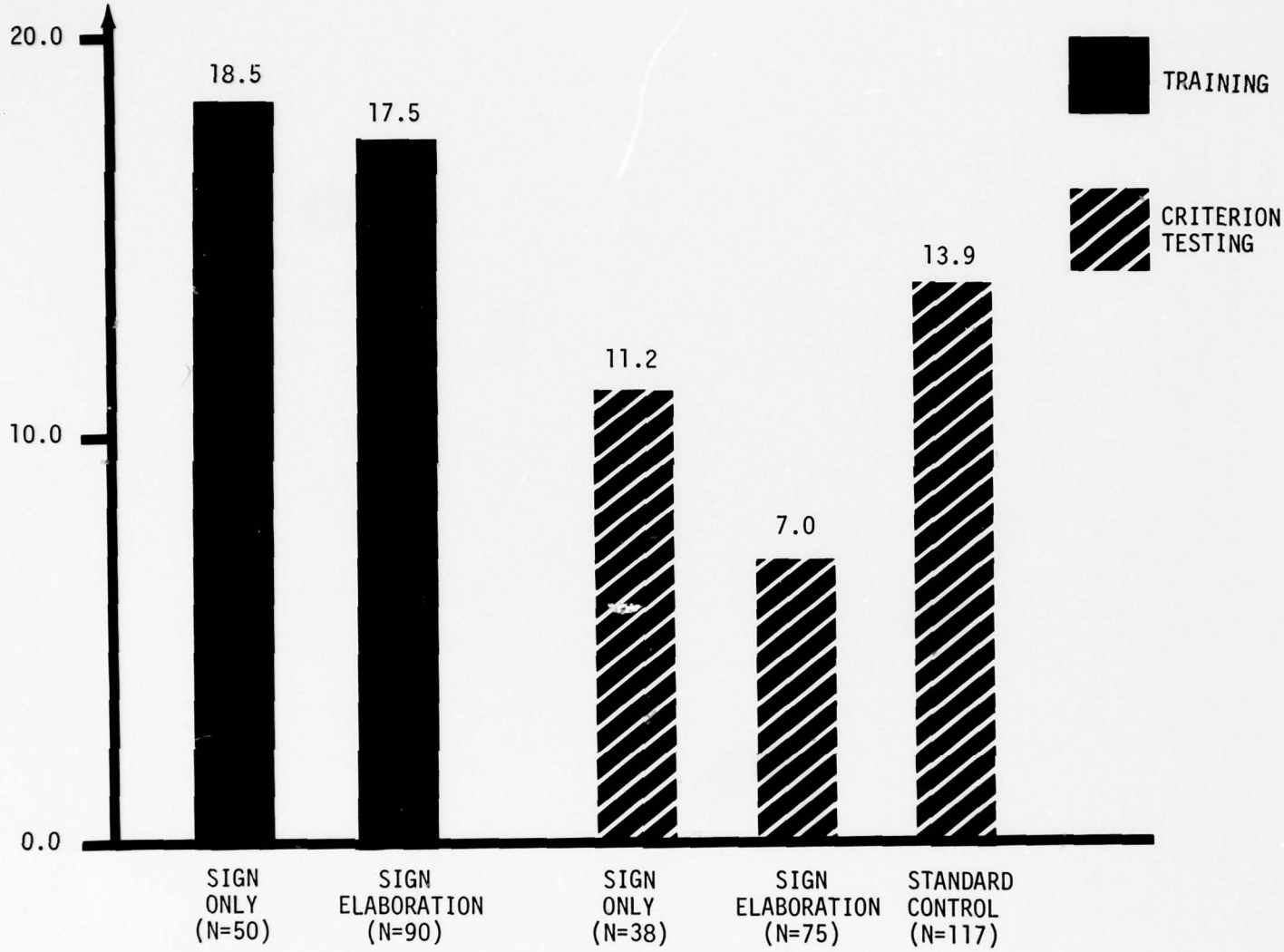

FIGURE 1. PERCENTAGES OF ROAD SIGNS MISSED BY CONDITION DURING TRAINING AND CRITERION TESTING

As an interim strategy, however, it is recommended that a selective training strategy be adopted, particularly for the more troublesome signs. Although personnel should be at least familiarized with all the signs, training should be concentrated on the more difficult signs. By adopting this training strategy, it is thought that performance can be enhanced significantly.

TECHNICAL SUPPLEMENT

BACKGROUND

A review of the literature on symbology indicated that there has been some difficulty in developing pictorial symbols that are readily interpretable. Cahill (1975) and Kolers (1969) have each commented on the difficulty of developing a universal symbology and on the need for empirical research to develop a symbology based on psychologically realistic principles. These conclusions, taken together with the difficulties experienced by military drivers being rotated to Europe, were legitimate reasons to question the interpretability of international road signs.

Training presented an interesting problem. According to the current memory literature (e.g., Paivio, 1971), memory for pictures is superior to memory for words. In fact, most techniques for mnemonic enhancement involve transforming verbal codes into visual codes. However, in the case of international road signs we begin with pictorial symbols, i.e., visual codes. These visual codes are useless, however, if they are not linked to the semantic representation of their meaning.

The current memory literature offered little to suggest how to train individuals in the meaning of international road signs. Although the literature amply demonstrated that visual elaboration enhanced verbal recall, there were no empirical demonstrations of the mnemonic enhancement of pictorial materials.

At least one theoretical idea in the literature appeared to offer some promise. This idea is termed "depth or spread of processing" (Craik & Lockhart, 1972; Craik & Tulving, 1975). The basic point is that memory is enhanced when codes are progressively elaborated to a semantic level of analysis. In the case of international road signs, the problem is to elaborate the pictorial representation of the sign so that it is linked with its semantic representation in memory.

One condition was developed in an attempt to elaborate the road signs mnemonically. Termed the Sign Elaboration condition, it was designed to elaborate mentally the pictorial representation and to link this pictorial representation with its underlying semantic interpretation. For example, for the sign "Autobahn Detour," the following mnemonic cue was provided: ". . . concentrate on the U in the sign. Think of the U detouring you around something."

