

RM-5957-PR

JUNE 1969

# The DELPHI Method, II: Structure of Experiments

B. Brown, S. Cochran and N. Dalkey

This research is supported by the United States Air Force under Project Rand—Contract No. F44620-67-C-0045—Monitored by the Directorate of Operational Requirements and Development Plans, Deputy Chief of Staff, Research and Development, Hq USAF. Views or conclusions contained in this study should not be interpreted as representing the official opinion or policy of Rand or of the United States Air Force.

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PREFACE

This Memorandum, a supplement to RM-5888-PR, The Delphi Method: An Experimental Study of Group Opinion, deals with one aspect of RAND's continuing study of methods for improving decisionmaking. It presents the material used in a series of experiments evaluating the Delphi procedures for formulating and refining group judgments, as well as a bibliography of RAND publications related to Delphi studies. The data generated by the experiments are analyzed and major conclusions of the study are presented in RM-5888-PR.

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EXPERIMENTS IN GROUP ESTIMATION

1. INTRODUCTION

Delphi is the name that has been applied to a technique designed to elicit opinions from a group with the aim of generating a group response. Delphi replaces direct confrontation and debate by a carefully planned, anonymous, orderly program of sequential individual interrogations usually conducted by questionnaires. The series of questionnaires is interspersed with feedback derived from the respondents.

Delphi has been used for a number of years, yet little is known about the dynamics of the Delphi process. The series of experiments described in this Memorandum and in RM-5888-PR was conducted in order to increase our understanding of the process by which groups answer questions using the Delphi method.

It was our intention to keep the subjects informed about the purpose of the experiments and the role that they were playing when serving as subjects; one way we did this was to include the following information in our instructions to them:

The experiment in which you are taking part this afternoon is one of a series investigating human information processing. Your primary task will be to answer questions of a general information type. The experiment is not a quiz or an examination, nor is it a test of social influence. We are interested in the way groups use incomplete information to arrive at factual conclusions.

It is not expected that you will know the exact answer to any of the questions. However, for most of them you will have some general knowledge that will enable you to make an estimate—an informed guess—of the answer. You are to make as good an estimate as you can; but in any case, answer every question as best you can.

A numerical answer was required for each question.

### Subjects

In experiments I through VIII, a total of 214 junior, senior, or graduate students from the University of California at Los Angeles were paid to serve as subjects, with 127 of them men and 87 women. They averaged 23 years of age with a range of 19 to 40; 85 per cent of them had not reached their 24th birthday. The ratio of graduates to undergraduates was 1:3.

### Material and Procedure

In the typical experiment, each subject answered 20 questions. A total of 160 different questions were asked; some questions were used in more than one experiment and, counting repeats, answers were obtained to 240 questions. In most of the experiments, subjects were allowed to revise their answers to the questions one or more times, according to the specific experimental design, resulting in about 10,000 responses to questions.

The Concept Mastery Test\* was completed by 66 of the men and 42 of the women.

College transcripts were obtained for each of the subjects.

All experiments were conducted in the RAND building in Santa Monica between June 1967 and July 1968. The experimental rooms were designed to ensure that each subject worked independently.

This document records some of the details of conducting the experiments. RM-5888-PR discusses the conclusions reached from the experimental data.

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\*Terman, Lewis M. Concept Mastery Test, Form T, The Psychological Corporation.

Experimental Schedule

\* Experiment A: Group a—5 subjects; Group b—5 subject,  
June 27 - 30, 1967.

Experiment I: Group 1—14 subjects; Group 2—14  
subjects, February 2 and 3, 1968.

Experiment II: Group 3—15 subjects; Group 4—14  
subjects, February 8, 1968.

Experiment III: Group 5—13 subjects; Group 6—13  
subjects, February 16, 1968.

Experiment IV: Group 7—25 subjects, February 23, 1968.

Experiment V: Group 9—13 subjects, Group 10—14  
subjects, March 21, 1968.

Experiment VI: Group 11—26 subjects, April 5, 1968.

Experiment VII: Group 13—30 subjects, May 3, 1968.

Experiment VIII: Group 15—23 subjects, May 17, 1968.

\* Experiment IX: Group 17—13 subjects, July 17, 18,  
and 19, 1968.

\* Experiment X: Group 19—11 subjects, July 23, 1968.

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\* Each summer, a number of graduate students from various universities work at RAND. Members of this group served as subjects in Experiments A, IX, and X.



## 2. INSTRUCTIONS TO RESPONDENTS

This section reproduces instructions to respondents. Different experiments were conducted to test different hypotheses, and groups within an experiment received different treatments, resulting in a variety of instructions. Consequently, all instructions for all experiments, for all groups, and for all rounds are included.

EXPERIMENT A

Instructions for Delphi I

Questionnaire 1

This is the first in a series of 5 questionnaires, intended to obtain from your group as accurate an estimate as possible of the answer to each of the 5 "primary" questions listed on a separate sheet.

- (a) Before attempting to answer any of the primary questions, read all five of them, and rate yourself with regard to your relative competence in contributing to their answers. Specifically, pick out that question among the five where you feel relatively most competent to contribute to its answer, and write '5' in the corresponding box on the left. Next, pick out that question where you feel relatively least competent to contribute, and write '1' in the corresponding box on the left. Having thus established a scale from 1 to 5 within which to express your relative competence, rate yourself with regard to the remaining three questions, by similarly inserting a '1', '2', '3', '4', or '5' in the appropriate boxes.
- (b) State your estimates as to the answers to the primary questions in the boxes provided on the right.
- (c) Is there any relevant information that you would like to have the group's estimate of, in order to arrive at more accurate estimates of the answers to the primary questions? If so, you may, for each primary question, state one or two subsidiary questions asking for such information; they should be of such a form as to call for single-word or single-number answers. Please use the 4 x 5 forms given to you for this purpose; be sure to give your name and to indicate the number of the primary question referred to.

Questionnaire 2

The respondents have submitted the following subsidiary questions in connection with Primary Question—in the expectation that the group's estimates of their answers might be helpful in answering the primary question.

Please give your answer to each question, except when you have no opinion about it whatsoever. Also, under "Self-Rating," give a number from 1 to 5 indicating how heavily we should weight your answer when we compute the group's joint estimate. Use

'5'	for	'quite sure'
'4'	for	'pretty good'
'3'	for	'fair'
'2'	for	'vague idea'
'1'	for	'sheer guess'

Questionnaire 3

In responding to this questionnaire, please make whatever use you think is appropriate of the appended answers to the subsidiary questions that were received in response to Questionnaire 2. Note that for each of the primary questions the 5 answers received in Round 1 have been listed.

- (a) Under "New Answer" enter your present (possibly revised) estimate as to the answer to the primary question.
- (b) Under "Reason" briefly state why you think that your estimate is likely to be closer to the true value than those given by others.

NOTE: You should answer this question only if at least one of the following conditions applies:

- (i) In Round 1 you self-rated your competence to answer this question as 4 or 5.
- (ii) Your present estimate lies outside the interval between the heavily framed numbers.
- (iii) You want to draw attention to a relevant factor that may have been overlooked by the other respondents.

Questionnaire 4

Reproduced below are the new (Round 3) responses to the primary questions, together with reasons supplied in their support.

- (a) Consider the stated reasons, give them whatever weight you think they deserve, and under "New Answer" enter your present (possibly revised) estimate as to the answer to the primary question.
- (b) Under "Critique of Reasons," briefly state which of the reasons offered by others you found unconvincing, and why.

NOTE: You should state such a critique only if at least one of the following conditions applied:

- (i) In Round 1 you self-rated your competence to answer this question as 4 or 5.
- (ii) Your present estimate lies outside the interval between the heavily framed numbers.
- (iii) You feel strongly that a reason offered is based on an erroneous assumption.

Questionnaire 5

In this final questionnaire you are given a record of the Round 4 responses, together with critical comments offered with regard to previously given reasons for estimates made by respondents.

- (a) Taking these critiques into account, and giving them whatever weight you think they deserve, enter under "Final Answer" your latest estimate as to the answer to the primary question.
- (b) In retrospect re-rate your relative competence once more, using the same scheme as in Round 1. That is, write '5' next to the question with regard to which you feel relatively most competent and '1' next to that with regard to which you feel relatively least competent; then rate yourself '1', '2', '3', '4', or '5' for the remaining three questions.

Instructions for Face-to-Face Discussion II

Instructions: Delphi Face-to-Face Group

The experiment in which you have kindly agreed to participate is one in a series of experiments to evaluate the Delphi technique. The Delphi technique is a method of utilizing the opinions of a group to obtain answers to questions. We are currently investigating different ways to obtain information from a small face to face group.

Your present experiment is "Delphi—face-to-face structured group." Your task is to obtain as accurate an answer as possible to each of a series of questions. Please follow the instruction carefully.

Question 1

Your group will estimate answers to five questions— one question at a time. These questions have been selected on the assumption that members of the group will know something about the topic covered by each question but probably no one member knows the exact answer. You should proceed as follows:

Step 1. Select a different member to preside for each question. You should do this by the following random process:

- a. Each person will be assigned the letter A, B, C, D or E.
- b. A number will be drawn from a list of random numbers which, in conjunction with Table I, will determine the presiding member for each question.

Step 2. The presiding member will read the question. Members of the group should supply as much relevant information about the question as possible. The presiding member will write on the board all of the information that is supplied by the group (demonstrate).

Step 3. Members of the group will criticize the information in an effort to determine its usefulness to answer the question. The presiding member of the group will keep an appropriate record of the group's action and always have this available on the board. New information may be suggested during this step.

Step 4. The information and critique of the information will suggest different ways in which the question can be answered. If this-this-and-this were taken into account in this way (demonstrate) the most likely estimate for the question would be \_\_\_\_\_. However, if this-this-and-this were considered in this way (demonstrate) the best estimate for the question would be \_\_\_\_\_. Determine as many different approaches as reasonable (at least two) and obtain an estimate for each approach.

Step 5. Making use of the information and discussion generated in the above steps, the group will try to arrive at a common estimate of the answer to the question. If an agreed-on estimate can be obtained, this will be reported as the group answer. Following the determinations of a group estimate, each member will then write his own individual estimate (even if it agrees with the group answer) on a 4 x 6 card and hand it to the presiding member.



Step 6. If the group cannot agree on a common answer, each member will make his own individual estimate. He will write his estimate on a 4 x 6 card and hand it to the presiding member. The presiding member will write the estimates on the board, and this will be the group response.

Question 2

Return to step one. The new chairman will proceed with the suggested steps.

Follow this procedure for the remaining questions.

During the experimental period, which is approximately one week, we ask your cooperation when outside the experimental session on the following: (1) do not discuss the experiment with anyone, (2) do not deliberately consult any source of information you feel will help you answer the questions, and (3) do not look up the answer to questions you have completed.

EXPERIMENT I

Instructions

Group 1, Group 2: Round 1, Day 1

The experiment in which you are taking part this afternoon is one of a series investigating human information processing. Your primary task will be to answer twenty questions of a general information type. You will be given ten questions at a time. In addition, you will take a standardized concept mastery test. The primary questionnaire is not a quiz or an examination, nor is it a test of social influence. We are interested in the way groups use incomplete information to arrive at factual conclusions.

It is not expected that you will know the exact answer to any of the questions. However, for most of them you will have some general knowledge that will enable you to make an estimate—an informed guess—of the answer. You are to make as good an estimate as you can; but in any case, answer every question as best you can. You are not required to give the answers in whole numbers—numbers with decimal fractions are acceptable. The time allowed is 17 minutes for each set of 10 questions, so you will have about a minute and a half per question.

In addition, you are asked to rate the questions with respect to the amount of knowledge you feel you have concerning the answer. Do this as follows: before giving any answers, look over the questions and find the one that you feel you know the most about. Give this question a rating of 5 in the box on the left labelled "self-rating."

Then find the one you feel you know the least about, and give this a rating of 1. Rate all the other questions relative to these two, using a scale of 1, 2, 3, 4, or 5. Thus, a question about which you know almost as much as the one you rated 5 could also get a 5 rating. One that you feel is roughly halfway between the one on which you are least informed and the one on which you are best informed would be rated 3, and so on. Notice that the rating is purely relative, and depends only on how much you feel you know about the question. Do not try to make refined estimates of these ratings, but be impressionistic.

Do not discuss the questions or the experiment with any of the other participants. Feel free to leave the room if necessary, and feel free to smoke. The experimenter will be available during the session if any questions concerning your task should arise. Notice that there is an additional form on which you should record your answers before the questionnaires are collected.

Group 1: Round 2, Day 2

Your task this afternoon will be to reconsider your answers to the twenty questions you worked with yesterday, and make any revisions which, on second thought, you feel are called for. The questionnaire has a record of your answers of yesterday in the lefthand column. Do not hurry, but rethink each question, considering whether there were factors you might have overlooked, or computations which might have contained numerical mistakes. However, keep in mind that you are still being asked only for your best estimate, based on what you know.

There is an additional form on which you should record your present answers before the questionnaires are collected. You will save this record of your answers for the second part of today's session.

Group 2: Round 2, Day 2

On this round, you are to reconsider your answers, this time taking into account some information concerning the responses of the other participants on the preceding round. You have your record of your previous answers. In addition, the questionnaire has a description of how the answers of all the other participants in your group were distributed. This description is given in terms of the Median and the Quartile interval,  $Q_1 - Q_3$ . The median is the middle response for that question. The quartile interval,  $Q_1 - Q_3$ , contains the middle 50 percent of the responses; its size gives you some indication of how widely the responses differed from one another.

Taking this new information into account, you may revise your answers where you think it appropriate.

Group 1, Group 2: Round 3, Day 2

On this round you are being asked to reconsider your estimates in light of the changes in estimates by the group on the last round. Your questionnaire has the summary of the group's second responses, and you have your record of your own answers. Please record your present answers below the first set on the answer sheet.

EXPERIMENT II

Instructions

Group 3, Group 4: Round 1

The experiment in which you are taking part this afternoon is one of a series investigating human information processing. Your primary task will be to answer twenty questions of a general information type. You will be given ten questions at a time. In addition, you will take a standardized concept mastery test. The primary questionnaire is not a quiz or an examination, nor is it a test of social influence. We are interested in the way groups use incomplete information to arrive at factual conclusions.

It is not expected that you will know the exact answer to any of the questions. However, for most of them you will have some general knowledge that will enable you to make an estimate—an informed guess—of the answer. You are to make as good an estimate as you can; but in any case, answer every question as best you can. You are not required to give the answers in whole numbers—numbers with decimal fractions are acceptable. The time allowed is one hour, so you will have about three minutes per question.

In addition, you are asked to rate the questions with respect to the amount of knowledge you feel you have concerning the answer. Do this as follows: before giving any answers, look over the questions and find the one that you feel you know the most about. Give this question a rating of 5 in the box on the left labelled "self-rating."

Then find the one you feel you know the least about, and give this a rating of 1. Rate all the other questions relative to these two, using a scale of 1, 2, 3, 4, or 5. Thus a question about which you know almost as much as the one you rated 5 could also get a 5 rating. One that you feel is roughly half way between the one on which you are least informed and the one on which you are best informed would be rated 3, and so on. Notice that the rating is purely relative, and depends only on how much you feel you know about the question. Do not try to make refined estimates of these ratings, but be impressionistic.

Do not discuss the questions or the experiment with any of the other participants. Feel free to leave the room if necessary, and feel free to smoke. The experimenter will be available during the session if any questions concerning your task should arise. Notice that there is an additional form on which you should record your answers before the questionnaires are collected.

Turn to instructions for questionnaire.