Of course, it was possible that the systematic presentation entailed by the Sign Elaboration condition, coupled with the active participation of the subjects during training, would result in mnemonic enhancement. It was also possible that the mnemonic cues would be a

hindrance rather than an aid; and that, perhaps, idiosyncratic mediators developed by individuals would be more helpful than those supplied by the experimenters. Accordingly, the Sign Only condition was developed. In this condition, the instructor presented the signs in the same way as in the Sign Elaboration condition but did not discuss them.

The traditional method of platform instruction supplemented with training aids was also included in the study as a baseline condition. This was called the Standard Control condition.

METHOD

Presentation and Test Materials

Slides showing the international road signs were prepared from ANNEX A of USAREUR Pam 190-34. Directly below each road sign was a unique number, identical to that in the pamphlet. A total of 128 slides was prepared; these were distributed among four slide trays. Two sets of slides were arranged in each tray, one for presentation and one for testing. A separate answer sheet prepared for each tray included only the signs presented in that tray. The response alternatives were alphabetized. A slide projector and screen were used for presentation.

A subset of 50 of the same 128 slides was employed during criterion testing. The 50 response alternatives were not alphabetized on the answer sheet during criterion testing.

Procedures

Training Phase. During the training phase in the Sign Elaboration and Sign Only conditions, the slides of the individual road signs were presented at a 10-sec/slide rate. During this 10-second presentation interval, the instructor named the road sign, provided mnemonic elaboration in the Sign Elaboration condition (see Appendix A for a listing of the mnemonic cues provided in the Sign Elaboration condition), and said the name of the sign again. In the Sign Only condition, the instructor spoke the name of the sign twice. Slides were presented in numerical order.

During testing, the slides were presented at a 20-sec/slide rate in random order with the restriction that each sign be tested only once. Subjects were required to write the slide number adjacent to the correct alternative on their answer sheets. Immediately after the answer sheets were handed in, a brief feedback trial was provided. All slides in the tray were shown again in the initial presentation order and their correct names provided. The same procedure was followed for each of the four slide trays, with a short break between the second and third trays. The total instructional session was just under 2 hours.

In the Standard Control condition, the individual instructors developed their own lesson plans according to standard procedures. Basically, the classes consisted of a standard platform presentation supplemented with training aids.

Criterion Testing. The criterion test was the road sign section of the international driver's test, a routine part of pre-deployment testing, which was administered approximately 1 week after training. Initially, each road sign was presented at a 30-sec/slide rate. Again, subjects were asked to write the number of the slide adjacent to the correct alternative on the answer sheet. After the first iteration, all slides were shown a second time at the rate of 15 sec/slide.

Design and Subjects

The subjects were the drivers assigned to the 2/67th Armor Battalion stationed at Fort Hood, Tex. The battalion was preparing to deploy to Germany as part of Brigade '75.

The three conditions of the research design were the Sign Elaboration, Sign Only, and Standard Control conditions. The regularly scheduled instructors were employed in the Sign Elaboration and Sign Only conditions, and they conducted classes in the manner described above. Assignment to condition was on the basis of the normally scheduled classes. The numbers of different classes were four for Sign Elaboration, three for Sign Only, and six for Standard Control. An effort was made to counterbalance the presentation order of the four slide trays in the Sign Elaboration and Sign Only conditions.

Assignment of classes to conditions was random within the constraints of scheduling resources. One class was lost from the Sign Only condition as a result of an equipment failure. The number of drivers for which data were collected during the training phase was 90 for the Sign Elaboration condition and 50 for the Sign Only condition. The number of drivers present for the criterion test was 75, 38, and 117 for the Sign Elaboration, Sign Only, and Standard Control conditions, respectively.

The discrepancies in n's between training and the criterion test are attributable to no-shows and missing data collection forms. Strictly speaking, the sampling unit for this study was the class and not the individual driver. It will be noted in the statistical analyses that follow, however, that the individual driver was employed as the sampling unit. This assumption was made to increase the statistical power of the test. The reader will also note, however, that the same conclusions would be reached regardless of the sampling unit.

RESULTS AND DISCUSSION

Training Techniques

No significant differences emerged during training between the Sign Elaboration and Sign Only conditions, $t(138) = -.00$, $p < .05$. The Sign Elaboration group missed 18.5% of the signs during training, whereas the Sign Only group missed 17.5% of the signs. No data were collected during training for the Standard Control condition.

On the criterion test, a one-way unweighted means analysis of variance did not reveal a significant effect; $F(2, 227) = 2.21$, $p < .05$. The mean percentages incorrect were 9.0%, 11.2%, and 13.9% for the Sign Elaboration, Sign Only, and Standard Control conditions, respectively.

Clearly, even instruction using mnemonic enhancement of sign materials was not completely successful. It cannot be concluded from the present data, however, that the basic approach to the mnemonic enhancement of sign materials is untenable. First of all, it is clear that the time programed for road sign instruction was inadequate. Perhaps no program limited to a 2-hour instructional block would have worked. Multiple presentations and testings may be necessary. The overall quality of the mnemonic cues may have been poor. The entire study was developed on short notice, and it was difficult to develop the mediators in the time available. Perhaps with better mnemonic cues a substantial effect would have been obtained.

Another possible approach would be to teach the subjects the strategy of sign elaboration, but to require the subjects to generate their own idiosyncratic mediators for each sign. Data indicate that subject-generated mediators are superior to experimenter-supplied mediators with respect to recall (Bobrow & Bower, 1969; Griffith, 1976). With the exception of having the subjects generate their own mediators, the literature offers little else in the way of suggesting techniques for the mnemonic enhancement of sign materials.