Group 4: Round 1

INSTRUCTIONS FOR QUESTIONNAIRE

Each of the questions calls for a numerical answer. To the right of the question are three blanks. These are to be filled in with three numbers which represent a low estimate, a mid estimate, and a high estimate. More precisely, the low estimate is the number that you think has about a 25 percent chance of being larger than the true answer. The mid estimate is the number you think has about an even chance of being larger than the true one. And the high estimate is the number you think has around a 75 percent chance of being larger than the true answer.

For a rough comparison in your thinking, the chances of getting two successive heads with two tosses of a coin is 25 percent, the appropriate criterion for the lower estimate. The chances against two successive heads is 75 percent, the appropriate measure for the upper estimate.

As an example, suppose the question were:

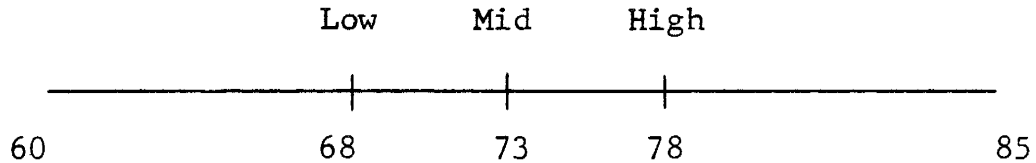
What is the present temperature of this room?

\_\_\_\_\_degrees

\_\_\_\_\_

\_\_\_\_\_

The temperature is certainly no lower than 60 degrees and certainly no higher than 85 degrees. Thinking along the lines of the figure



as you proceed up the scale, you might judge that around 68 degrees there is a one to three chance that the temperature is lower. That would then be your low estimate. At around 73 degrees you might think there is about a 50 - 50 chance that it is higher—your mid estimate. Finally, you might consider that at 78 degrees the chances are no better than one in three that the temperature is higher and that would be your high estimate. The numbers just stated are only illustrative. As a practice exercise, write your own estimates of the temperature in the order low estimate in the top blank, mid estimate in the center, and high estimate below.

The questions you are being asked in the experiment are not concerned with simple physical quantities like temperature, but the general procedure of formulating low, mid, and high estimates is the same.

Group 3: Round 2

Your next task this afternoon will be to reconsider your answers to the twenty questions, and make any revisions which, on second thought, you feel are called for. Do not hurry, but rethink each question, considering whether there were factors you might have overlooked, or computations which might have contained numerical mistakes. However, keep in mind that you are still being asked only for your best estimate, based on what you know.

Group 4: Round 2

Your next task this afternoon will be to reconsider your answers to the twenty questions, and make any revisions which, on second thought, you feel are called for. Do not hurry, but rethink each question, considering whether there were factors you might have overlooked, or computations which might have contained numerical mistakes. However, keep in mind that you are still being asked only for your best estimate, based on what you know.

You have your record of your previous answers. In addition, the questionnaire shows the average values of the low, mid, and high estimates of your group to the left of the question. Taking this information into account, you may revise your answers where you think it appropriate.

Time Test: Group 3

Twenty questions from Experiment I were presented one at a time on 24" x 30" briefing charts. Five questions for each of 4 intervals: 1/4 minute, 1/2 minute, 1 minute, and 2 minutes.

EXPERIMENT III

Instructions

Group 5, Group 6: Round 1

The experiment in which you are taking part this afternoon is one of a series investigating human information processing. Your primary task will be to answer twenty questions of a general information type. You will be given ten questions at a time. In addition, you will take a standardized concept mastery test. The primary questionnaire is not a quiz or an examination, nor is it a test of social influence. We are interested in the way groups use incomplete information to arrive at factual conclusions.

The experimental session will consist of two rounds. In the first you will answer the twenty questions relying on what background information you may have. In the second round you will be furnished a summary of the answers for this group. The summary will consist of the median answers of the group, and the two quartiles, that is, the range in which fifty percent of the group's answers are found. This summary is a form of "pooling" of the information of all the members of your group and will serve as a basis for revising your answers if it seems appropriate.

It is not expected that you will know the exact answer to any of the questions. However, for most of them you will have some general knowledge that will enable you to make an estimate—an informed guess—of the answer. You are to make as good an estimate as you can; but in any case, answer every question as best you can. You are

not required to give the answers in whole numbers—numbers with decimal fractions are acceptable. The time allowed is fifteen minutes for each set of 10 questions, so you will have about one and a half minutes per question.

In addition, you are asked to rate the questions with respect to the amount of knowledge you feel you have concerning the answer. Do this as follows: before giving any answers, look over the questions and find the one that you feel you know the most about. Give this question a rating of 5 in the box on the left labelled "self-rating." Then find the one you feel you know the least about, and give this a rating of 1. Rate all the other questions relative to these two, using a scale of 1, 2, 3, 4, or 5. Thus, a question about which you know almost as much as the one you rated 5 could also get a 5 rating. One that you feel is roughly halfway between the one on which you are least informed and the one on which you are best informed would be rated 3, and so on. Notice that the rating is purely relative, and depends only on how much you feel you know about the question. Do not try to make refined estimates of these ratings, but be impressionistic.

Do not discuss the questions or the experiment with any of the other participants. Feel free to leave the room if necessary, and feel free to smoke. The experimenter will be available during the session if any questions concerning your task should arise. Notice that there is an additional form on which you should record your answers before the questionnaires are collected.

Group 6: Round 1

INSTRUCTIONS FOR QUESTIONNAIRE

The first questionnaire has ten questions arranged five per page. There will be a second questionnaire identical in form. Below each primary question numbered 1 to 10 are two questions labelled (a) and (b) whose answer is relevant to the answer for the primary question. In each case, write down your best estimate for these secondary questions before answering the primary question. Both the group answers to the primary questions and the group answer to the secondary questions will be furnished you at a subsequent round, at which time you will be able to modify your answers if you find it appropriate. To review—first look over all the questions and rate them on the scale 1 - 5 in terms of your relative knowledge. Then for each question answer the secondary question, then answer the primary question. You will have 30 minutes for the first 10 questions.



Group 5: Round 2

Your task for this round will be to reconsider your answers to the twenty questions, and make any revisions which, on second thought, you feel are called for. Do not hurry, but rethink each question, considering whether there were factors you might have overlooked, or computations which might have contained numerical mistakes. However, keep in mind that you are still being asked only for your best estimate, based on what you know.

The computer printout summarizes the answers of all the other participants in your group from the preceding round. This summary is given in terms of the Median and the Quartile interval,  $Q_1 - Q_3$ . The median is the middle response for that question. The quartile interval,  $Q_1 - Q_3$ , contains the middle 50 per cent of the responses; its size gives you some indication of how widely the responses differed from one another. Taking this information into account, you may revise your answers where you think it appropriate.

Group 6: Round 2

Your task for this round will be to reconsider your answers to the twenty questions, and make any revisions which, on second thought, you feel are called for. Do not hurry, but rethink each question, considering whether there were factors you might have overlooked, or computations which might have contained numerical mistakes. However, keep in mind that you are still being asked only for your best estimate, based on what you know.

The computer printout summarizes the answers of all the other participants in your group to both the primary and the secondary questions from the previous round. This summary is given in terms of the Median and the Quartile interval,  $Q_1 - Q_3$ . The median is the middle response for that question. The quartile interval,  $Q_1 - Q_3$ , contains the middle 50 percent of the responses; its size gives you some indication of how widely the responses differed from one another. Taking this information into account, you may revise your answers where you think it appropriate. Do not put down answers to the secondary questions this time. The secondary questions are reproduced (without answer blanks) for your convenience.

EXPERIMENT IV

Instructions

Group 7: Round 1

The experiment in which you are taking part this afternoon is one of a series investigating human information processing. Your primary task will be to answer twenty questions of a general information type. You will take a standardized concept mastery test. The primary questionnaire is not a quiz or an examination, nor is it a test of social influence. We are interested in the way groups use incomplete information to arrive at factual conclusions.

The experimental session will consist of two rounds. In the first you will answer the twenty questions relying on what background information you may have. In the second round you will be furnished a summary of the answers of all the participants. The summary will consist of the median answers of the group, and the two quartiles, that is, the range in which fifty percent of the group's answers are found. This summary is a form of "pooling" of the information of all the members of your group and will serve as a basis for revising your answers if it seems appropriate.

It is not expected that you will know the exact answer to any of the questions. However, for most of them you will have some general knowledge that will enable you to make an estimate—an informed guess—of the answer. You are to make as good an estimate as you can; but in any case, answer every question as best you can. You are not required to give the answers in whole numbers -- numbers with decimal fractions are acceptable. The time

allowed is twenty-five minutes for each set of 10 questions, so you will have about two and a half minutes per question.

Do not discuss the questions or the experiment with any of the other participants. Feel free to leave the room if necessary, and feel free to smoke. The experimenter will be available during the session if any questions concerning your task should arise. Notice that there is an additional form on which you should record your answers before the questionnaires are collected.

EXPERIMENT IV

Group 7: Round 1

INSTRUCTIONS FOR QUESTIONNAIRE

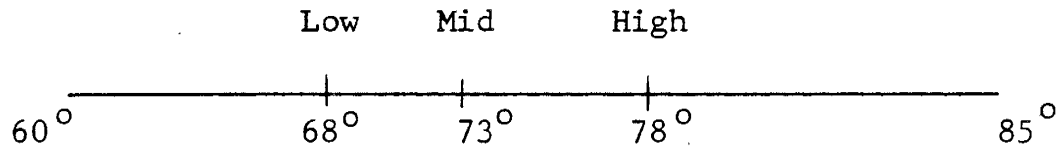
Each of the questions calls for a numerical answer. To the right of the question are three blanks. These are to be filled in with three numbers which represent a low estimate, a mid estimate, and a high estimate. More precisely, the low estimate is the number that you think has about a 25 percent chance of being larger than the true answer. The mid estimate is the number you think has about an even chance of being larger than the true one. And the high estimate is the number you think has around a 75 percent chance of being larger than the true answer.

For a rough comparison in your thinking, the chances of getting two successive heads with two tosses of a coin is 25 percent, the appropriate criterion for the lower estimate. The chances against two successive heads is 75 percent, the appropriate measure for the upper estimate.

As an example, suppose the question were:

What is the present temperature of  
this room? \_\_\_\_\_ degrees  
\_\_\_\_\_  
\_\_\_\_\_

The temperature is certainly no lower than 60 degrees and certainly no higher than 85 degrees. Thinking along the lines of the figure



as you proceed up the scale, you might judge that around 68 degrees there is a one to three chance that the temperature is lower. That would then be your low estimate. At around 73 degrees you might think there is about a 50 - 50 chance that it is higher--your mid estimate. Finally, you might consider that at 78 degrees the chances are no better than one in three that the temperature is higher and that would be your high estimate. The numbers just stated are only illustrative. As a practice exercise, write your own estimates of the temperature in the order low estimate in the top blank, mid estimate in the center, and high estimate below.

The questions you are being asked in the experiment are not concerned with simple physical quantities like temperature, but the general procedure of formulating low, mid, and high estimates is the same.

In addition, you are asked to state the basis on which you made your estimate. To the left of each question

are five letters, A, B, C, D, E. These refer to five possible ways in which you could arrive at your answer. These five ways are:

- A. I happened to know the answer.
- B. I made a rough computation.
- C. I remembered some relevant facts.
- D. I made an intuitive estimate.
- E. I made a sheer guess.

You are to circle the one that most nearly describes how you obtained your estimate. For example, if the question were, "What is the area of the United States, excluding Alaska and Hawaii?" and you recall that the distance from San Francisco to New York is about 3000 miles and from San Diego to Seattle is about 1500 miles, so the area is about  $4\frac{1}{2}$  million square miles, you would circle "B". If the question were, "How many deaths in the U.S. in 1965 were ascribed to cirrhosis of the liver?" and you felt you hadn't the slightest idea, but guessed "quite a few—maybe 5000," you would circle "E".

Group 7: Round 2

Your task for this round will be to reconsider your answers to the twenty questions, and make any revisions which, on second thought, you feel are called for. Do not hurry, but rethink each question, considering whether there were factors you might have overlooked, or computations which might have contained numerical mistakes. However, keep in mind that you are still being asked only for your best estimate, based on what you know.

The computer printout summarizes the answers of all the other participants from the preceding round. This summary is given in terms of the Median and the Quartile interval,  $Q_1 - Q_3$ , of the mid estimates. The median is the middle response for that question; that is, it is the number which is greater than 50 percent of the mid estimates of the group. The quartile interval,  $Q_1 - Q_3$ , contains the middle 50 percent of the mid responses; its size gives you some indication of how widely the answers differed from one another. Taking this information into account, you may revise your answers where you think it appropriate.

You should circle one of the letters to the left of the question which best corresponds to the reason for your new estimate, according to the table below. Thus, if you changed your answer because you realized you had made an error in computation, you would refer to Table I and circle B to the left of the question. If you did not change your answer because you believed it to be correct whatever the group opinion, you would refer to Table II and circle A to the left of the question.

You will have 20 minutes to complete the first ten questions.



Group 7: Round 2

BASIS FOR ESTIMATE

I

If You  
Changed Your Answer

- A. I had misread the question.
- B. I made a mistake in computation.
- C. I remembered some additional facts.
- D. My estimate was too far from the group median.
- E. The other members of the group are likely to know more about the question than I do.

II

If You Did Not  
Change Your Answer

- A. I believe my original estimate.
- B. The other members of the group are not likely to know more about the question than I do.
- C. No good reason to change.
- D. My estimate was close to the group median.
- E. It would be more effort than it's worth to rethink the answer.

EXPERIMENT V

Instructions

Group 9, Group 10: Round 1

The experiment in which you are taking part this afternoon is one of a series investigating human information processing. Your task will be to answer twenty questions of a general information type. You will be given ten questions at a time. The questionnaire is not a quiz or an examination, nor is it a test of social influence. We are interested in the way groups use incomplete information to arrive at factual conclusions.

The experimental session will consist of three rounds. In the first you will answer the twenty questions relying on what background information you may have. In the second round you will be furnished a summary of the answers of all the other members of this group. The summary will consist of the median answers of the group, and the two quartiles, that is, the range in which fifty percent of the group's answers are found. This summary is a form of "pooling" of the information of all the members of your group and will serve as a basis for revising your answers if it seems appropriate. In the third round you will be furnished a similar resume of the results of the second round, and in addition you will be asked to supply some information concerning your answer.

For this round you are asked to rate the questions with respect to the amount of knowledge you feel you have concerning the answer. Do this as follows: Write one of the numbers 1, 2, 3, or 4 in the box labeled "Self Rating"

to the left of the question, indicating how relatively confident you feel about your answer, using 1 for most confident. More specifically, imagine that the answers from all respondents (upper classmen and graduate students chosen from various departments of UCLA) are ranked according to their distance from the true answer; then your number should indicate whether you think your answer will be among the best one quarter of the answers, the second best, third or fourth.

It is not expected that you will know the exact answer to any of the questions. However, for most of them you will have some general knowledge that will enable you to make an estimate—an informed guess—of the answer. You are to make as good an estimate as you can; but in any case, answer every question as best you can. You are not required to give the answers in whole numbers—numbers with decimal fractions are acceptable. The time allowed for the first round is 30 minutes, so you will have about a minute and a half per question.

Do not discuss the questions or the experiment with any of the other participants. Feel free to leave the room if necessary, and feel free to smoke. The experimenter will be available during the session if any questions concerning your task should arise. Notice that there is an additional form on which you should record your answers before the questionnaires are collected.

Group 9: Round 2

Your task for this round will be to reconsider your answers to the twenty questions, and make any revisions which, on second thought, you feel are called for. Do not hurry, but rethink each question, considering whether there were factors you might have overlooked, or computations which might have contained numerical mistakes. However, keep in mind that you are still being asked only for your best estimate, based on what you know.