Interpretability

The data on the individual road signs are presented in Appendixes B and C. With these interpretability data, it will be useful to keep two considerations in mind. One consideration is the context dependency of the data. To a certain extent, these data are a function of their respective testing situations. It was possible for an individual to miss a sign, even though he might have understood the basic meaning of the sign, because there were alternatives with similar meanings on the answer sheet (e.g., one-way traffic and one-way street).

The second consideration is the environmental validity of the testing situation. It is quite obvious that when people are driving and see a sign they do not consult an answer sheet to find the correct alternative. Hence, they are not likely to be confused by similar alternatives. By the same token, however, when driving they are required not to recognize but to recall the meaning of the sign, and typically they have much less than 20 seconds to respond appropriately. Thus, it is important when examining the interpretability data not to take the reported values literally.

To a certain extent, the data are a function of the testing situation. They do not necessarily indicate the percentage of drivers who would respond appropriately when confronted by the sign on the highway. Nevertheless, these considerations do not detract from the basic thrust of the interpretability data: There is reason to question seriously the general interpretability of international road signs. Moreover, these considerations do not question the general rank ordering of the signs in terms of interpretability.

The percentage of personnel missing a given sign varied from 0% to 86% during the training phase. Ten of the 128 signs were missed by more than half the personnel in at least one of the conditions. It is important to realize that these drivers were not entirely naive with respect to international road signs. Some drivers had held licenses in Europe previously, and study aids were available to all outside the formal classroom setting. Nevertheless, substantial numbers of road signs were being missed. These findings take exception to the conclusions of Brainard, Campbell, and Elkin (1961), that international road signs are highly interpretable and that their interpretability approaches 100% after one exposure to the meanings of the signs.

Although we disagree with certain conclusions of Brainard et al. (1961), we esentially agree with their analysis of the nature of road sign difficulty. A subjective analysis of the interpretability data by the authors indicated that the most readily interpreted signs fell into two categories. Not surprisingly, one category consisted of those signs having direct counterparts in existing American signs (e.g., STOP). The second category consisted of signs using direct pictorial representations (e.g., low-flying aircraft). As a general rule, it appeared that the more abstract the pictorial representation, the lower the interpretability.

REFERENCES

Bobrow, S. A., & Bower, G. H. Comprehension and Recall of Sentences. Journal of Experimental Psychology, 1969, 80, 455-461.

Brainard, R. W., Campbell, R. J., & Elkin, E. H. Design and Interpretability of Road Signs. Journal of Applied Psychology, 1961, 45, 130-136.

Cahill, M. C. Interpretability of Graphic Symbols as a Function of Context and Experience Factors. Journal of Applied Psychology, 1975, 60, 376-380.

Craik, F. I. M., & Lockhart, R. S. Levels of Processing: A framework for memory research. Journal of Verbal Learning and Verbal Behavior, 1972, 11, 671-884.

Craik, F. I. M., & Tulving, E. Depth of Processing and the Retention of Words in Episodic Memory. Journal of Experimental Psychology: General, 1975, 104, 268-294.

Griffith, D. The Attentional Demands of Mnemonic Control Processes. Memory and Cognition, 1976, 4, 103-108.

Kolers, P. A. Some Formal Characteristics of Pictograms. American Scientist, 1969, 57, 348-363.

Paivio, A. Imagery and Verbal Processes. New York: Holt, Rinehart, and Winston, Inc., 1971.

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APPENDIX A

LISTING OF MNEMONIC CUES

LIST 1

1. STOP - read the sign. It's identical to that employed in the States.

2. Halt - Halt means the same as STOP.

3. Danger - Both the exclamation point and the triangular shape mean danger.

4. Danger - Both the exclamation point and the triangular shape mean danger and the word underneath tells what kind of danger (Strassenbahn means Streetcar).

5. Danger - Although they forgot the dot for the exclamation point, the sign still means danger.

6. Temporary "Go" Sign - This is a manually operated sign to control traffic at construction sites. Concentrate on the green color. It means go.

7. Yield Right-of-Way - The shape of the sign is identical to the same sign in the States. The differences are that the sign is not yellow and does not say "yield."

8. Dangerous Downgrade - The triangular shape means danger--watch out. The downward slope indicates that the road slopes downward and the 10 percent indicates a 10 percent grade.

9. Dangerous Upgrade - The triangular shape means watch out--danger. The upward slope indicates that the road slopes upward, and the 12 percent indicates a 12 percent grade.

10. Oncoming Traffic - The triangular shape means watch out. The opposing arrows indicate traffic approaching from opposite directions.

11. Road Narrows - The triangular shape means watch out; the closing lines indicate that the road narrows.

12. Road Narrows - The triangular shape means watch out; the closing line on the right indicates that the right side of the road narrows.

13. Crossroads - The triangular shape means watch out; and the crossing lines indicate what to watch out for--a crossroad ahead.

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14. Drawbridge Ahead - The triangular shape means watch out; and the picture of the drawbridge tells you what to watch out for--a drawbridge.

15. Wild Animal Crossing - The triangular shape means watch out; and the picture tells you what to watch out for--a deer, a wild animal crossing the road.

16. Domestic Animal Crossing - The triangular shape means watch out; and the picture of the cow tells you what to watch out for.

17. Single Curve - The triangular shape means watch out; and the line curving to the right indicates the direction of the road ahead.

18. Double Curve - The triangular shape means watch out; and the line indicates that the road curves first to the right and then to the left.

19. Curve or Winding Road - The triangular shape means watch out; and the curving, winding line indicates--what else?--a curving, winding road.

20. Rough Road - The triangular shape means watch out; and the two bumps indicate a bumpy road.

21. Slippery Road - The triangular shape means watch out; and the car, which is apparently in trouble, has skidded on a slippery road.

22. Construction Site - The triangular shape means watch out; and the picture of a man working indicates what you should watch out for--a construction site.

23. Danger of Falling Rocks - The triangular shape means watch out; and the picture tells you what to watch out for--falling rocks.

24. Quay or River Bank - The triangular shape means watch out; and the picture of the car falling into the water indicates that you, too, should be careful of driving off the road into a body of water.