The computer printout summarizes the answers of all the other participants from the preceding round. This summary is given in terms of the Median and the Quartile interval,  $Q_1 - Q_3$ , of the estimates. The median is the middle response for that question; that is, it is the number which is greater than 50 percent of the estimates of the group. The quartile interval,  $Q_1 - Q_3$ , contains the middle 50 percent of the responses; its size gives you some indication of how widely the answers differed from one another. Taking this information into account, you may revise your answers where you think it appropriate.

You will have 15 minutes to complete the first ten questions.

Group 9: Round 3

Your task for this round will be to reconsider your answers to the twenty questions and in addition furnish some information concerning the basis for your estimates.

The computer printout summarizes the answers from the last round. After you have answered the ten questions, check whether your new answer is outside the interquartile range of the previous responses. If it is outside--that is if your answer is less than  $Q_1$  or greater than  $Q_3$ --you should fill out one of the 5 x 8 inch cards, giving a short statement of why you think the answer should be higher (or lower) than the quartile value. In addition to filling in your name, desk number and the question number, check the box indicating whether your answer is high or low.

You will have 20 minutes for the first 10 questions.

Group 10: Round 2

Your task for this round will be to reconsider your answers to the twenty questions, and make any revisions which, on second thought, you feel are called for. Do not hurry, but rethink each question, considering whether there were factors you might have overlooked, or computations which might have contained numerical mistakes. However, keep in mind that you are still being asked only for your best estimate, based on what you know.

The computer printout summarizes the answers of all the other participants from the preceding round. This summary is given in terms of the Median and the Quartile interval,  $Q_1 - Q_3$ , of the estimates. The median is the middle response for that question; that is, it is the number which is greater than 50 percent of the estimates of the group. The quartile interval,  $Q_1 - Q_3$ , contains the middle 50 percent of the responses; its size gives you some indication of how widely the answers differed from one another. Taking this information into account, you may revise your answers where you think it appropriate.

After you have answered the five questions, check whether your new answer is outside of the interquartile range of the other responses. If it is outside—that is if your answer is less than  $Q_1$  or greater than  $Q_3$ —you should fill out one of the 5 x 8 inch cards, giving a short statement of why you think the answer should be higher (or lower) than the quartile value. In addition to filling in your name, desk number and the question number, check the box indicating whether your answer is high or low.

You will have 10 minutes to complete the first five questions.

On this round you are being furnished the statistical summary of the answers from the last round and a summary of the reasons given by those respondents whose estimates were outside the interquartile range. You should read the arguments carefully and then revise your answers where you see a good reason to do so.

You will have 10 minutes for the first five questions.

EXPERIMENT VI

Instructions

Group 11: Round 1

PHASE I

The experiment in which you are taking part this afternoon is one of a series investigating human information processing. Your primary task will be to answer a sequence of questions of a general information type. You will be given one question at a time. The experiment is not a quiz or an examination, nor is it a test of social influence. We are interested in the way groups use incomplete information to arrive at factual conclusions.

It is not expected that you will know the exact answer to any of the questions. However, for most of them you will have some general knowledge that will enable you to make an estimate—an informed guess—of the answer. You are to make as good an estimate as you can; but in any case, answer every question as best you can. You are not required to give the answers in whole numbers—numbers with decimal fractions are acceptable.

Each question will be dealt with in three phases. On your desks are three stacks of 3 x 5 inch cards, one white, one yellow, and one green. These cards are numbered with your desk number, and with the question number. The first digits before the zeros refer to the question number.

In the first phase you will write your best estimate of the answer to the question on a white card. The white card will be collected, and in the second phase you will



write your self-rating and high and low estimates on a yellow card. These will be explained at the appropriate time. During the third phase you will be informed of the group's initial answers and on the basis of this information you will revise your estimates, writing your new answers on a green card. When these have been collected you will be told the true answer, and a new question will be presented. This procedure will be continued for as many questions as time allows.

Do not use the cards for any purpose other than writing your estimates, and do not disturb the stacks, since the cards are in proper order. Do not discuss the questions or the experiment with any of the other participants. Feel free to smoke. Notice that there is an additional form on which you should record your answers before the cards are collected.

Group 11: Round 2

INSTRUCTIONS FOR PHASE II

In this phase you have two tasks: (1) Rate the question with respect to the amount of knowledge you feel you have concerning it. (2) Indicate low and high levels for your estimate. Use a yellow card and write your rating in the left side of the card, and your high and low estimates on the right side.

YELLOW CARD

		000000
	.	
	.	High Estimate
	.	
Rating	.	Actual Estimate
	.	
	.	Low Estimate
	.	

You need not write the words "rating," "high estimate" and "low estimate"—just the numbers.

Make your rating as follows: Write one of the numbers 1, 2, 3, 4, or 5, using 1 for most confident, and 5 for least confident. More specifically, imagine that answers were obtained from fellow students (upper classmen and graduate students from various departments of UCLA) and were ranked according to their distance from the true answer; then the number 1 should indicate that you think your answer will be among the top 20 percent of the answers, 2 the next 20 percent, and so on—5 indicating that you think your answer will be in the bottom 20 percent.

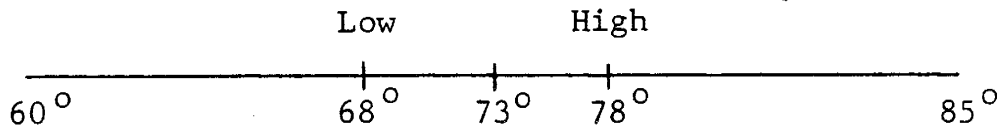
For estimating low and high levels: The low estimate is the number that you think has about a 25 percent chance of being larger than the true answer. The high estimate is the number you think has around a 75 percent chance of being larger than the true answer.

For a rough comparison in your thinking, the chances of getting two successive heads with two tosses of a coin is 25 percent, the appropriate criterion for the lower estimate. The chances against two successive heads is 75 percent, the appropriate measure for the upper estimate.

As an example, suppose the question were:

"What is the present temperature of this room?"

and you have estimated that the temperature is about 73 degrees. The temperature is certainly no lower than 60 degrees and certainly no higher than 85 degrees. Thinking along the lines of the figure



as you proceed up the scale, you might judge that around 68 degrees there is a one to three chance that the temperature is lower. That would then be your low estimate. On the upper side of 73 degrees consider that at 78 degrees the chances are no better than one in three that the temperature is higher, and that would be your high estimate.

The numbers just stated are only illustrative. The questions you are being asked in the experiment are not concerned with simple physical quantities like temperature, but the general procedure of formulating low and high estimates is the same. You will have 2 minutes for this phase.

Group 11: Round 3

INSTRUCTIONS FOR PHASE III

Your task for this phase will be to reconsider your answer and revise it when appropriate. The posted numbers summarize the answers of all the other participants in Phase I. This summary is given in terms of the Median and the Quartile interval,  $Q_1 - Q_3$ . The median is the middle response for that question. The quartile interval,  $Q_1 - Q_3$ , contains the middle 50 percent of the responses; its size gives you some indication of how widely the responses differed from one another.

Rethink the question, considering whether there were factors you might have overlooked, or computations which might have contained numerical mistakes. However, keep in mind that you are still being asked only for your best estimate, based on what you know. Write your new estimate, or your previous answer if unchanged, on a green card. You have a minute and a half.

EXPERIMENT VII

Instructions

Group 13: Round 1

The experiment in which you are taking part this afternoon is one of a series investigating human information processing. Your primary task will be to answer a sequence of questions of a general information type. The experiment is not a quiz or an examination, nor is it a test of social influence. We are interested in the way groups use incomplete information to arrive at factual conclusions.

It is not expected that you will know the exact answer to any of the questions. However, for most of them you will have some general knowledge that will enable you to make an estimate—an informed guess—of the answer. You are to make as good an estimate as you can; but in any case, answer every question as best you can. You are not required to give the answers in whole numbers—numbers with decimal fractions are acceptable.

The experiment will consist of three rounds. In the first round you will answer 40 questions with different times allowed for each question, ranging from 2 minutes to 15 seconds. The questions will be displayed one at a time and your answers are to be recorded on the answer sheet on your desk. In the second round you will make new estimates for twenty of these questions, along with related questions for some of them.

You are part of a larger group which includes the students in the adjoining room. In the third round you will

be given a summary of the answers of the entire group to the questions in round two, and will make new estimates on the basis of this information.

Do not discuss the questions or the experiment with any of the other participants. Feel free to smoke. Please write your name and desk number in the appropriate blanks on your answer sheet.

Group 13: Round 2

Your task this round will be to reconsider your answers to twenty of the questions from the first round, and make any revisions which, on second thought, you feel are called for. The questions will be presented in two sets of ten each. For half of the questions in each set, two additional related questions are to be answered.

Do not hurry, but rethink each question, considering whether there were factors you might have overlooked, or computations which might have contained numerical mistakes. However, keep in mind that you are being asked only for your best estimate, based on what you know.

There is an additional form on which you should record your present answers before the questionnaires are collected. You will save this record of your answers for the following round.

Group 13: Round 3

On this round you are to reconsider your answers, this time taking into account some information concerning the responses of the other participants on the preceding round. You have your record of your previous answers. The computer printout is a description of how the answers of all the other participants in this session were distributed for both the related and the original questions. This description is given in terms of the Median and the Quartile interval,  $Q_1 - Q_3$ . The median is the middle response for that question. The quartile interval,  $Q_1 - Q_3$ , contains the middle 50 percent of the responses; its size gives you some indication of how widely the responses differed from one another.

Taking this new information into account, you may revise your answers where you think it appropriate. Do not answer the related questions this round.



EXPERIMENT VIII

Instructions

Group 15: Round 1

The experiment in which you are taking part this afternoon is one of a series investigating human information processing. Your task will be to answer twenty questions of a general information type. The questionnaire is not a quiz or an examination, nor is it a test of social influence. We are interested in the way groups use incomplete information to arrive at factual conclusions.

In this experiment we are concerned with the effect of face-to-face discussion on the accuracy of answers. In previous experiments we have found that talking over a question by a group more often than not reduces the accuracy of the group response. The major factors responsible for the degradation appear to be: (1) Dominant individuals—the group response is highly influenced by the person who does the most talking, and that person is not necessarily the one who knows the most or has the best judgment. (2) Noise—not auditory noise, but the many irrelevant utterances which enter into the social situation. (3) Group pressure toward "conformity"—which suppresses the contribution of less assertive members.

Most of the previous experiments have been conducted with five or more members in the group. In this experiment we are investigating whether working with small groups of three will reduce the undesirable effects.

The experimental session will consist of two rounds. In the first you will answer the twenty questions individually, relying on what background information you may have.

In the second round you will be divided into groups of three. You will be furnished a summary of the first-round answers from all the participants. The summary will consist of the median answers of the group, and the two quartiles, that is, the range in which fifty percent of the group's answers are found. This summary is a form of "pooling" of the information of the larger group.

You will first give individual answers to the questions, then talk them over, and see if you can use the material brought out in the discussion to improve your answers. Further instructions will be given after the first round.

It is not expected that you will know the exact answer to any of the questions. However, for most of them you will have some general knowledge that will enable you to make an estimate—an informed guess—of the answer. You are to make as good an estimate as you can; but in any case, answer every question as best you can. You are not required to give the answers in whole numbers—numbers with decimal fractions are acceptable. The time allowed is fifteen minutes for each set of 10 questions, so you will have about one and a half minutes per question.

In addition, you are asked to rate the questions with respect to the amount of knowledge you feel you have concerning the answer. Do this as follows: Before giving any answers, look over the questions and find the one that you feel you know the most about. Give this question a rating of 5 in the box on the left labelled "self-rating." Then find the one you feel you know the least about, and give this a rating of 1. Rate all the other questions relative to these two, using a scale of 1, 2, 3, 4, or 5. Thus, a question about which you know almost as much as the

one you rated 5 could also get a 5 rating. One that you feel is roughly halfway between the one on which you are least informed and the one on which you are best informed would be rated 3, and so on. Notice that the rating is purely relative, and depends only on how much you feel you know about the question. Do not try to make refined estimates of these ratings, but be impressionistic.

Do not discuss the questions or the experiment with any of the other participants. Feel free to leave the room if necessary, and feel free to smoke. The experimenter will be available during the session if any questions concerning your task should arise. Notice that there is an additional form on which you should record your answers before the questionnaires are collected.

EXPERIMENT IX

Instructions

Group 17: Round 1

QUESTIONNAIRE I

The experiment in which you are taking part this afternoon is one of a series investigating human information processing. Your primary task will be to answer twenty questions of a general information type. The questionnaire is not a quiz or an examination, nor is it a test of social influence. We are interested in the way groups use incomplete information to arrive at factual conclusions.

The experimental session will consist of three rounds. In the first—to be completed this afternoon—you will answer the twenty questions relying on what background information you may have. In the second—to be completed Friday morning—you will make new estimates and furnish some information concerning your revisions.

In the final round—to be completed Friday afternoon—you will first be given a summary of the answers of all participants on the second round. The summary will consist of the median answers of the group, and the two quartiles, that is, the range in which fifty percent of the group's answers are found. This summary is a form of "pooling" of the information of all the members of your group and will serve as a basis for again revising your answers if it seems appropriate.

It is not expected that you will know the exact answer to any of the questions. However, for most of them you

will have some general knowledge that will enable you to make an estimate—an informed guess—of the answer.

You are to make as good an estimate as you can; but in any case, answer every question as best you can. You are not required to give the answers in whole numbers—numbers with decimal fractions are acceptable. The time allowed is approximately one hour for the set of 20 questions.

Do not discuss the questions or the experiment with any of the other participants, and do not refer to any source material. The questions should be answered on the basis of what information you presently have in your mind. Notice that there is an additional form on which you should record your answers before the questionnaires are returned.

Turn in your first questionnaire at the Correspondence Desk, Room 1334, by 4:30 this afternoon.

Group 17: Round 2

QUESTIONNAIRE II

Your task for this round will be to reconsider your answers to the twenty questions, and make any revisions which, on second thought, you feel are called for. Do not hurry, but rethink each question, considering whether there were factors you might have overlooked, or computations which might have contained numerical mistakes. However, keep in mind that you are still being asked only for your best estimate, based on what you know.

For those questions where you feel a revised estimate is called for, indicate the one or two major reasons for your change, selected out of the list below.

1. I remembered some additional facts.
2. I thought of a new way to arrive at the answer.
3. I became aware of a mistake in my computations.
4. I (inadvertently) obtained new relevant information from some source (TV, newspaper, conversation, etc.).
5. I had a general impression that the answer should be changed.
6. Other.

Write the appropriate number, or numbers, indicating the reason(s) for your change in the box to the left of the question.

Mark those questions where you feel your original answer is still your best estimate with an X in the "Reason for Change" box, so that on completion of the questionnaire every box will have an entry. Keep a record of your revisions on the answer record sheet.

Turn in your completed questionnaires to the Correspondence Desk, Room 1334, by 11:00 A.M. this morning.

Group 17: Round 3

QUESTIONNAIRE III

On this round you are to reconsider your answers, this time taking into account some information concerning the responses of the other participants on the preceding round. You have your record of your previous answers. The computer printout lists the three quartiles of the answers to the twenty questions given by the group on Round 2. The first quartile is the answer for which 25 percent of the group's responses were lower (and 75 percent higher). The second quartile (the median) is the response for which 50 percent were lower and 50 percent higher. The third quartile is the response for which 75 percent were lower and 25 percent higher. These three numbers indicate the central estimate of the group and the range of responses.

Taking this information into account, you may revise your answers where you think it appropriate. Fill in all the blanks whether you change your estimate or not.

Turn in the completed questionnaire to the Correspondence desk by 4:30 P.M. today.

EXPERIMENT X

Instructions

Group 19: Time Test

The experiment in which you are taking part this afternoon is one of a series investigating human information processing. Your primary task will be to answer a sequence of questions of a general information type. The experiment is not a quiz or an examination, nor is it a test of social influence. We are interested in the way groups use incomplete information to arrive at factual conclusions.

It is not expected that you will know the exact answer to any of the questions. However, for most of them you will have some general knowledge that will enable you to make an estimate—an informed guess—of the answer. You are to make as good an estimate as you can; but in any case, answer every question as best you can. You are not required to give the answers in whole numbers—numbers with decimal fractions are acceptable.

This afternoon you will answer 80 questions with different times allowed for each question, ranging from 20 seconds to 90 seconds. The questions will be displayed one at a time and your answers are to be recorded on the answer sheet on your desk.

Do not discuss the questions or the experiment with any of the other participants. Feel free to smoke. Please write your name in the appropriate blank on your answer sheet.



### 3. PURPOSE AND STRUCTURE OF EXPERIMENTS

A statement of the purpose of each experiment is found in this section along with a schematic diagram that describes the structure. In order to show the format of the questionnaire, the first question presented to each group of respondents is given.

EXPERIMENT A

- Purpose:

To compare the relative accuracy of group estimates obtained by use of a questionnaire-feedback method (Delphi) with group estimates obtained by a structured face-to-face discussion

Structure:

	Group a	Group b
Tuesday	II Face-to-face discussion	I Delphi
Wednesday	I Delphi	II Face-to-face discussion
Thursday	I Delphi	II Face-to-face discussion
Friday	II Face-to-face discussion	I Delphi

(Experiment A continued on next page)

EXPERIMENT A (Continued)

I Delphi	II Face-to-Face Discussion
Five questions; point estimates; self-rating; suggest subsidiary questions.	Five questions, one at a time, completed by group action in prescribed manner; arrive at a group estimate for each question.
Answer subsidiary questions and give self-rating for each question.	Procedure: (1) select a different person to preside for each question;(2) group supplied relevant information about the question—
Subjects were given (a) answers and competence ratings to subsidiary questions, (b) estimates of each subject to all questions in Round 1, (c) opportunity to revise answer to each primary question, (d) under some conditions gave reasons for revisions.	chairman wrote information on the board;(3) members evaluated the information;(4) members selected certain combinations of the information and arrived at a group estimate; other combinations gave alternative estimates;(5) group arrived at a common answer;(6) individual given opportunity to give own answer.
Subjects were given (a) estimates of each subject to all questions (and reasons if applicable) on previous round, (b) opportunity to revise answer, (c) under some conditions gave critique of the reasons for estimates given in previous round.	
Subjects were given (a) estimates of each subject (and critique of reasons) to all questions on previous round, (b) opportunity to revise estimate, (c) final self-rating for each question.	

Experiment A, Group a, Group b (three hours per day for four consecutive days; five questions each day)

1. What was the average weekday circulation reported at the end of the first quarter of 1966 of the Washington Post?

EXPERIMENT I

Purpose:

To compare multi-round exercises with and without feedback.

Structure:

Day One		Day Two	
Group 1 20 questions Self-ratings	Group 2 20 questions Self-ratings	Group 1 No feedback 20 questions	Group 2 Feedback Q <sub>1</sub> , Q <sub>2</sub> , Q <sub>3</sub> 20 questions
Concept mastery test	Concept mastery test	Creativity quiz	
		Feedback Q <sub>1</sub> , Q <sub>2</sub> , Q <sub>3</sub> 20 questions	Feedback Q <sub>1</sub> , Q <sub>2</sub> , Q <sub>3</sub> 20 questions
Two Hours		Two Hours	

Experiment I, Group 1, Group 2 (20 questions) Round 1

Self-rating

1. What was the popular vote (in millions) for Taft in 1908 when he was elected President of the U.S.?

—————Million  
Votes

In rounds 2 and 3 the self-rating box was removed, otherwise questions were same as round 1.

EXPERIMENT II

Purpose:

To compare point estimates with confidence level (Low, Mid, High) estimates.

Structure:

Group 3

Group 4

20 questions Point estimates Self-ratings	20 questions Low, mid, high estimates Self-ratings
CMT	CMT
Feedback Q <sub>1</sub> , Q <sub>2</sub> , Q <sub>3</sub> 20 questions Point estimates	Feedback means of low, mid, high 20 questions Low, mid, high estimates
Timed test (20 questions) 1/2, 1, 2 and 4 minutes	

3 hours

Experiment II Group 3 (20 questions) - Round 1

Self-rating

1. In 1966 what was the number of non-whites (in thousands), 20 years of age and over, who had completed four years of college? \_\_\_\_\_ thousand

Group 4 (20 questions) - Round 1

Self-rating

1. In 1966 what was the number of non-whites (in thousands), 20 years of age and over, who had completed four years of college? \_\_\_\_\_ thousand

In round 2 the self-rating box was removed, otherwise questions were same as round 1.

EXPERIMENT III

Purpose:

To evaluate effect of secondary questions.

Structure:

Group 5	Group 6
20 questions Point estimates Self-ratings	20 questions Point estimates 2 secondary questions for each primary Self-ratings
CMT	CMT
Feedback Q <sub>1</sub> , Q <sub>2</sub> , Q <sub>3</sub> , 20 questions	Feedback Q <sub>1</sub> , Q <sub>2</sub> , Q <sub>3</sub> For primary and second- ary questions
Timed test (20 questions) 1/2, 1, 2, and 4 minutes	

Three Hours

Experiment III: Group 5 (20 questions) Round 1

Self-rating

1. How many non-white children  
(in millions) under 5 years  
of age were there in the U.S. \_\_\_\_\_ million  
in 1965? children

(Experiment III continued on next page)

(Experiment III continued from previous page)

Experiment III: Group 6 (20 questions) Round 1

Self-rating

1. How many non-white children (in millions) under 5 years of age were there in the U.S. in 1965? \_\_\_\_\_ million children

a. What was the number (in millions) of all the children in the U.S. in 1965 under 5 years of age? \_\_\_\_\_ million children

b. What percent of the total population of the U.S. is non-white? \_\_\_\_\_ percent

In round 2 the self-rating box was removed, otherwise questions were same as round 1.

EXPERIMENT IV

Purpose:

To check the hypothesis: Improvement with simple feedback can be accounted for by the relatively smaller tendency of more accurate respondents to change their estimates.

Structure:

Group 7

20 questions low, mid, high estimates basis; of estimate rating
CMT
Feedback $Q_1, Q_2, Q_3$ of mid estimates 20 questions Basis of change

Three hours

Experiment IV: Group 7 (20 questions) Round 1

A B C D E 1. How many appointments have been \_\_\_\_\_ Appoint-  
made to the U.S. Supreme Court \_\_\_\_\_ ments  
since 1930? \_\_\_\_\_

In round 2 questions were the same as in round 1.



EXPERIMENT V

Purpose:

To examine effect of requiring reasons and feedback of reasons.

Structure:

Group 9	Group 10
20 questions Point estimates	20 questions Point estimates
Feedback Q <sub>1</sub> , Q <sub>2</sub> , Q <sub>3</sub> 20 questions	Feedback Q <sub>1</sub> , Q <sub>2</sub> , Q <sub>3</sub> 20 questions Reasons if outside Q <sub>1</sub> - Q <sub>3</sub>
Feedback Q <sub>1</sub> , Q <sub>2</sub> , Q <sub>3</sub> 20 questions reasons if outside Q <sub>1</sub> - Q <sub>3</sub>	Feedback Q <sub>1</sub> , Q <sub>2</sub> , Q <sub>3</sub> Summaries of reasons

Three hours

Experiment V: Group 9, Group 10 (20 questions) Round 1

Self-rating

- How many popular votes did Kennedy receive in Texas in 1960?

\_\_\_\_\_ Votes

In rounds 2 and 3 the self-rating box was removed, otherwise questions were same as in round 1.

EXPERIMENT VI

Purpose:

Examine effects of learning on accuracy, self rating and high-low interval.

Structure:

Group 11

One question, point estimate
Self-rating High-low estimates
Feedback $Q_1, Q_2, Q_3$ Point estimate
Feedback, true answer Iterate, new question : : : 20 questions

3 hours

Experiment VI; Group 11 (20 questions)

1. For how many years has Cal Tech been in existence?  
The questions were presented to the group on 24 x 30 inch briefing charts and answers recorded on 3 x 5 inch cards.

EXPERIMENT VII

Purpose:

1. Reiterate Time Test with larger group and larger set of questions.
2. Reiterate related questions comparison.

Structure:

Group 13

40 questions, 10 each at 1/4, 1/2, 1 and 2 minutes
20 questions (out of 40) 10 with 2 related questions each
Feedback $Q_1$ , $Q_2$ , $Q_3$ on 20 questions and related questions

Three hours

Experiment VII: Group 13 (20 questions) Round 1

- 1a. What percentage of the takeoffs and landings at the L.A. airport are accounted for by commercial passenger airliners?
- 1b. What is the minimal time interval required between successive takeoffs? 
  1. What was the total number (in thousands) of takeoffs plus landings at the L.A. International Airport from January through June, 1967?

In round 2 questions were the same as in round 1.

EXPERIMENT VIII

Purpose:

Examine effect of three member group face-to-face discussion on accuracy.

Structure:

Group 15

20 questions Self ratings 10 questions at a time	30 minutes
Feedback Q <sub>1</sub> , Q <sub>2</sub> , Q <sub>3</sub> Given opportunity to revise answer to question	One minute each question (one question at a time)
Face-to-face discussion (three member groups) Individual answer : : : 20 questions	Five minutes each question (one question at a time)
Diagnostic questionnaire	10 minutes

Three hours

Experiment VIII Group 15 (20 questions) Round 1

Self-rating 1. What was the number (in thousands) of marriages in California in 1950? \_\_\_\_\_ marriages

The 2nd and 3rd round responses were recorded on 3 x 5 cards.

In rounds 2 and 3 questions were presented to each group on a 10" x 24" wall chart.

EXPERIMENT IX

Purpose

To evaluate the effect of feedback or no feedback with more lapsed time between successive rounds.

Structure:

Group 17

20 questions Point estimates	Day one
No feedback Opportunity to revise the estimates and record one of 6 selected reasons for change of estimate	Day two
Feedback $Q_1, Q_2, Q_3$ Opportunity to revise estimates	Day three

30 - 45 minutes per day for three consecutive days

Experiment:IX Group 17 (20 questions) Round 1

1. What was the population of Belgium in 1965? \_\_\_\_\_

In rounds 2 and 3 questions were the same as in round 1.

EXPERIMENT X

Purpose:

1. Evaluate accuracy relative to time allowed for estimate.
2. Evaluate accuracy relative to numerical size of true answer.

Structure:

One question at a time with questions randomized for time intervals 20 sec. 40 sec., 60 sec. and 90 sec. Total of 80 questions presented in sequence with 20 in each time interval. Groups of questions were balanced for numerical size of True answer. BBC present and filming.

Three hours

Experiment X: Group 19 (80 questions)

1. What was the length, in feet, of the longest under-water vehicular tunnel in the United States?

The questions were presented on 24 x 30 inch briefing charts and answers were recorded on answer sheet. Time intervals used for the questions were 20, 40, 60 and 90 seconds.

4. LIST OF QUESTIONS USED IN EXPERIMENTS I-VIII  
ORDERED ON GROUP ACCURACY IN ROUND 1

The 240 questions that were used in Experiments I through VIII with UCLA students as subjects are shown in the compilation which follows. These are ordered by size of the group error on the first round. The first question had the largest underestimate of the true value, and question number 240 shows the largest overestimate. Questions 107 to 178 show an accuracy measure of less than .3. Note that question number 149 shows no error on the group response, since the group median was identical. The designation (6:7) refers to group 6, question 7.

The measure of error used is the  $\ln$  [Median of group on Round 1/ True]. For example, the number of telephones in Africa in 1966 was 2,474,000. This question was answered by 13 respondents in Group 6, Experiment III. The median response on Round 1 was 20,000. The ratio of Median to True is .0081, and  $\ln .0081$  is  $-4.818$ .

1. (6:7) Error: -4.818 True: 2474  
What was the number of telephones (in thousands) in Africa in 1966?
2. (2:10) Error: -4.198 True: 64,588  
What was the total egg production in millions in the U.S. in 1965?
3. (5:12) Error: -4.198 True: 3193  
How many million gallons of beer were produced in the U.S. in 1964?
4. (5:13) Error: -3.805 True: 21,337  
How many millions of dollars were expended for public elementary and secondary education in the U.S. during 1963?
5. (1:17) Error: -3.620 True: 2016  
What was the total number of five-cent pieces (in millions) minted in the U.S. for the calendar year 1964?
6. (6:13) Error: -3.571 True: 21,337  
How many millions of dollars were expended for public elementary and secondary education in the U.S. during 1963?
7. (5:7) Error: -3.229 True: 2474  
What was the number of telephones (in thousands) in Africa in 1966?
8. (1:13) Error: -3.153 True: 5849  
What was the amount of the total payroll (in millions) of dollars) in the Printing and Publishing Industry in the U.S. in 1964?
9. (9:9) Error: -3.109 True: 224,000  
How many married students were enrolled in high school in the U.S. in 1965?
10. (2:17) Error: -3.082 True: 2016  
What was the total number of five-cent pieces (in



millions) minted in the U.S. for the calendar year 1964?

11. (6:6) Error: -3.011 True: 2031

What was the daily circulation (in thousands) of the New York News in 1966?

12. (5:8) Error: -2.919 True: 1853

What was the total number of deaths (in thousands) in the U.S. in 1966?

13. (6:8) Error: -2.871 True: 1853

What was the total number of deaths (in thousands) in the U.S. in 1966?

14. (2:13) Error: -2.816 True: 5849

What was the amount of the total payroll (in millions of dollars) in the Printing and Publishing Industry in the U.S. in 1964?

15. (5:4) Error: -2.813 True: 3333

What was the total civilian government payroll (in millions of dollars) in the U.S. in 1960 (including federal, state and local)?

16. (7:7) Error: -2.773 True: 480

What is the number of active pilot certificates held in the U.S. in 1966 (transport, commercial, private)?

17. (3:2) Error: -2.734 True: 1540

How many thousand new housing units were started in the U.S. in 1966?

18. (4:2) Error: -2.734 True: 1540

How many thousand new housing units were started in the U.S. in 1966?

19. (4:12) Error: -2.266 True: 135

How many children (in thousands) were adopted (child adoption petitions granted) in the U.S. in 1964?

20. (3:10) Error: -2.229 True: 2787

What was the production of crude petroleum in the U.S. in 1964 (millions of barrels)?

21. (6:12) Error: -2.155 True: 3193

How many million gallons of beer were produced in the U.S. in 1964?

22. (10:6) Error: -2.081 True: 180,323

How many bankruptcy cases were filed in the U.S. in 1965?

23. (6:9) Error: -2.079 True: 320

What was the percent increase in electric power production in the U.S. between 1950-1965?

24. (6:5) Error: -2.068 True: 2174

What was the number of female students (in thousands) enrolled in colleges and universities in the U.S. in 1966?

25. (15:10) Error: -2.054 True: 156

How many space vehicles were in earth orbit as of June 1966?

26. (4:10) Error: -2.006 True: 2787

What was the production of crude petroleum in the U.S. in 1964 (in millions of barrels)?

27. (3:13) Error: -1.944 True: 1398

What was the total membership of boys age 11-18 (in thousands) of Boy Scouts of America in 1955?

28. (11:7) Error: -1.928 True: 8320

In 1966 what was the average number of pounds of milk produced per year by a dairy cow in the United States?

29. (5:6) Error: -1.913 True: 2031

What was the daily circulation (in thousands) of the New York News in 1966?