25. Traffic Lights - The triangular shape means "be aware" and the red, amber, and green lights indicate that there is a traffic light ahead.

26. Low-Flying Aircraft - The triangular shape means look out; and the picture tells you that it is low-flying aircraft which you should look out for.

27. Side Wind - The triangular shape means look out; and the picture tells you what to look out for. In case you don't recognize the picture, it is a picture of a wind sock and it indicates that there is the danger of a side wind.

28. Children - The triangular shape means watch out; and the picture indicates you are to watch out for children.

29. Bicycle Crossing - The triangular shape means look out; and the picture of the man on a bicycle indicates that it is a bicycle crossing.

30. Pedestrian Crosswalk - The triangular shape means look out; and the picture of the man crossing the street indicates that it is a pedestrian crosswalk.

31. Pedestrian Crosswalk - The triangular shape means look out; and the picture of the man crossing the street indicates that it is a pedestrian crosswalk.

32. Pedestrian Crosswalk - The picture of a man crossing the street indicates that it is a pedestrian crosswalk. This sign is posted at the crosswalk and comes after the warning signs.

33. Pedestrian Crosswalk - The white stripes painted on the pavement indicate that pedestrians cross here.

LIST 2

34. Dead End - This picture represents a dead end. Think of the white stripe as being a dead-end alley.

35. Children Playing - This sign of a child playing indicates that children are permitted to play on the roadway.

36. Streetlight Marking - This sign is printed on streetlights that do not remain on all night. You must have your parking lights on if you park here.

37. Guarded Railroad Crossing - The triangular shape means watch out. The picture tells you two things. It looks like a railroad track, so this means that you are approaching a railroad crossing. It also looks like a gate, meaning that the railroad crossing is guarded.

38. Unguarded Railroad Crossing - The triangular shape is a warning. The picture of the train indicates that it is a railroad crossing and that the crossing is unguarded.

39. Railroad Crossing - The shape of the sign is the same as the one in the States.

40. Railroad Crossing - The shape of the sign is the same as the one in the States. If the red light on top is flashing, it means that a train is approaching.

41. Distance to Guarded Railroad Crossing - Same as the earlier one. Stripes indicate the number of 80-meter intervals to the crossing.

42. Distance to Unguarded Railroad Crossing - Same as the earlier one. Stripes indicate the number of 80-meter intervals to the crossing.

43. No Stopping - Think of this sign as a wheel, a wheel meaning go. The X cancels "Go," indicating no stopping on the roadway. Got that? (If not, repeat.)

44. No Stopping on Shoulder - The sign shows a car stopped on the shoulder of the road. The X means you shouldn't do this.

45. Limited No Stopping - Think of this as being half of the No Stopping sign. You have only half an X. It means that you can only stop for the purpose of mounting and dismounting, and loading and unloading.

46. No Parking - The P in the sign stands for parking. The slash indicates that parking is prohibited.

47. No Stopping Zone - This sign contains sign 45 which indicates limited No Stopping. The rest of the sign indicates the conditions under which parking is permitted. In this case, for 3 hours (Stunden) if you have a blue permit.

LIST 3

48. End of No Stopping Zone - This is a cancellation (note diagonal stripes) of the No Stopping Zone sign indicating that the parking permit is not valid beyond this sign.

49. No Passing - This circular shape indicates that something is prohibited. The picture in the sign shows you what it is--passing other motor vehicles.

50. No Passing - The circular shape indicates that something is prohibited, and the picture shows you what it is. Trucks (in red) are not allowed to pass.

51. No Passing - Same business--no passing.

52. End of No Passing Zone - This is a picture of sign 49, i.e., No Passing - The slash through the sign indicates that the previous sign has been canceled.

53. End of No Passing Zone - This is a picture of sign 50, i.e., Trucks cannot pass - The slash through the sign indicates that the previous sign has been canceled.

54. End of No Passing Zone - Ende means end. This sign means that the no passing sign has been canceled.

55. Vehicles Above a Specific Axle Weight Prohibited - The circular sign means that something is prohibited, and the picture shows you what it is. The 8 t means 8 tons, and the picture of the wheel axle indicates that vehicles above an 8-ton axle weight are prohibited.

56. Maximum Weight Allowed - The circular sign indicates that something is prohibited. The 5.5 T stands for 5½ tons and means that vehicles above this weight will not be allowed to continue.

57. Maximum Height Allowed -The circular shape indicates that something is prohibited. The two vertical markers indicate that it is height, and the 3 M indicates the maximum height, in meters, of a vehicle that may pass.

58. Maximum Width Allowed - The circular shape indicates that something is prohibited. The horizontal markers and the 2 M indicate that vehicles more than 2 meters wide may not pass.

59. No Vehicles Carrying Pollutants - The circular shape indicates that something is prohibited. Note the blue lines indicating water, the red oval indicating pollutants and the wheels denoting a vehicle. Put this all together, and you have no vehicles carrying pollutants.

60. Customs Control - Think of a slot in the sign as the place you would drop your customs tax.

61. Road Closed - Remember, circular signs usually mean that something is prohibited. A circular sign with nothing on it means that the road is closed, that everything is prohibited.

62. Motor Vehicles Prohibited - The circular sign indicates that something is prohibited, and the picture shows you what it is--motor vehicles.

63. Motorcycles Prohibited - The circular sign indicates that something is prohibited, and the picture shows you what it is--motorcycles.

64. Motor Vehicles Prohibited on Sundays and Holidays - This sign is similar to the motor vehicles prohibited sign. The difference is that the drawing is not colored in. It also has a similar meaning. Motor vehicles prohibited, but only on Sundays and Holidays.

65. Entry Prohibited - Think of the red closing in on the white, prohibiting anything from entering.

66. Speed Limit - The circular shape indicates that something is prohibited, and the 30 K M indicates that speeds greater than 30 K M are prohibited (i.e., the speed limit).