30. (1:10) Error: -1.865 True: 64,588

What was the total egg production in millions in the U.S. in 1965?

31. (3:17) Error: -1.831 True: 156

How many space vehicles were in Earth orbit as of June, 1966?

32. (15:20) Error: -1.819 True: 185,000

What was the number of members of Phi Beta Kappa in 1966?

33. (6:20) Error: -1.769 True: 3518

What was the population (in thousands) of Cairo, Egypt in 1966?

34. (5:2) Error: -1.696 True: 109

How many cities were there in the U.S. having a population over 100,000 in 1910?

35. (7:12) Error: -1.685 True: 539,000

How many Bachelor's degrees were awarded by colleges and universities in the U.S. in 1965?

36. (9:10) Error: -1.625 True: 127,000

How many Americans travelled to South America during 1965?

37. (5:20) Error: -1.615 True: 3518

What was the population (in thousands) of Cairo, Egypt in 1966?

38. (10:9) Error: -1.605 True: 24,000

How many married students were enrolled in high school in the U.S. in 1965?

39. (3:6) Error: -1.577 True: 2421

What was the total number (in thousands) of Federal civilian employees in 1960?

40. (4:3) Error: -1.521 True: 20,588

What was the number of deaths from suicide in the U.S. in 1964?

41. (5:5) Error: -1.470 True: 2174

What was the number of female students (in thousands) enrolled in colleges and universities in the U.S. in 1966?

42. (2:2) Error: -1.448 True: 1766

What was the total motor fuel consumption in millions of gallons in 1965 in Massachusetts?

43. (3:3) Error: -1.415 True: 20,588

What was the number of deaths from suicide in the U.S. in 1964?

44. (11:20) Error: -1.401 True: 3604

How many boats are at present berthed in Marina del Rey (in Venice, California)?

45. (5:9) Error: -1.386 True: 320

What was the percent increase in electric power production in the U.S. between 1950-1965?

46. (4:1) Error: -1.371 True: 335

In 1966, what was the number of nonwhites (in thousands), 20 years of age and over, who had completed four years of college?

47. (1:2) Error: -1.367 True: 1766

What was the total motor fuel consumption in millions of gallons in 1965 in Massachusetts?

48. (4:13) Error: -1.316 True: 1398

What was the total membership of boys age 11-18 (in thousands) of Boy Scouts of America in 1955?

49. (4:6) Error: -1.315 True: 2421

What was the total number (in thousands) of Federal civilian employees in 1960?

50. (4:17) Error: -1.289 True: 156

How many space vehicles were in earth orbit as of June, 1966?

51. (9:6) Error: -1.283 True: 180,323  
How many bankruptcy cases were filed in the U.S. in 1965?
52. (13:6) Error: -1.241 True: 4.20  
What was the average consumption per person (in standard 1/5 gallon bottles) in the U.S. in 1960 of domestic wines?
53. (2:12) Error: -1.240 True: 1900  
What was the total of State Unemployment Benefits Payments (in millions of dollars) in the U.S. in fiscal 1966?
54. (6:16) Error: -1.234 True: 79  
What was the number (in thousands) of marriages in California in 1950?
55. (3:1) Error: -1.209 True: 335  
In 1966, what was the number of nonwhites (in thousands), 20 years of age and over, who had completed four years of college?
56. (11:3). Error: -1.191 True: 1250  
What was the number of deaths in civil aviation accidents in the United States in 1964?
57. (7:15) Error: -1.125 True: 3857  
What is the total number of all executions in the United States since 1930?
58. (4:18) Error: -1.121 True: 306.80  
What was the total number (in thousands) of U.S. armed forces personnel who served in the Spanish American War?
59. (15:14) Error: -1.107 True: 2421  
What was the total number (in thousands) of Federal civilian employees in 1960?
60. (1:12) Error: -1.100 True: 1900  
What was the total of State Unemployment Benefits

Payments (in millions of dollars) in the U.S. in fiscal 1966?

61. (3:12) Error: -1.099 True: 135

How many children (in thousands) were adopted (child adoption petitions granted) in the U.S. in 1964?

62. (13:5) Error: -1.079 True: 20588

What was the number of deaths from suicide in the U.S. in 1964?

63. (11:5) Error: -1.041 True: 2.48 Million

What was the membership of the Mormon Church in 1966?

64. (15:7) Error: -1.030 True: 5,600,000

How many people were included in the farm work force in the United States in 1965?

65. (9:19) Error: -1.014 True: 964,639

How many elementary school teachers were there in the U.S. in 1966?

66. (4:19) Error: -.986 True: 26.80

What was the total number of motor vehicle registrations (in millions) in the U.S. in 1930 (cars, trucks, buses)?

67. (3:18) Error: -.939 True: 306.80

What was the total number (in thousands) of U.S. armed forces personnel who served in the Spanish-American War?

68. (2:5) Error: -.925 True: 227

What was the total number (in thousands) of takeoffs plus landings at the L.A. International Airport from January through June, 1967?

69. (13:15) Error: -.897 True: 1900

How many teachers are there at the University of Southern California?

70. (5:3) Error:  $-.888$  True: 243

How many Negroes (in thousands) were there in the New England states in 1960?

71. (7:10) Error:  $-.827$  True: 16

What was the largest number of copies sold of any single recording (in millions)?

72. (15:12) Error:  $-.803$  True: 335

In 1966, what was the number of nonwhites (in thousands) 20 years of age and over, who had completed four years of college?

73. (13:19) Error:  $-.726$  True: 2,480,000

What was the membership of the Mormon Church in 1966?

74. (11:10) Error:  $-.723$  True: 5666

What is the United States' annual immigration quota for Italian nationals?

75. (10:10) Error:  $-.670$  True: 127,000

How many Americans travelled to South America during 1965?

76. (13:10) Error:  $-.667$  True: 26.30

How many billion dollars did consumers in the U.S. spend on recreation in 1965?

77. (11:1) Error:  $-.655$  True: 77

For how many years has Cal Tech been in existence?

78. (15:9) Error:  $-.654$  True: 1385

How many symphony orchestras were there in the U.S. in 1965 (including college, community and metropolitan)?

79. (6:10) Error:  $-.624$  True: 28

What percentage of the homes in the L.A. area had a color television set in November 1966?

80. (15:5) Error:  $-.615$  True: 4070

How many radio and TV broadcasting stations were operating in the U.S. as of June 1, 1966?

81. (7:9) Error:  $-.599$  True: 17,300

How many American military personnel were killed in action in Vietnam through 1967?

82. (7:16) Error:  $-.510$  True: 1066

How many calories are there in a pint of 80 proof gin?

83. (13:1) Error:  $-.501$  True: 227

What was the total number (in thousands) of takeoffs plus landings at the L.A. International Airport from January through June, 1967?

84. (13:7) Error:  $-.485$  True: 26.80

What was the total number of motor vehicle registrations (in millions) in the U.S. in 1930 (cars, trucks, buses)?

85. (3:16) Error:  $-.458$  True: 20,542

How many new books were published in the U.S. in 1964?

86. (7:14) Error:  $-.446$  True: 234.40

How many miles (in thousands) of railroad were there in the U.S. in 1940?

87. (6:2) Error:  $-.443$  True: 109

How many cities were there in the U.S. having a population over 100,000 in 1910?

88. (5:16) Error:  $-.438$  True: 79

What was the number (in thousands) of marriages in California in 1950?

89. (15:6) Error:  $-.432$  True: 77

For how many years has Cal Tech been in existence?

90. (11:8) Error:  $-.427$  True: 2070



How many seats are there in the General Assembly Hall at United Nations Headquarters in New York?

91. (4:16) Error:  $-.420$  True: 20542

How many new books were published in the U.S. in 1964?

92. (3:8) Error:  $-.419$  True: 45.60

What was the Roman Catholic population (in millions) in the U.S. in 1965?

93. (2:6) Error:  $-.414$  True: 9.46

What was the population in millions of Belgium in 1965?

94. (9:20) Error:  $-.402$  True: 6726

What was the median money income per family in California in 1959?

95. (13:16) Error:  $-.375$  True: 40

How many new members were admitted to the U.N. between 1950-1960?

96. (15:16) Error:  $-.346$  True: 7.07

How many million tons of steel were produced in India in 1965?

97. (6:18) Error:  $-.339$  True: 140.40

How many battle deaths (in thousands) were there in the Union Forces in the Civil War?

98. (3:7) Error:  $-.336$  True: 4.20

What was the average consumption per person (in standard 1/5 gallon bottles) in the U.S. in 1960 of domestic wines?

99. (5:10) Error:  $-.336$  True: 28

What percentage of the homes in the L.A. area had a color television set in November 1966?

100. (6:3) Error:  $-.328$  True: 243

How many Negroes (in thousands) were there in the

New England states in 1960?

101. (11:15) Error:  $-.323$  True: 1900

How many teachers are there at the University of Southern California?

102. (5:14) Error:  $-.318$  True: 5.50

How many million housing units were there in California in 1960?

103. (6:14) Error:  $-.318$  True: 5.50

How many million housing units were there in California in 1960?

104. (7:8) Error:  $-.314$  True: 479,000

What was the number of single females, 14 years or older in Massachusetts in 1960?

105. (4:8) Error:  $-.308$  True: 45.60

What was the Roman Catholic population (in millions) in the U.S. in 1965?

106. (7:4) Error:  $-.305$  True: 4070

How many radio and TV broadcasting stations were operating in the U.S. as of June 1, 1966?

107. (3:15) Error:  $-.288$  True: 40

How many new members were admitted to the U.N. between 1950-1960?

108. (11:18) Error:  $-.276$  True: 14.50

How many seconds pass, on the average, between successive births in the United States?

109. (10:16) Error:  $-.253$  True: 103

What was the number (in millions) of licensed drivers in the U.S. in 1966?

110. (10:19) Error:  $-.252$  True: 964,639

How many elementary school teachers were there in the U.S. in 1966?

111. (3:19) Error:  $-.244$  True: 26.80

What was the total number of motor vehicle registrations (in millions) in the U.S. in 1930 (cars, trucks, buses)?

112. (4:9) Error:  $-.227$  True: 64

What percent of the civilian population of voting age voted in the presidential election in 1948?

113. (11:17) Error:  $-.216$  True: 18

In a ranking of states by area in descending order what is Oklahoma's rank?

114. (15:4) Error:  $-.215$  True: 24,800

What is the total number of pages in the 1966 edition of Encyclopedia Britannica (excluding index and yearbook)?

115. (10:20) Error:  $-.201$  True: 6726

What was the median money income per family in California in 1959?

116. (11:12) Error:  $-.189$  True: 6.04 million

According to the 1960 census, what was the population of Los Angeles County?

117. (10:14) Error:  $-.176$  True: 149,000

How many real estate agents and brokers were there in the U.S. in 1960?

118. (7:11) Error:  $-.166$  True: 24,800

What is the total number of pages in the 1966 edition of Encyclopedia Britannica (excluding index and yearbook)?

119. (3:5) Error:  $-.160$  True: 17.60

What percent of families in the U.S. had money income of less than \$2000 in 1965?

120. (15:3) Error:  $-.157$  True: 1,170,000

How many popular votes did Kennedy receive in Texas in 1960?

121. (3:14) Error:  $-.143$  True: 1385  
How many symphony orchestras were there in the U.S. in 1965 (including college, community and metropolitan)?
122. (4:15) Error:  $-.134$  True: 40  
How many new members were admitted to the U.N. between 1950-1960?
123. (9:5) Error:  $-.134$  True: 8  
When the standard time in Los Angeles is 4 p.m., what is the standard time in Hongkong?
124. (10:5) Error:  $-.134$  True: 8  
When the standard time in Los Angeles is 4 P.M., what is the standard time in Hongkong?
125. (11:6) Error:  $-.131$  True: 9117  
What is the length, in feet, of the longest underwater vehicular tunnel in the United States?
126. (4:5) Error:  $-.127$  True: 17.60  
What percent of families in the U.S. had money income of less than \$2000 in 1965?
127. (7:1) Error:  $-.105$  True: 20  
How many appointments have been made to the U.S. Supreme Court since 1930?
128. (13:17) Error:  $-.098$  True: 965,000  
How many elementary school teachers were there in the U.S. in 1966?
129. (13:13) Error:  $-.093$  True: 6,039,000  
According to the 1960 census, what was the population of Los Angeles County?
130. (4:11) Error:  $-.079$  True: 80.60  
What percent of the households in the U.S. had telephones in 1965?

131. (13:14) Error:  $-.077$  True: 324,000  
How many mobile homes and travel trailers were manufactured in the United States in 1965?
132. (9:12) Error:  $-.066$  True: 20.30  
What was the median age at first marriage of females in the U.S. in 1950?
133. (3:9) Error:  $-.065$  True: 64  
What percent of the civilian population of voting age voted in the presidential election in 1948?
134. (5:11) Error:  $-.054$  True: 18,990  
What was the median net income before taxes of all dentists in California in 1961?
- 135 (6:11) Error:  $-.054$  True: 18,990  
What was the median net income before taxes of all dentists in California in 1961?
136. (6:1) Error:  $-.053$  True: 3.27  
How many non-white children (in millions) under 5 years of age were there in the U.S. in 1965?
137. (15:1) Error:  $-.052$  True: 79  
What was the number (in thousands) of marriages in California in 1950?
138. (1:6) Error:  $-.050$  True: 9.46  
What was the population in millions of Belgium in 1965?
139. (9:16) Error:  $-.030$  True: 103  
What was the number (in millions) of licensed drivers in the U.S. in 1966?
140. (3:20) Error:  $-.016$  True: 508  
What was the population (in thousands) of Capetown, South Africa, in 1960?
141. (1:9) Error:  $-.015$  True: 170

What is the number (in millions) of people in the world speaking Spanish as their principal language in 1966?

142. (15:8) Error:  $-.010$  True: 101

How many Supreme Court Justices have there been in the history of the United States through 1967?

143. (10:12) Error:  $-.009$  True: 20.30

What was the median age at first marriage of females in the U.S. in 1950?

144. (3:11) Error:  $-.007$  True: 80.60

What percent of the households in the U.S. had telephones in 1965?

145. (11:16) Error:  $-.006$  True: 23,145

What was the number of women marines in 1945?

146. (2:16) Error:  $-.006$  True: 17.60

What was the number of milk cows on farms (in millions) in the U.S. as of January 1, 1965?

147. (7:6) Error:  $-.004$  True: 100.40

What was the population density (people per sq. mi. of land area) of California in 1960?

148. (10:3) Error:  $-.003$  True: 1937

In what year was nylon invented?

149. (9:2) Error:  $.000$  True: 10

What was the lowest temperature ever recorded by the U.S. Weather Bureau in the state of Florida?

150. (9:3) Error:  $.001$  True: 1937

In what year was nylon invented?

151. (9:14) Error:  $.007$  True: 149,000

How many real estate agents and brokers were there in the U.S. in 1960?

152. (10:8) Error:  $.029$  True: 170

What was the in-orbit weight in pounds of the Telstar 1 satellite?

153. (11:13) Error: .029 True: 101

How many Supreme Court Justices have there been in the history of the United States through 1967?

154. (10:15) Error: .034 True: 2.18

How many million tons of raisin grapes did California produce in 1966?

155. (15:19) Error: .034 True: 7.73

What was the average circulation of Look Magazine (in millions) during the second half of 1966?

156. (1:5) Error: .052 True: 227

What was the total number (in thousands) of takeoffs plus landings at the L.A. International Airport from January through June, 1967?

157. (4:20) Error: .079 True: 508

What was the population (in thousands) of Capetown, South Africa, in 1960?

158. (4:14) Error: .113 True: 1385

How many symphony orchestras were there in the U.S. in 1965 (including college, community and metropolitan)?

159. (1:11) Error: .120 True: 3.77

What was the number of live births in millions in the U.S. in 1965?