67. End of Speed Limit - The slash cancels the KMH speed limit.

68. End of Speed Limit - Again, the diagonal line cancels the speed limit.

69. End of Restrictions - The multiple diagonal lines indicate that more than one restriction is canceled.

70. One-Way Street - Similar to the States. Einbahnstrasse is German for One-Way Street.

71. One-Way Street - Same meaning as the preceding sign.

72. Yield to Oncoming Traffic - The two arrows indicate oncoming traffic. The red arrow indicates who must yield.

73. Oncoming Traffic Must Wait - Again, the two arrows incicate oncoming traffic, and the red arrow indicates who must wait.

74. One-Way Traffic - The arrow simply indicates that there is one-way traffic and the direction of the traffic.

75. Mandatory Direction of Travel - The arrow simply means that you must travel in the direction indicated.

76. Mandatory Direction of Travel - The arrow indicates the side on which you are to pass an obstacle.

77. Mandatory Direction of Travel - Arrow indicates the direction in which you must proceed.

78. Mandatory Direction of Travel - Arrows indicate the direction in which traffic must travel.

79. Mandatory Direction of Travel - Traffic must turn left.

80. Mandatory Direction of Travel - You must turn either right or left.

81. Motor Vehicles Only - The picture indicates the type of vehicles which are allowed on the highway, i.e., motor vehicles.

82. End of Restriction Imposed by Sign 81 - The diagonal cancels the sign.

83. Bridle Path - The picture indicates a horse and rider. Only horseback riders are allowed on this path.

84. Pedestrians Only - The picture shows two pedestrians. Only pedestrians are allowed here.

85. Bicycles Only - The picture indicates a bicycle, and the sign means that only bicycles are allowed here.

86. Priority Road - A diamond inside of another diamond indicates that you are on a priority road. Think of the diamond as being something important, e.g., a diamond ring, indicating the priority road.

87. Priority Road - Same as 86.

88. Priority Road - Same business.

89. Priority Road Ahead - Remember this yield sign has the same shape as it does in the States. This sign means that you are approaching a priority road and must yield the right-of-way.

90. End of Priority Road - The diagonal lines through the priority road sign cancel the priority road sign, indicating the end of the priority road.

91. Priority Road - Remember the triangular shape means "warning." The wavy arrow indicates you are in a priority road. The horizontal line indicates that you have the right-of-way <u>only at the next intersection</u>.

92. Detour - Umleitung is German for Detour. Concentrate on the U. Imagine the U detouring you around something.

93. Bypass Routing - The sign indicates an alternative route. The 5.5 T stands for 5½ tons and indicates that vehicles greater than this weight must take the alternative route.

94. Truck Route - The picture of the truck indicates a truck route. The arrows show the direction in which trucks must travel.

95. City Limits - A rectangular sign with the name of a city on it and Kreis Ahrweiler means the city limits.

96. End of City Limits - The same sign with a red slash through it indicates the end of the city limits.

97. Direction Marker - City names with arrows by them point to the direction of the cities.

98. European Highway - The E stands for European, and the number denotes the number of the route.

99. Federal Highway Number - Simply denotes the number of the highway you are using.

100. Place Number - Signs of this shape simply indicate the name of a place.

LIST 4

101. Direction of the Autobahn - Two parallel white lines crossed by a bridge indicate the autobahn. This sign points the direction to the nearest autobahn entrance. The name in the sign is the name of the terminal city.

102. Autobahn Entrance - Einfahrt means entrance; concentrate on the second and third letters, which spell "in."

103. End of Autobahn - Remember that the parallel white lines with the bridge crossing them is the sign for the Autobahn. This same sign with the diagonal red slash indicates the end of the Autobahn.

104. Autobahn Direction Sign - Shows direction on the Autobahn.

105. Change of Traffic Lanes - The arrows indicate where you must cross.

106. Detour Route Marker - Concentrate on the U in the sign. Think of the U detouring you around something.

107. Autobahn Detour - Concentrate on the U in the sign. Think of the U detouring you around something.

108. Police - Polizei is German for Police. It looks quite similar to the English word. The 200 m stands for 200 meters--the distance to the nearest police station.

109. Telephone - The picture of the telephone receiver indicates there is a telephone ahead. 200 m, 200 meters, gives you the distance.

110. First Aid Station - The red cross stands for first aid. A first aid station is ahead.

111. Recommended Speed - The km should tell you that this is a speed limit. Note that a speed range is indicated. This is a recommended speed.

112. Water Protection Area - Note the oil truck and the water. This is a water protection area.

113. Parking Area - The P stands for parking. This is a parking area.

114. Parking on Curb Permitted - Note the P which stands for parking and the picture of the car parked on the curb. This indicates that parking on the curb is permitted.

115. Soft Shoulder - Note the picture of the car sunk in the soft shoulder. This warns you of a soft shoulder.

116. Compulsory Minimum Speed - Remember that the circular shape indicates that this is a regulation. The number indicates the minimum speed in KPH which you are required to travel.

117. End of Compulsory Minimum Speed Zone - The diagonal slash indicates cancellation. In this case, it is canceling the minimum speed limit.

118. Directional Arrows - These arrows indicate directions just as they would in the States.

119. Solid White Line - Indicates no passing. In Germany, a solid single line means the same as a solid double line in the States.

120. Broken White Line - Means the same as it does in the States.

121. Solid and Broken White Line - Means the same as it does in the States.

122. Bus Stop - Think of the H as meaning Halt or Stop, and imagine a bus the shape of the sign. This is the sign for a bus stop.

123. Streetcar Stop - Think of the H as meaning Halt or Stop. Let the circular shape remind you of streetcar wheels. This sign is for a streetcar stop.

124. No Parking - Think of the broken lines as representing what might happen to your car if you park in a No Parking Zone.

125. Direction Marker - The arrows point the way to whatever is written on them.

126. Traffic Directed by School Guard - Concentrate on the picture. It tells you exactly what the sign means.

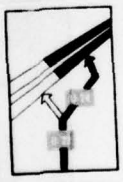
127. Snow Chains Mandatory - The circular shape of the sign means that it's a regulation, and the picture indicates exactly what the regulation is.

128. Taxi Parking Only - Remember that the circular sign with one slash through it indicates no stopping or parking. The word Taxi indicates that taxis are excepted, that this parking is for taxis only.

129. Taxi Parking Only - Same as sign 131, except that Droschken is the German word for Taxi.

APPENDIX B

RANK ORDERING OF ROAD SIGNS MISSED DURING TRAINING

		Sign Only	Sign Elaboration
1. No Stopping Zone		64	86
2. Limited No Stopping		62	74
3. Priority Road Ahead		74	56
4. One-Way Traffic		62	68
5. Detour Route Marker		62	63
6. Autobahn Detour		62	62

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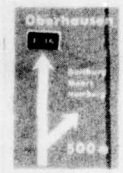
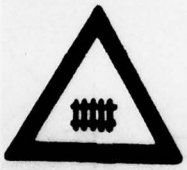
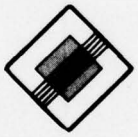
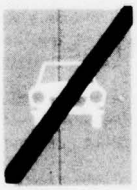
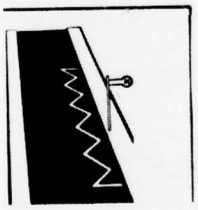
		Sign Only	Sign Elaboration
7.	Direction to Autobahn	60	46
8.	Roads Closed	60	41
9.	End of City Limits	54	52
10.	Direction Marker	32	53
11.	No Stopping	48	52
12.	Autobahn Direction Sign 	48	48
13.	End of No Stopping Zone	48	48
14.	Yield to Oncoming Traffic	32	47

		Sign Only	Sign Elaboration
15.	Entry Prohibited	40	44
16.	Oncoming Traffic Must Wait	22	41
17.	Autobahn Entrance	34	36
18.	Streetlight Marking	28	36
19.	Priority Road	34	29
20.	Priority Road	34	29
21.	Priority Road	34	29
22.	Priority Road	34	29

		Sign Only	Sign Elaboration
23. Direction Marker		14	34
24. End of Restrictions		30	33
25. Maximum Weight Allowed		32	28
26. Guarded Railroad Crossing		22	32
27. Recommended Speed		22	31
28. Compulsory Minimum Speed		30	29
29. Unguarded Railroad Crossing		26	30

		Sign Only	Sign Elaboration
30.	Motor Vehicles Prohibited	30	21
31.	Detour	20	30
32.	Bypass Routing	14	28
33.	Distance to Unguarded Railroad Crossing	20	27
34.	End of Priority Road 	26	21
35.	End of Motor Vehicle Only Restriction 	18	26
36.	Change of Traffic Lanes	14	24

		Sign Only	Sign Elaboration
37.	Curve or Winding Road	22	23
38.	Motor Vehicles Prohibited on Sundays or Holidays	20	23
39.	Vehicles Above a Certain Axle Weight Prohibited	14	23
40.	Directional Arrows	22	21
41.	Double Curve	20	22
42.	Distance to Guarded Railroad Crossing	16	22
43.	Maximum Width Allowed	22	12

		Sign Only	Sign Elaboration
44.	No Vehicles Carrying Pollutants	12	22
45.	End of Autobahn	22	9
46.	Place Name	18	21
47.	Customs Control	16	21
48.	No Parking 	16	20
49.	Maximum Height Allowed	20	14
50.	European Highway	14	20
51.	Yield Right of Way	20	12

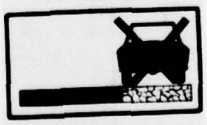
	Sign Only	Sign Elaboration
52. Motor Vehicles Only	20	11
53. Mandatory Direction of Travel	19	16
54. Mandatory Direction of Travel	19	16
55. Mandatory Direction of Travel	19	16
56. Mandatory Direction of Travel	19	16
57. Mandatory Direction of Travel	19	16
58. Mandatory Direction of Travel	19	16

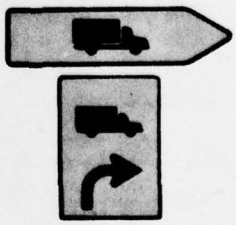
		Sign Only	Sign Elaboration
59. End of No Passing Zone		14	19
60. End of No Passing Zone		14	19
61. End of No Passing Zone		14	19
62. No Parking		12	19
63. One Way Street		18	17
64. One Way Street		18	17
65. Federal Highway Marker		14	17
66. Broken White Line		12	17

		Sign Only	Sign Elaboration
67. Single Curve		12	17
68. City Limits		12	16
69. Railroad Crossing		7	16
70. Railroad Crossing		7	16
71. Side Wind		16	4
72. No Passing		13	15
73. No Passing		13	15

		Sign Only	Sign Elaboration
74.	No Passing	13	15
75.	End of Compulson Minimum Speed Zone	12	13
76.	Streetcar Stop	12	12
77.	Dangerous Downgrade	12	9
78.	Pedestrians Only	12	9
79.	Crossroads	12	8
80.	Rough Road	12	6

		Sign Only	Sign Elaboration
81. Speed Limit		6	12
82. Temporary Go Sign		12	2
83. Taxi Parking Only		11	11
84. Taxi Parking Only		11	11
85. End of Speed Limit		10	11
86. End of Speed Limit		8	11
87. Children		10	10

		Sign Only	Sign Elaboration
88.	Dangerous Upgrade	10	9
89.	Bus Stop	6	10
90.	Road Narrows	10	6
91.	Solid White Line	10	6
92.	Danger	10	5
93.	No Stopping on Shoulder 	8	8
94.	Dead End	8	7
95.	Solid & Broken White Line	6	8

		Sign Only	Sign Elaboration
96. Domestic Animal Crossing		8	4
97. Halt		2	8
98. Parking on Curb Permitted		4	7
99. Bridle Path		2	7
100. Oncoming Traffic		2	7
101. Truck Route		4	8
102. Wild Animal Crossing		6	1