160. (1:8) Error: .128 True: 22

What was the total number (in millions) of telephones in use in the U.S. as of Dec. 31, 1940?

161. (1:16) Error: .128 True: 17.60

What was the number of milk cows on farms (in millions) in the U.S. as of January 1, 1965?

162. (7:5) Error: .132 True: 26.30

How many billion dollars did consumers in the U.S. spend on recreation in 1965?

163. (13:3) Error: .137 True: 170

What was the number (in millions) of people in the world speaking Spanish as their principal language in 1966?

164. (1:15) Error: .141 True: 17.80

What was the percent of the population of Florida reported as Negro in 1960?

165. (6:15) Error: .148 True: 50

How old is Mrs. Indira Nehru Gandhi of India?

166. (13:12) Error: .161 True: 149,000

How many real estate agents and brokers were there in the U.S. in 1960?

167. (9:8) Error: .163 True: 170

What was the in-orbit weight in pounds of the Telstar 1 satellite?

168. (5:15) Error: .166 True: 50

How old is Mrs. Indira Nehru Gandhi of India?

169. (13:9) Error: .194 True: 2.47

What was the number of volumes in the UCLA Library System as of June 30, 1967 (in millions)?

170. (1:18) Error: .197 True: 19.70

What percent of the 1966 U.S. population 18 years of age and over had completed one or more years of college?

171. (11:4) Error: .199 True: 25,417

In 1967 what was the membership of the American Psychological Association?

172. (15:11) Error: .205 True: 1.63

How many millions of persons visited Yosemite



National Park during 1965?

173. (7:19) Error: .213 True: 404

How many students in Kindergarten through 6th grade in the Los Angeles Public School System in June 1966 had recorded I.Q.'s of 160 or above?

174. (7:18) Error: .230 True: 139,000

What was the number of beds in the hospitals of California in 1964?

175. (7:17) Error: .242 True: 1.57

What is the number of U.S. citizens who travelled to Europe in 1966 (in millions)?

176. (9:17) Error: .266 True: 69,000

How many production workers were there in the coal mining industry in the U.S. in 1965?

177. (2:15) Error: .278 True: 17.80

What was the percent of the population of Florida reported as Negro in 1960?

178. (7:13) Error: .295 True: 335,000

What was the number of Negroes in Los Angeles in 1960?

179. (10:18) Error: .302 True: 6.91

What was the population (in millions) of California in 1940?

180. (2:1) Error: .313 True: 7.68

What was the popular vote in millions for Taft in 1908 when he was elected President of the U.S.?

181. (10:1) Error: .315 True: 1,168,000

How many popular votes did Kennedy receive in Texas in 1960?

182. (13:4) Error: .328 True: 3.35

What was the circulation of Playboy Magazine (in

millions) as of January 1, 1966?

183. (2:18) Error: .334 True: 19.70

What percent of the 1966 U.S. population 18 years of age and over had completed one or more years of college?

184. (6:4) Error: .344 True: 3333

What was the total civilian government payroll (in millions of dollars) in the U.S. in 1960 (including federal, state and local)?

185. (5:18) Error: .354 True: 140.40

How many battle deaths (in thousands) were there in the Union Forces in the Civil War?

186. (13:8) Error: .354 True: 140.40

How many battle deaths (in thousands) were there in the Union Forces in the Civil War?

187. (7:3) Error: .361 True: 23

How many different men have been world heavyweight champions since the beginning of boxing in 1890?

188. (13:11) Error: .364 True: 139,000

What was the number of beds in the hospitals of California in 1964.

189. (2:3) Error: .366 True: 26

What was the percent increase in the population of Los Angeles from 1950 to 1960?

190. (1:14) Error: .372 True: 400

What was the GNP per capita (in U.S. dollars) of Mexico in 1963?

191. (2:9) Error: .405 True: 170

What is the number (in millions) of people in the world speaking Spanish as their principal language in 1966?

192. (11:9) Error: .411 True: 49,700

How many foreign students were in the United States for the 1966-67 academic year?

193. (13:20) Error: .411 True: 49,700

How many foreign students were in the United States for the 1966-1967 academic year?

194. (10:13) Error: .428 True: 1.63

How many millions of persons visited Yosemite National Park during 1965?

195. (4:7) Error: .437 True: 4.20

What was the average consumption per person (in standard 1/5 gallon bottles) in the U.S. in 1960 of domestic wines?

196. (9:18) Error: .465 True: 6.91

What was the population (in millions) of California in 1940?

197. (15:18) Error: .465 True: 1.57

What is the number of U.S. citizens who travelled to Europe in 1966 (in millions)?

198. (2:11) Error: .481 True: 3.77

What was the number of live births in millions in the U.S. in 1965?

199. (1:7) Error: .481 True: 8.65

What is the area of the USSR in millions of square miles?

200. (11:2) Error: .500 True: 5.61 million

How many people were included in the farm work force in the United States in 1965?

201. (13:18) Error: .519 True: 1250

What was the number of deaths in civil aviation accidents in the U.S. in 1964?

202. (11:19) Error: .521 True: 1.49 million

What was the population of the state of California

in 1900?

203. (9:1) Error: .538 True: 1,168,000

How many popular votes did Kennedy receive in Texas in 1960?

204. (11:11) Error: .540 True: 58.30

How many tons of gold were mined in the United States in 1965?

205. (4:4) Error: .542 True: 16,000

What was the largest price ever paid by an American zoo for a single animal?

206. (1:3) Error: .549 True: 26

What was the percent increase in the population of Los Angeles from 1950 to 1960?

207. (2:19) Error: .556 True: 86

What was the number (in thousands) of active, non-federal dentists in the U.S. in 1965?

208. (10:2) Error: .560 True: 10

What was the lowest temperature ever recorded by the U.S. Weather Bureau in the state of Florida?

209. (2:20) Error: .566 True: 3.35

What was the circulation of Playboy Magazine (in millions) as of January 1, 1966?

210. (1:4) Error: .587 True: 520

How many Junior Colleges were there in the U.S. in 1965 with an enrollment of at least 100 students?

211. (15:2) Error: .591 True: 3.60

What is the total area (in millions of square miles) for all 50 states of the U.S.?

212. (10:17) Error: .594 True: 69,000

How many production workers were there in the coal mining industry in the U.S. in 1965?

213. (7:2) Error: .600 True: 2.47  
What was the number of volumes in the UCLA library system as of June 30, 1967 (in millions)?
214. (9:13) Error: .610 True: 1.63  
How many millions of persons visited Yosemite National Park during 1965?
215. (7:20) Error: .616 True: 540  
How many B-52s did the U.S. Air Force have in operation as of June 30, 1967?
216. (15:17) Error: .629 True: 1066  
How many calories are there in a pint of 80 proof gin?
217. (11:14) Error: .734 True: 324,000  
How many mobile homes and travel trailers were manufactured in the United States in 1965?
218. (1:1) Error: .759 True: 7.68  
What was the popular vote in millions for Taft in 1908 when he was elected President of the U.S.?
219. (5:1) Error: .761 True: 3.27  
How many nonwhite children (in millions) under 5 years of age were there in the U.S. in 1965?
220. (13:2) Error: .770 True: 22  
What was the total number (in millions) of telephones in use in the U.S. as of Dec. 31, 1940?
221. (1:19) Error: .819 True: 86  
What was the number (in thousands) of active, non-federal dentists in the U.S. in 1965?
222. (2:7) Error: .838 True: 8.65  
What is the area of the USSR in millions of square miles?

223. (1:20) Error: .839 True: 3.35

What was the circulation of Playboy Magazine (in millions) as of January 1, 1966?

224. (2:8) Error: .870 True: 22

What was the total number (in millions) of telephones in use in the U.S. as of Dec. 31, 1940?

225. (6:17) Error: 1.001 True: 3.60

What is the total area (in millions of square miles) for all 50 states of the U.S.?

226. (15:13) Error: 1.005 True: 49,400

What was the population of New York City in 1790?

227. (9:15) Error: 1.015 True: 2.18

How many million tons of raisin grapes did California produce in 1966?

228. (5:17) Error: 1.022 True: 3.60

What is the total area (in millions of square miles) for all 50 states of the U.S.?

229. (3:4) Error: 1.139 True: 16,000

What was the largest price ever paid by an American zoo for a single animal?

230. (2:4) Error: 1.214 True: 520

How many Junior Colleges were there in the U.S. in 1965 with an enrollment of at least 100 students?

231. (15:15) Error: 1.214 True: 520

How many Junior Colleges were there in the U.S. in 1965 with an enrollment of at least 100 students?

232. (9:7) Error: 1.225 True: 1615

How many new books of fiction (new titles) were published in 1965 in the U.S.?

233. (5:19) Error: 1.299 True: 60

What was the average income income (in U.S. dollars)

per person in South Vietnam in 1966?

234. (2:14) Error: 1.545 True: 400

What was the GNP per capita (in U.S. dollars) of Mexico in 1963?

235. (10:7) Error: 2.046 True: 1615

How many new books of fiction (new titles) were published in 1965 in the U.S.?

236. (6:19) Error: 2.120 True: 60

What was the average annual income (in U.S. dollars) per person in South Vietnam in 1966?

237. (9:4) Error: 2.708 True: 20

How many American died of polio in 1965?

238. (10:4) Error: 3.016 True: 20

How many Americans died of polio in 1965?

239. (9:11) Error: 3.529 True: 2.20

What was the divorce rate (number of divorces per 1000 population) in the U.S. in 1962?

240. (10:11) Error: 4.376 True: 2.20

What was the divorce rate (number of divorces per 1000 population) in the U.S. in 1962?

5. MEASURES OF GROUP RESPONSE

EXP I GR 1 RD 1-2-3 (14 RESPONDENTS)

Question	Round	Low Quartile	Median	High Quartile	True Value
1	1	12.68	16.40	20.50	7.68
	2	10.25	14.25	17.08	
	3	11.40	14.25	16.20	
2	1	27.00	450.00	1040.00	1766.00
	2	127.50	675.00	1174.13	
	3	127.50	675.00	1071.40	
3	1	28.75	45.00	67.50	26.00
	2	27.25	45.50	71.25	
	3	32.00	45.50	66.20	
4	1	387.50	935.50	2868.00	520.00
	2	387.50	1000.00	2300.00	
	3	475.00	1000.00	1425.00	
5	1	82.05	239.00	1250.00	227.00
	2	102.35	240.40	8100.00	
	3	103.80	243.40	553.50	
6	1	6.65	9.00	21.25	9.46
	2	7.10	10.50	19.25	
	3	9.50	11.50	15.25	
7	1	7.70	14.00	556.00	8.65
	2	8.25	18.00	166.25	
	3	8.00	18.00	24.00	
8	1	15.63	25.00	81.25	22.00
	2	16.88	32.50	75.00	
	3	17.50	32.50	67.50	
9	1	90.00	167.50	375.00	170.00
	2	100.00	250.00	420.00	
	3	122.50	250.00	377.50	
10	1	593.75	10000.00	35000.00	64588.00
	2	887.50	13300.00	63000.00	
	3	962.50	13300.00	52500.00	
11	1	2.43	4.25	9.63	3.77
	2	2.03	3.35	8.95	
	3	2.20	4.25	8.60	



EXP I GR 1 RD 1-2-3 (14 RESPONDENTS)

Question	Round	Low Quartile	Median	High Quartile	True Value
12	1	123.75	632.50	2940.00	1900.00
	2	262.50	632.50	5340.00	
	3	471.20	732.50	5340.00	
13	1	16.25	250.00	2915.00	5849.00
	2	29.63	400.00	2915.00	
	3	144.60	622.50	1525.00	
14	1	373.75	580.00	797.50	400.00
	2	373.75	550.00	797.50	
	3	440.00	550.00	710.60	
15	1	16.50	20.50	28.50	17.80
	2	16.00	17.50	23.50	
	3	16.50	18.00	23.50	
16	1	2.43	20.00	125.00	17.60
	2	3.13	13.50	80.00	
	3	4.30	13.50	50.00	
17	1	17.00	54.00	250.00	2016.00
	2	12.75	45.00	190.25	
	3	17.50	50.00	189.25	
18	1	14.25	24.00	30.25	19.70
	2	17.00	22.50	37.25	
	3	19.20	22.50	31.50	
19	1	93.75	195.00	762.50	86.00
	2	93.75	195.00	762.50	
	3	106.00	242.50	516.20	
20	1	4.30	7.75	25.00	3.35
	2	4.30	7.25	12.78	
	3	4.30	7.50	9.00	

EXP I GR 2 RD 1-2-3 (14 RESPONDENTS)

Question	Round	Low Quartile	Median	High Quartile	True Value
1	1	2.00	10.50	17.50	7.68
	2	8.25	10.75	14.25	
	3	5.50	10.75	13.63	
2	1	58.75	415.00	712.50	1766.00
	2	290.00	500.00	612.50	
	3	400.00	510.00	612.50	
3	1	20.00	37.50	53.75	26.00
	2	30.00	37.50	44.00	
	3	30.00	37.50	44.00	
4	1	487.50	1750.00	9700.00	520.00
	2	1075.00	1750.00	2125.00	
	3	1075.00	1700.00	2000.00	
5	1	51.70	90.00	275.00	227.00
	2	93.75	166.50	232.19	
	3	100.00	145.00	195.31	
6	1	2.15	6.25	16.25	9.46
	2	2.15	5.40	8.25	
	3	2.00	5.00	8.00	
7	1	7.80	20.00	124.00	8.65
	2	12.25	20.00	35.00	
	3	14.50	20.00	30.00	
8	1	20.00	52.50	100.00	22.00
	2	20.00	45.00	81.25	
	3	23.75	47.50	75.00	
9	1	100.00	255.00	500.00	170.00
	2	237.50	300.00	400.00	
	3	222.50	272.50	400.00	
10	1	655.00	970.00	5595.00	64588.00
	2	900.00	2000.00	5253.00	
	3	1000.00	2200.00	5000.00	
11	1	2.88	6.10	38.75	3.77
	2	3.14	6.35	27.50	
	3	3.41	6.35	25.00	

EXP I GR 2 RD 1-2-3 (14 RESPONDENTS)

Question	Round	Low Quartile	Median	High Quartile	True Value
12	1	47.50	550.00	825.00	1900.00
	2	475.00	800.00	2500.00	
	3	600.00	800.00	2000.00	
13	1	93.75	350.00	725.00	5849.00
	2	107.50	350.00	612.50	
	3	150.00	300.00	615.00	
14	1	350.00	1875.00	875000000.00	400.00
	2	362.50	1875.00	437500000.00	
	3	287.50	1125.00	25002250.00	
15	1	16.88	23.50	34.50	17.80
	2	17.50	21.00	34.50	
	3	17.38	21.00	34.50	
16	1	5.00	17.50	45.25	17.60
	2	12.00	17.50	32.75	
	3	13.50	17.50	30.25	
17	1	20.15	92.50	312.50	2016.00
	2	37.50	103.00	440.00	
	3	37.50	103.00	212.50	
18	1	16.00	27.50	35.00	19.70
	2	18.00	26.00	30.00	
	3	18.00	26.00	30.00	
19	1	55.00	150.00	562.50	86.00
	2	66.00	150.00	510.00	
	3	67.75	150.00	425.00	
20	1	3.20	5.90	34.00	3.35
	2	3.88	6.80	13.50	
	3	3.88	6.80	13.50	

EXP II GR 3 RD 1-2 (15 RESPONDENTS)