		Sign Only	Sign Elaboration
103. Slippery Road		6	1
104. Pedestrian Crosswalk		5	4
105. Pedestrian Crosswalk		5	4
106. Pedestrian Crosswalk		5	4
107. Pedestrian Crosswalk		5	4
108. Danger		4	5
109. Danger		4	5

		Sign Only	Sign Elaboration
110.	Traffic Directed by School Guard	4	4
111.	Drawbridge Ahead	4	4
112.	Shoft Shoulder	4	3
113.	Traffic Lights	4	3
114.	Parking Area	4	3
115.	Stop	2	4
116.	Construction Site	4	2

		Sign Only	Sign Elaboration
117.	Bicyles Only	4	1
118.	Quay or River Bank	4	1
119.	Police	4	1
120.	Children Playing	4	0
121.	Motorcycles Prohibited	4	0
122.	Danger of Falling Rocks	2	3
123.	Snow Chains Mandatory	2	2
124.	Water Protection Area	2	2

		Sign Only	Sign Elaboration
125. Telephone		2	2
126. Bicycle Crossing		2	0
127. First Aid Station		0	1
128. Low Flying Aircraft		0	0

APPENDIX C

RANK ORDERING OF ROAD SIGNS MOST FREQUENTLY MISSED DURING CRITERION TESTING

		Sign Only	Sign Elaboration	Standard
1.	One-Way Street	32	21	30
2.	Bicycle Crossing	18	20	31
3.	Entry Prohibited	24	19	29
4.	Street Car Stop	13	24	29
5.	Children	16	24	28
6.	Pedestrian Only	26	27	26
7.	No Stopping	16	20	26
8.	Detour	26	16	22
9.	Autobahn Entrance	24	20	26
10.	Motor Vehicles Prohibited	13	9	26
11.	Bus Stop	11	23	19
12.	Bicycles Only	18	23	14
13.	Autobahn Ends	13	9	23
14.	Federal Highway Marker	11	5	22
15.	Cross Roads	8	8	21
16.	Pedestrian Crosswalk	16	16	21
17.	Guarded Railroad Crossing	21	13	14
18.	Maximum Weight Allowed	13	12	21
19.	Double Curve	21	1	9
20.	Maximum Height Allowed	16	11	20

		Sign Only	Sign Elaboration	Standard
21.	End of Speed Limit	16	11	12
22.	Dangerous Downgrade	16	4	14
23.	Children Playing	11	9	15
24.	Dead End	8	9	15
25.	Temporary Go Sign	11	4	15
26.	Danger	13	3	9
27.	Dangerous Upgrade	3	5	13
28.	Mandatory Right or Left Turn	8	11	12
29.	Danger Strassenbahn	11	4	11
30.	Oncoming Traffic	8	9	11
31.	Drawbridge Ahead	11	7	4
32.	Speed Limit	8	3	11
33.	Side Wind	11	3	10
34.	Road Narrows	11	1	9
35.	No Passing	5	4	11
36.	Unguarded Railroad Crossing	5	9	10
37.	Traffic Lights	5	8	9
38.	Quay or River Bank	3	5	8
39.	First Aid Station	8	4	2
40.	Wild Animal Crossing	8	0	3
41.	Construction Site	3	1	6

	Sign Only	Sign Elaboration	Standard
42. Maximum Width Allowed	5	4	7
43. Rough Road	5	4	3
44. Telephone	5	3	3
45. Domestic Animal Crossing	5	1	4
46. Falling Rocks	0	1	4
47. Stop	3	1	2
48. Slippery Road	3	0	3
49. Truck Route	3	1	2
50. Parking Area	3	0	2