Question	Round	Low Quartile	Median	High Quartile	True Value
1	1	35.00	100.00	500.00	335.00
	2	50.00	120.00	500.00	
2	1	20.00	100.00	800.00	1540.00
	2	70.00	100.00	800.00	
3	1	2000.00	5000.00	15000.00	20588.00
	2	3000.00	5300.00	15000.00	
4	1	25000.00	50000.00	432000.00	16000.00
	2	45000.00	50000.00	250000.00	
5	1	8.00	15.00	23.00	17.60
	2	10.00	15.00	23.00	
6	1	250.00	500.00	1000.00	2421.00
	2	400.00	750.00	900.00	
7	1	1.50	3.00	34.00	4.20
	2	2.00	3.00	17.00	
8	1	10.00	30.00	47.80	45.60
	2	20.00	30.00	40.00	
9	1	48.00	60.00	67.00	64.00
	2	50.00	60.00	65.00	
10	1	200.00	300.00	780.00	2787.00
	2	300.00	500.00	780.00	
11	1	75.00	80.00	90.00	80.60
	2	75.00	80.00	86.00	
12	1	15.00	45.00	150.00	135.00
	2	20.00	45.00	150.00	
13	1	75.00	200.00	700.00	1398.00
	2	100.00	300.00	700.00	
14	1	1000.00	1200.00	5000.00	1385.00
	2	1000.00	3000.00	6375.00	
15	1	20.00	30.00	38.00	40.00
	2	25.00	30.00	35.00	

EXP II GR 3 RD 1-2 (15 RESPONDENTS)

Question	Round	Low Quartile	Median	High Quartile	True Value
16	1	7000.00	13000.00	73000.00	20542.00
	2	10000.00	20000.00	56000.00	
17	1	10.00	25.00	97.00	156.00
	2	11.00	30.00	97.00	
18	1	50.00	120.00	200.00	306.80
	2	50.00	120.00	200.00	
19	1	10.00	21.00	35.00	26.80
	2	10.80	21.00	30.00	
20	1	200.00	500.00	750.00	508.00
	2	350.00	500.00	750.00	

EXP II GR 4 RD 1-2 (14 RESPONDENTS)

Question	Round	Low Quartile	Median	High Quartile	True Value
1	1	27.50	85.00	287.50	335.00
	2	195.00	250.00	362.50	
2	1	20.00	100.00	600.00	1540.00
	2	250.00	300.00	412.50	
3	1	2000.00	4500.00	20000.00	20588.00
	2	9750.00	13000.00	16250.00	
4	1	14750.00	27500.00	112500.00	16000.00
	2	28750.00	95000.00	105000.00	
5	1	7.00	15.50	30.75	17.60
	2	14.25	17.50	20.00	
6	1	100.00	650.00	3250.00	2421.00
	2	1150.00	2500.00	4000.00	
7	1	1.88	6.50	30.00	4.20
	2	4.75	21.00	41.25	
8	1	20.00	33.50	52.50	45.60
	2	30.00	37.50	40.00	
9	1	45.00	51.00	60.00	64.00
	2	49.50	53.00	60.00	
10	1	200.00	375.00	1062.50	2787.00
	2	875.00	1000.00	1275.00	
11	1	58.75	74.50	80.00	80.60
	2	63.75	74.50	77.00	
12	1	4.75	14.00	212.50	135.00
	2	47.50	115.00	200.00	
13	1	85.00	375.00	975.00	1398.00
	2	487.50	750.00	925.00	
14	1	407.50	1550.00	8250.00	1385.00
	2	2075.00	7000.00	9250.00	
15	1	14.25	35.00	50.00	40.00
	2	20.00	37.50	46.25	

EXP II GR 4 RD 1-2 (14 RESPONDENTS)

Question	Round	Low Quartile	Median	High Quartile	True Value
16	1	3225.25	13500.00	875000.00	20542.00
	2	10750.00	35000.00	1508741.75	
17	1	11.50	43.00	207.50	156.00
	2	38.75	70.00	100.00	
18	1	40.00	100.00	462.50	306.80
	2	93.75	225.00	400.00	
19	1	6.50	10.00	20.75	26.80
	2	10.00	14.50	17.00	
20	1	250.00	550.00	1275.00	508.00
	2	281.25	1500.00	11250.00	

EXP III GR 5 RD 1-2 (13 RESPONDENTS)

Question	Round	Low Quartile	Median	High Quartile	True Value
1	1	3.50	7.00	18.50	3.27
	2	5.50	8.00	10.00	
2	1	12.00	20.00	53.50	109.00
	2	12.50	20.00	27.50	
3	1	22.50	100.00	600.00	243.00
	2	87.50	120.00	450.00	
4	1	42.50	200.00	750.00	3333.00
	2	160.00	300.00	700.00	
5	1	125.00	500.00	650.00	2174.00
	2	275.00	500.00	525.00	
6	1	121.50	300.00	500.00	2031.00
	2	200.00	300.00	450.00	
7	1	25.00	98.00	335.00	2474.00
	2	80.00	100.00	326.00	
8	1	60.00	100.00	372.50	1853.00
	2	100.00	158.00	222.50	
9	1	45.00	80.00	105.00	320.00
	2	67.50	80.00	105.00	
10	1	5.00	20.00	22.50	28.00
	2	5.00	16.00	20.00	
11	1	13500.00	18000.00	22500.00	18990.00
	2	16250.00	18000.00	20000.00	
12	1	24.00	48.00	273.50	3193.00
	2	34.85	50.00	106.00	
13	1	55.00	475.00	750.00	21337.00
	2	410.00	475.00	750.00	
14	1	2.50	4.00	43.50	5.50
	2	2.50	4.00	8.60	
15	1	55.50	59.00	65.00	50.00
	2	56.50	59.00	60.00	



EXP III GR 5 RD 1-2 (13 RESPONDENTS)

Question	Round	Low Quartile	Median	High Quartile	True Value
16	1	34.00	51.00	84.50	79.00
	2	41.50	51.00	82.00	
17	1	4.25	10.00	16.50	3.60
	2	3.75	10.00	10.00	
18	1	110.00	200.00	525.00	140.40
	2	150.00	225.00	288.50	
19	1	107.50	220.00	750.00	60.00
	2	125.00	220.00	450.00	
20	1	530.00	700.00	950.00	3518.00
	2	600.00	720.00	950.00	

EXP III GR 6 RD 1-2 (13 RESPONDENTS)

Question	Round	Low Quartile	Median	High Quartile	True Value
1	1	1.30	3.10	12.39	3.27
	2	2.85	4.00	10.30	
2	1	8.50	70.00	282.50	109.00
	2	11.00	70.00	120.50	
3	1	35.00	175.00	725.00	243.00
	2	75.00	200.00	550.00	
4	1	95.00	4700.00	67500.00	3333.00
	2	675.00	4700.00	23750.00	
5	1	182.50	275.00	488.00	2174.00
	2	200.00	300.00	1400.00	
6	1	49.50	100.00	550.00	2031.00
	2	57.50	100.00	362.50	
7	1	8.00	20.00	610.00	2474.00
	2	22.50	127.00	450.00	
8	1	57.50	105.00	463.00	1853.00
	2	90.00	200.00	375.00	
9	1	10.00	40.00	46.00	320.00
	2	17.50	35.00	41.00	
10	1	8.00	15.00	55.00	28.00
	2	7.80	10.00	22.50	
11	1	10250.00	18000.00	26000.00	18990.00
	2	12500.00	18000.00	21000.00	
12	1	12.50	370.00	575.00	3193.00
	2	175.00	400.00	575.00	
13	1	335.00	600.00	30375.00	21337.00
	2	325.00	500.00	19875.00	
14	1	1.65	4.00	11.50	5.50
	2	3.78	5.00	6.50	
15	1	53.00	58.00	65.00	50.00
	2	53.00	58.00	60.00	

EXP III GR 6 RD 1-2 (13 RESPONDENTS)

Question	Round	Low Quartile	Median	High Quartile	True Value
16	1	12.50	23.00	62.50	79.00
	2	20.00	25.00	45.00	
17	1	5.30	9.80	47.50	3.60
	2	6.25	10.00	21.00	
18	1	14.00	100.00	213.50	140.40
	2	35.00	105.00	275.00	
19	1	112.50	500.00	760.00	60.00
	2	300.00	500.00	620.00	
20	1	310.00	600.00	800.00	3518.00
	2	500.00	750.00	900.00	

EXP IV GR 7 RD 1-2 (25 RESPONDENTS)

Question	Round	Low Quartile	Median	High Quartile	True Value
1	1	12.00	18.00	24.50	20.00
	2	12.00	18.00	20.00	
2	1	2.83	4.50	14.00	2.47
	2	2.78	4.50	6.25	
3	1	23.00	33.00	46.50	23.00
	2	29.50	33.00	40.00	
4	1	1750.00	3000.00	12500.00	4070.00
	2	2500.00	4000.00	10000.00	
5	1	4.15	30.00	60.00	26.30
	2	17.50	30.00	40.00	
6	1	27.50	100.00	190.00	100.40
	2	43.00	100.00	150.00	
7	1	7.50	30.00	75.00	480.00
	2	15.00	30.00	52.00	
8	1	120.00	350.00	1000.00	479.00
	2	120.00	380.00	750.00	
9	1	3.50	9.50	30.00	17.30
	2	5.00	10.00	11.50	
10	1	3.80	7.00	10.50	16.00
	2	5.00	7.00	10.00	
11	1	15.00	21.00	50.80	24.80
	2	17.50	24.00	46.50	
12	1	20.00	100.00	675.00	539.00
	2	70.00	100.00	400.00	
13	1	145.00	450.00	1000.00	335.00
	2	300.00	500.00	900.00	
14	1	47.50	150.00	2250.00	234.40
	2	105.00	200.00	1500.00	
15	1	223.00	1252.00	5000.00	3857.00
	2	473.50	1500.00	5000.00	

EXP IV GR 7 RD 1-2 (25 RESPONDENTS)

Question	Round	Low Quartile	Median	High Quartile	True Value
16	1	360.00	640.00	1950.00	1066.00
	2	500.00	780.00	1390.00	
17	1	1.13	2.00	4.90	1.57
	2	1.00	2.00	3.20	
18	1	62.50	175.00	1300.00	139.00
	2	100.00	150.00	275.99	
19	1	225.00	500.00	850.00	404.00
	2	250.00	450.00	500.00	
20	1	280.00	1000.00	5000.00	540.00
	2	500.00	700.00	2750.00	

EXP V GR 9 RD 1-2-3 (13 RESPONDENTS)

Question	Round	Low Quartile	Median	High Quartile	True Value
1	1	550000.00	2000000.00	5000000.00	1168000.00
	2	1500000.00	2000000.00	4000000.00	
	3	1500000.00	2000000.00	4000000.00	
2	1	2.50	10.00	15.00	10.00
	2	7.00	10.00	14.00	
	3	9.00	10.00	13.50	
3	1	1929.50	1939.00	1946.00	1937.00
	2	1933.00	1936.00	1942.50	
	3	1934.00	1936.00	1940.00	
4	1	106.00	300.00	5000.00	20.00
	2	175.00	350.00	1250.00	
	3	200.00	350.00	1000.00	
5	1	4.00	7.00	11.00	8.00
	2	4.50	8.00	10.00	
	3	5.00	8.00	10.00	
6	1	15000.00	50000.00	450000.00	180323.00
	2	39000.00	100000.00	350000.00	
	3	62500.00	105000.00	350000.00	
7	1	2200.00	5500.00	60000.00	1615.00
	2	2450.00	5500.00	12500.00	
	3	3000.00	6000.00	12500.00	
8	1	32.50	200.00	700.00	170.00
	2	100.00	300.00	650.00	
	3	137.50	300.00	475.00	
9	1	5000.00	10000.00	550000.00	224000.00
	2	6250.00	10000.00	352500.00	
	3	7250.00	15000.00	347500.00	
10	1	13500.00	25000.00	400000.00	127000.00
	2	20500.00	25000.00	150000.00	
	3	23000.00	25000.00	150000.00	
11	1	15.50	75.00	250.00	2.20
	2	5.50	75.00	250.00	
	3	5.50	75.00	250.00	

EXP V GR 9 RD 1-2-3 (13 RESPONDENTS)

Question	Round	Low Quartile	Median	High Quartile	True Value
12	1	18.25	19.00	20.00	20.30
	2	18.50	19.00	20.00	
	3	18.50	19.00	20.00	
13	1	1.50	3.00	4.78	1.63
	2	2.00	3.50	4.15	
	3	2.25	3.00	4.00	
14	1	35000.00	150000.00	275000.00	149000.00
	2	112500.00	165000.00	300000.00	
	3	122500.00	165000.00	225000.00	
15	1	1.00	6.00	75.00	2.18
	2	1.75	6.00	75.00	
	3	1.75	5.50	13.75	
16	1	73.00	100.00	120.00	103.00
	2	81.50	100.00	112.50	
	3	81.50	100.00	112.50	
17	1	15000.00	90000.00	337500.00	69000.00
	2	50000.00	90000.00	325000.00	
	3	52500.00	90000.00	275000.00	
18	1	7.50	11.00	15.50	6.91
	2	9.75	11.00	13.25	
	3	10.00	11.00	13.00	
19	1	190000.00	350000.00	900000.00	964639.00
	2	400000.00	800000.00	1375000.00	
	3	650000.00	800000.00	1125000.00	
20	1	3800.00	4500.00	6250.00	6726.00
	2	3800.00	4500.00	5500.00	
	3	4050.00	4500.00	5100.00	

EXP V GR 10 RD 1-2-3 (14 RESPONDENTS)

Question	Round	Low Quartile	Median	High Quartile	True Value
1	1	687500.00	1600000.00	2362500.00	1168000.00
	2	1425000.00	1800000.00	2237500.00	
	3	1425000.00	1800000.00	3025000.00	
2	1	9.50	17.50	25.25	10.00
	2	10.00	15.00	21.75	
	3	10.00	15.00	20.25	
3	1	1922.75	1932.00	1938.50	1937.00
	2	1927.00	1932.00	1935.75	
	3	1910.00	1928.50	1934.25	
4	1	50.00	408.00	6000.00	20.00
	2	68.75	307.50	3500.00	
	3	93.75	307.50	2250.00	
5	1	4.00	7.00	8.25	8.00
	2	4.75	8.00	10.00	
	3	4.75	8.00	10.00	
6	1	8125.00	22500.00	112500.00	180323.00
	2	15000.00	22500.00	88000.00	
	3	28750.00	53500.00	92500.00	
7	1	1937.50	12500.00	51250.00	1615.00
	2	5300.00	12500.00	35000.00	
	3	4200.00	14000.00	38750.00	
8	1	38.00	175.00	1250.00	170.00
	2	83.00	175.00	800.00	
	3	83.00	135.50	202.50	
9	1	9406.25	45000.00	112500.00	224000.00
	2	9968.75	35000.00	112500.00	
	3	12250.00	35000.00	106250.00	
10	1	17500.00	65000.00	247500.00	127000.00
	2	25000.00	62500.00	100000.00	
	3	25000.00	62500.00	92500.00	
11	1	10.00	175.00	289.50	2.20
	2	10.00	175.00	289.50	
	3	10.00	100.00	212.50	



EXP V GR 10 RD 1-2-3 (14 RESPONDENTS)

Question	Round	Low Quartile	Median	High Quartile	True Value
12	1	18.75	20.13	21.19	20.30
	2	18.88	20.13	21.00	
	3	19.00	20.00	21.00	
13	1	1.00	2.50	8.53	1.63
	2	1.58	2.00	4.00	
	3	1.75	2.00	5.00	
14	1	47250.00	125000.00	1625000.00	149000.00
	2	87500.00	151750.00	750000.00	
	3	88750.00	151750.00	500000.00	
15	1	.50	2.25	25.75	2.18
	2	.46	2.25	11.25	
	3	.33	1.50	3.12	
16	1	61.25	80.00	98.80	103.00
	2	77.50	81.50	90.00	
	3	70.00	80.00	90.00	
17	1	53000.00	125000.00	1375000.00	69000.00
	2	58500.00	125000.00	500000.00	
	3	62250.00	175000.00	500000.00	
18	1	5.50	9.35	15.50	6.91
	2	6.75	9.75	12.75	
	3	6.75	8.50	10.00	
19	1	70000.00	750000.00	2100000.00	964639.00
	2	118750.00	550000.00	800000.00	
	3	487500.00	625000.00	800500.00	
20	1	4375.00	5500.00	6900.00	6726.00
	2	4612.50	5250.00	6800.00	
	3	4150.00	4825.00	5750.00	