DISTRIBUTION

ARI Distribution List

4 OASD (M&RA)
2 HQDA (DAMI-CSZ)
1 HQDA (DAPE-PBR
1 HQDA (DAMA-AR)
1 HQDA (DAPE-HRE-PO)
1 HQDA (SGRD-ID)
1 HQDA (DAMI-DOT-C)
1 HQDA (DAPC-PMZ-A)
1 HQDA (DACH-PPZ-A)
1 HQDA (DAPE-HRE)
1 HQDA (DAPE-MPO-C)
1 HQDA (DAPE-DW)
1 HQDA (DAPE-HRL)
1 HQDA (DAPE-CPS)
1 HQDA (DAFD-MFA)
1 HQDA (DARD-ARS-P)
1 HQDA (DAPC-PAS-A)
1 HQDA (DUSA-OR)
1 HQDA (DAMO-RQR)
1 HQDA (DASG)
1 HQDA (DA10-PI)
1 Chief, Consult Div (DA-OTSG), Adelphi, MD
1 Mil Asst. Hum Res, ODDR&E, OAD (E&LS)
1 HQ USARAL, APO Seattle, ATTN: ARAGP-R
1 HQ First Army, ATTN: AFKA-OI-TI
2 HQ Fifth Army, Ft Sam Houston
1 Dir, Army Stf Studies Ofc, ATTN: OAVCSA (DSP)
1 Ofc Chief of Stf, Studies Ofc
1 DCSPER, ATTN: CPS/OCP
1 The Army Lib, Pentagon, ATTN: RSB Chief
1 The Army Lib, Pentagon, ATTN: ANRAL
1 Ofc, Asst Sect of the Army (R&D)
1 Tech Support Ofc, OJCS
1 USASA, Arlington, ATTN: IARD-T
1 USA Rsch Ofc, Durham, ATTN: Life Sciences Dir
2 USARIEM, Natick, ATTN: SGRD-UE-CA
1 USATTC, Ft Clayton, ATTN: STETC-MO-A
1 USAIMA, Ft Bragg, ATTN: ATSU-CTD-OM
1 USAIMA, Ft Bragg, ATTN: Marquat Lib
1 US WAC Ctr & Sch, Ft McClellan, ATTN: Lib
1 US WAC Ctr & Sch, Ft McClellan, ATTN: Tng Dir
1 USA Quartermaster Sch, Ft Lee, ATTN: ATSM-TE
1 Intelligence Material Dev Ofc, EWL, Ft Holabird
1 USA SE Signal Sch, Ft Gordon, ATTN: ATSO-EA
1 USA Chaplain Ctr & Sch, Ft Hamilton, ATTN: ATSC-TE-RD
1 USATSCH, Ft Eustis, ATTN: Educ Advisor
1 USA War College, Carlisle Barracks, ATTN: Lib
2 WRAIR, Neuropsychiatry Div
1 DLI, SDA, Monterey
1 USA Concept Anal Agcy, Bethesda, ATTN: MOCA-WGC
1 USA Concept Anal Agcy, Bethesda, ATTN: MOCA-MR
1 USA Concept Anal Agcy, Bethesda, ATTN: MOCA-JF
1 USA Artic Test Ctr, APO Seattle, ATTN: STEAC-MO-ASL
1 USA Artic Test Ctr, APO Seattle, ATTN: AMSTE-PL-TS
1 USA Armament Cmd, Redstone Arsenal, ATTN: ATSK-TEM
1 USA Armament Cmd, Rock Island, ATTN: AMSAR-TDC
1 FAA-NAFEC, Atlantic City, ATTN: Library
1 FAA-NAFEC, Atlantic City, ATTN: Hum Engr Br
1 FAA Aeronautical Ctr, Oklahoma City, ATTN: AAC-44D
2 USA Fld Arty Sch, Ft Sill, ATTN: Library
1 USA Armor Sch, Ft Knox, ATTN: Library
1 USA Armor Sch, Ft Knox, ATTN: ATSB-DI-E
1 USA Armor Sch, Ft Knox, ATTN: ATSB-DT-TP
1 USA Armor Sch, Ft Knox, ATTN: ATSB-CD-AD
2 HQUSACDEC, Ft Ord, ATTN: Library
1 HQUSACDEC, Ft Ord, ATTN: ATEC-EX-E-Hum Factors
2 USAEEC, Ft Benjamin Harrison, ATTN: Library
1 USAPACDC, Ft Benjamin Harrison, ATTN: ATCP-HR
1 USA Comm-Elect Sch, Ft Monmouth, ATTN: ATSN-EA
1 USAEC, Ft Monmouth, ATTN: AMSEL-CT-HDP
1 USAEC, Ft Monmouth, ATTN: AMSEL-PA-P
1 USAEC, Ft Monmouth, ATTN: AMSEL-SI-CB
1 USAEC, Ft Monmouth, ATTN: C, Facl Dev Br
1 USA Materials Sys Anal Agcy, Aberdeen, ATTN: AMXSY-P
1 Edgewood Arsenal, Aberdeen, ATTN: SAREA-BL-H
1 USA Ord Ctr & Sch, Aberdeen, ATTN: ATSL-TEM-C
2 USA Hum Engr Lab, Aberdeen, ATTN: Library/Dir
1 USA Combat Arms Tng Bd, Ft Benning, ATTN: Ad Supervisor
1 USA Infantry Hum Rsch Unit, Ft Benning, ATTN: Chief
1 USA Infantry Bd, Ft Benning, ATTN: STEBC-TE-T
1 USASMA, Ft Bliss, ATTN: ATSS-LRC
1 USA Air Def Sch, Ft Bliss, ATTN: ATSA-CTD-ME
1 USA Air Def Sch, Ft Bliss, ATTN: Tech Lib
1 USA Air Def Bd, Ft Bliss, ATTN: FILES
1 USA Air Def Bd, Ft Bliss, ATTN: STEBD-PO
1 USA Cmd & General Stf College, Ft Leavenworth, ATTN: Lib
1 USA Cmd & General Stf College, Ft Leavenworth, ATTN: ATSW-SE-L
1 USA Cmd & General Stf College, Ft Leavenworth, ATTN: Ed Advisor
1 USA Combined Arms Cmbt Dev Act, Ft Leavenworth, ATTN: DepCdr
1 USA Combined Arms Cmbt Dev Act, Ft Leavenworth, ATTN: CCS
1 USA Combined Arms Cmbt Dev Act, Ft Leavenworth, ATTN: ATCASA
1 USA Combined Arms Cmbt Dev Act, Ft Leavenworth, ATTN: ATCACO-E
1 USA Combined Arms Cmbt Dev Act, Ft Leavenworth, ATTN: ATCACC-CI
1 USAECOM, Night Vision Lab, Ft Belvoir, ATTN: AMSEL-NV-SD
3 USA Computer Sys Cmd, Ft Belvoir, ATTN: Tech Library
1 USAMERDC, Ft Belvoir, ATTN: STSFB-DQ
1 USA Eng Sch, Ft Belvoir, ATTN: Library
1 USA Topographic Lab, Ft Belvoir, ATTN: ETL-TD-S
1 USA Topographic Lab, Ft Belvoir, ATTN: STINFO Center
1 USA Topographic Lab, Ft Belvoir, ATTN: ETL-GSL
1 USA Intelligence Ctr & Sch, Ft Huachuca, ATTN: CTD-MS
1 USA Intelligence Ctr & Sch, Ft Huachuca, ATTN: ATS-CTD-MS
1 USA Intelligence Ctr & Sch, Ft Huachuca, ATTN: ATSI-TE
1 USA Intelligence Ctr & Sch, Ft Huachuca, ATTN: ATSI-TEX-GS
1 USA Intelligence Ctr & Sch, Ft Huachuca, ATTN: ATSI-CTS-OR
1 USA Intelligence Ctr & Sch, Ft Huachuca, ATTN: ATSI-CTD-DT
1 USA Intelligence Ctr & Sch, Ft Huachuca, ATTN: ATSI-CTD-CS
1 USA Intelligence Ctr & Sch, Ft Huachuca, ATTN: DAS/SRD
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