EXP VI GR 11 RD 1-2 (26 RESPONDENTS)

Question	Round	Low Quartile	Median	High Quartile	True Value
1	1	35.00	40.00	50.50	77.00
	2	40.00	40.00	48.00	
2	1	.23	9.25	16.00	5.61
	2	5.00	9.50	13.50	
3	1	200.00	380.00	2000.00	1250.00
	2	300.00	660.00	1500.00	
4	1	5750.00	31000.00	175000.00	25417.00
	2	11500.00	36500.00	72500.00	
5	1	.19	.88	4.00	2.48
	2	.65	1.39	2.50	
6	1	3150.00	8000.00	18594.75	9117.00
	2	6750.00	9500.00	15210.00	
7	1	600.00	1210.00	3650.00	8320.00
	2	782.50	1410.00	2625.00	
8	1	537.50	1350.50	2812.50	2070.00
	2	975.00	1335.50	2000.00	
9	1	16875.00	75000.00	406250.00	49700.00
	2	42500.00	82500.00	247750.00	
10	1	1375.00	2750.00	13687.50	5666.00
	2	2000.00	3000.00	5000.00	
11	1	5.03	100.00	1000.00	58.30
	2	6.83	34.00	212.50	
12	1	2.88	5.00	6.60	6.04
	2	3.91	5.00	6.35	
13	1	60.75	104.00	184.25	101.00
	2	98.75	112.50	162.75	
14	1	82500.00	675000.00	1575000.00	324000.00
	2	381750.00	700000.00	1500000.00	
15	1	656.25	1375.00	1950.00	1900.00
	2	887.50	1250.00	1525.00	

EXP VI GR 11 RD 1-2 (26 RESPONDENTS)

Question	Round	Low Quartile	Median	High Quartile	True Value
16	1	5000.00	23000.00	110000.00	23145.00
	2	10000.00	26500.00	62500.00	
17	1	10.00	14.50	22.00	18.00
	2	12.00	15.00	17.00	
18	1	2.96	11.00	60.00	14.50
	2	3.80	11.00	36.25	
19	1	1.38	2.50	6.03	1.49
	2	1.73	2.50	4.00	
20	1	340.50	887.50	1614.50	3604.00
	2	691.75	987.50	1350.00	

EXP VII GR 13 RD 1-2 (30 RESPONDENTS)

Question	Round	Low Quartile	Median	High Quartile	True Value
1	1	74.50	137.50	610.75	227.00
	2	123.75	200.00	547.95	
2	1	18.00	47.50	125.00	22.00
	2	30.00	80.25	111.25	
3	1	100.00	195.00	325.00	170.00
	2	150.00	200.00	300.00	
4	1	2.38	4.65	20.00	3.35
	2	3.00	4.40	10.00	
5	1	2000.00	7000.00	30000.00	20588.00
	2	2075.00	5000.00	10125.00	
6	1	.95	2.50	10.00	4.20
	2	1.43	2.65	5.25	
7	1	3.00	16.50	50.00	26.80
	2	5.00	30.00	50.00	
8	1	52.25	200.00	425.00	140.40
	2	60.00	225.00	362.50	
9	1	2.00	3.00	7.13	2.47
	2	2.19	3.00	5.00	
10	1	4.70	13.50	40.50	26.30
	2	7.00	15.25	26.25	
11	1	41834.00	200000.00	375000.00	139000.00
	2	100000.00	200000.00	300000.00	
12	1	57500.00	175000.00	720528.00	149000.00
	2	75000.00	200000.00	662500.00	
13	1	2975000.00	5500000.00	8200000.00	6039000.00
	2	4875000.00	5850000.00	7875000.00	
14	1	73750.00	300000.00	1125000.00	324000.00
	2	160000.00	290000.00	850000.00	
15	1	437.50	775.00	1200.00	1900.00
	2	487.50	784.50	1100.00	

EXP VII GR 13 RD 1-2 (30 RESPONDENTS)

Question	Round	Low Quartile	Median	High Quartile	True Value
16	1	14.50	27.50	47.75	40.00
	2	16.75	25.00	36.25	
17	1	475000.00	875000.00	1425000.00	965000.00
	2	552500.00	865000.00	1000000.00	
18	1	-1000.00	2100.00	3625.00	1250.00
	2	1187.50	2000.00	2812.50	
19	1	287500.00	1200000.00	5000000.00	2480000.00
	2	775000.00	1450000.00	5000000.00	
20	1	28000.00	75000.00	225000.00	49700.00
	2	38750.00	77500.00	131250.00	

EXP VIII GR 15 RD 1-2-3 (23 RESPONDENTS)

Question	Round	Low Quartile	Median	High Quartile	True Value
1	1	25.00	75.00	250.00	79.00
	2	50.00	75.00	150.00	
	3	65.00	100.00	120.00	
2	1	3.50	6.50	15.00	3.60
	2	4.50	5.50	9.00	
	3	4.50	6.00	6.50	
3	1	80000.00	1000000.00	2500000.00	1170000.00
	2	400000.00	800000.00	1000000.00	
	3	700000.00	1000000.00	1200000.00	
4	1	13000.00	20000.00	25000.00	24800.00
	2	18000.00	20000.00	25000.00	
	3	21000.00	22000.00	25000.00	
5	1	1000.00	2200.00	8600.00	4070.00
	2	2000.00	2500.00	10000.00	
	3	2400.00	3500.00	8000.00	
6	1	35.00	50.00	70.00	77.00
	2	40.00	55.00	60.00	
	3	48.00	55.00	60.00	
7	1	750000.00	2000000.00	8000000.00	5600000.00
	2	1700000.00	3000000.00	6000000.00	
	3	2000000.00	4200000.00	6000000.00	
8	1	60.00	100.00	150.00	101.00
	2	70.00	100.00	125.00	
	3	85.00	110.00	120.00	
9	1	500.00	720.00	6000.00	1385.00
	2	720.00	1500.00	6000.00	
	3	650.00	1250.00	4200.00	
10	1	10.00	20.00	50.00	156.00
	2	13.00	20.00	40.00	
	3	20.00	40.00	100.00	
11	1	1.50	2.00	6.00	1.63
	2	2.00	2.00	6.00	
	3	1.75	2.50	4.00	

EXP VIII GR 15 RD 1-2-3 (23 RESPONDENTS)

Question	Round	Low Quartile	Median	High Quartile	True Value
12	1	50.00	150.00	500.00	335.00
	2	75.00	200.00	400.00	
	3	150.00	300.00	500.00	
13	1	45000.00	135000.00	300000.00	49400.00
	2	75000.00	150000.00	200000.00	
	3	100000.00	150000.00	200000.00	
14	1	250.00	800.00	4000.00	2421.00
	2	1000.00	2000.00	5000.00	
	3	2000.00	2700.00	6000.00	
15	1	750.00	1750.00	3500.00	520.00
	2	1100.00	2000.00	3000.00	
	3	750.00	2000.00	3500.00	
16	1	2.00	5.00	10.00	7.07
	2	2.00	4.00	8.00	
	3	1.00	3.00	5.00	
17	1	1000.00	2000.00	2680.00	1066.00
	2	1600.00	2000.00	2400.00	
	3	2000.00	2200.00	3000.00	
18	1	1.00	2.50	5.50	1.57
	2	1.50	2.50	5.00	
	3	1.50	2.00	5.00	
19	1	4.50	8.00	28.00	7.73
	2	6.00	8.00	15.00	
	3	5.50	7.00	10.00	
20	1	3000.00	30000.00	160000.00	185000.00
	2	25000.00	50000.00	100000.00	
	3	40000.00	85000.00	100000.00	

EXP X GR 17 RD 1-2-3 (14 RESPONDENTS)

Question	Round	Low Quartile	Median	High Quartile	True Value
1	1	3.88	8.00	17.00	9.46
	2	3.88	8.00	17.00	
	3	4.75	8.00	12.00	
2	1	3.88	37.50	300.00	2016.00
	2	5.00	37.50	650.00	
	3	17.00	100.00	550.00	
3	1	37.50	67.50	100.00	26.00
	2	37.50	60.00	100.00	
	3	50.00	60.00	75.00	
4	1	4500.00	25000.00	60000.00	64588.00
	2	8750.00	17000.00	33250.00	
	3	10000.00	20000.00	45000.00	
5	1	575.00	3000.00	9000.00	1900.00
	2	870.00	3800.00	9000.00	
	3	750.00	3600.00	8000.00	
6	1	8.75	25.00	50.00	22.00
	2	8.75	30.00	50.00	
	3	12.50	25.00	40.00	
7	1	1.75	10.00	40.00	15.80
	2	1.00	6.00	40.00	
	3	1.50	5.00	20.00	
8	1	1.72	2.50	6.12	3.35
	2	1.72	3.25	6.87	
	3	1.90	3.50	6.25	
9	1	78300.00	162000.00	212500.00	227000.00
	2	53000.00	136000.00	212500.00	
	3	100000.00	110000.00	200000.00	
10	1	20000.00	45000.00	105000.00	86000.00
	2	20000.00	45000.00	140000.00	
	3	20000.00	50000.00	110000.00	
11	1	2.00	11.50	13.25	7.68
	2	3.12	11.00	14.75	
	3	4.75	11.00	12.00	



EXP X GR 17 RD 1-2-3 (14 RESPONDENTS)

Question	Round	Low Quartile	Median	High Quartile	True Value
12	1	12.75	20.00	32.50	17.80
	2	11.50	21.25	35.50	
	3	12.00	18.00	32.50	
13	1	1.00	3.50	4.62	3.77
	2	1.77	4.00	5.00	
	3	2.50	4.00	4.50	
14	1	6.87	10.50	8.25	8.65
	2	6.87	10.50	31.50	
	3	6.75	11.00	18.00	
15	1	.25	1.38	5.60	5.80
	2	.45	1.38	6.10	
	3	.50	1.00	3.65	
16	1	650.00	1000.00	2750.00	520.00
	2	500.00	900.00	3125.00	
	3	500.00	800.00	2250.00	
17	1	10.00	20.00	32.50	19.70
	2	10.00	20.00	31.25	
	3	10.00	20.00	27.50	
18	1	76.50	812.50	3000.00	1766.00
	2	58.75	687.50	2625.00	
	3	612.50	1000.00	1750.00	
19	1	133.75	300.00	400.00	170.00
	2	133.75	300.00	400.00	
	3	172.50	300.00	341.50	
20	1	1.00	10.00	100.00	17.60
	2	1.00	10.00	162.50	
	3	3.25	17.00	200.00	

EXP X GR 19 ROUND 1 (11 RESPONDENTS)

Question	Round	Low Quartile	Median	High Quartile	True Value
1	1	5280.00	8000.00	20000.00	9117.00
2	1	35.00	50.00	60.00	51.30
3	1	120.00	500.00	1000.00	335.00
4	1	30.00	35.00	40.00	39.00
5	1	.00	.05	.10	26.80
6	1	200.00	300.00	500.00	156.00
7	1	300.00	1000.00	3000.00	1066.00
8	1	100.00	500.00	3000.00	1540.00
9	1	.35	1.00	5.00	91.00
10	1	.30	10.00	20.00	5.61
11	1	45.00	80.00	150.00	101.00
12	1	.50	3.25	25.00	7.07
13	1	2.00	5.00	12.00	7.73
14	1	300.00	4000.00	20000.00	23145.00
15	1	40.00	100.00	10000.00	2787.00
16	1	1.50	3.00	7.00	4.20
17	1	2500.00	5000.00	22000.00	20588.00
18	1	500.00	800.00	1000.00	1250.00
19	1	2000.00	5000.00	10000.00	2421.00
20	1	10000.00	100000.00	400000.00	324000.00
21	1	3000.00	10000.00	50000.00	25417.00
22	1	7.00	25.00	50.00	11.00
23	1	1.20	15.00	1500.00	58.30

EXP X GR 19 ROUND 1 (11 RESPONDENTS)

Question	Round	Low Quartile	Median	High Quartile	True Value
24	1	400.00	500.00	800.00	3636.00
25	1	40.00	56.00	75.00	54.70
26	1	10000.00	10000.00	29000.00	49400.00
27	1	40000.00	50000.00	70000.00	50000.00
28	1	150.00	220.00	400.00	465.00
29	1	3.00	60.00	200.00	845.00
30	1	85.00	180.00	500.00	79.00
31	1	10.00	60.00	400.00	75.70
32	1	50.00	200.00	1000.00	104.00
33	1	2.00	20.00	35.00	22.00
34	1	35.00	42.00	75.00	40.00
35	1	3.00	7.50	10.00	14.50
36	1	.01	1.50	10.00	10.77
37	1	3.00	20.00	50.00	26.30
38	1	.29	1.00	2.50	1.57
39	1	21600.00	35000.00	50000.00	24800.00
40	1	10.00	17.00	20.00	19.00
41	1	25.00	300.00	600.00	310.00
42	1	20.00	40.00	50.00	45.60
43	1	150.00	300.00	800.00	195.00
44	1	10000.00	20000.00	60000.00	20542.00
45	1	5000.00	20000.00	80000.00	127000.00
46	1	20000.00	65000.00	100000.00	16000.00

EXP X GR 19 ROUND 1 (11 RESPONDENTS)

Question	Round	Low Quartile	Median	High Quartile	True Value
47	1	950000.00	2500000.00	3000000.00	1853.00
48	1	10.00	30.00	75.00	78.30
49	1	150000.00	600000.00	900000.00	965000.00
50	1	5000.00	20000.00	40000.00	49700.00
51	1	1200.00	5000.00	40000.00	5666.00
52	1	1800.00	3000.00	10000.00	8320.00
53	1	85.00	150.00	850.00	430.00
54	1	20.00	27.00	150.00	39.00
55	1	80.00	86.50	95.00	80.60
56	1	400.00	1300.00	2000.00	508.00
57	1	.10	.55	1.50	2.30
58	1	.75	1.50	2.50	1.17
59	1	5.00	9.00	15.00	17.60
60	1	90000.00	200000.00	500000.00	140400.00
61	1	25.00	45.50	125.00	16.00
62	1	.88	1.10	5.50	1.63
63	1	10.00	40.00	85.00	135.00
64	1	1037.50	1750.00	7000.00	2344.00
65	1	1000.00	3350.00	12000.00	4070.00
66	1	24750.00	115000.00	275000.00	149000.00
67	1	137.50	962.50	2500.00	4405.00
68	1	26.25	50.00	232.50	42.00
69	1	237500.00	980000.00	1900000.00	479000.00

EXP X GR 19 ROUND 1 (11 RESPONDENTS)

Question	Round	Low Quartile	Median	High Quartile	True Value
70	1	7.00	15.00	85.25	7.00
71	1	1.00	2.50	5.75	2.48
72	1	18.94	95.00	125.00	188.00
73	1	242.50	550.00	1000.00	243.00
74	1	237.50	375.00	1500.00	145.00
75	1	316.25	1250.00	6750.00	1398.00
76	1	90.00	375.00	697.50	306.80
77	1	.75	1.65	3.75	3.27
78	1	475.00	2150.00	3700.00	1385.00
79	1	.76	3.00	10.50	26.80
80	1	.09	.50	5.75	20.40

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