Clarke-Delphi I

An Illustrative and Select Sample of Questions

Re: Career Management in Government

James Waters

December 1970

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PREFACE

This report deals with case study on the use of the DELPHI technique. As such, it is an illustration of method and does not represent an applied DELPHI suitable for formal consideration by decision-makers. The initial exercise was conducted at American University by the author during the Fall of 1970 for Dr. J. M. Clarke and his course in Advanced Organization Theory.

The exercise is partially concerned with evaluating the effectiveness of DELPHI procedures for formulating group judgments. Also, this study is of direct relevance for those who are interested in using DELPHI as an aid to decision-making, especially in the area of broad or long-range policy formulation.

I would like to express my appreciation to Dr. Clarke for allowing me the luxury of conducting a three round DELPHI in lieu of a dry and canned lecture. It is always more meaningful for respondents to participate in the procedures and the researcher is certainly appreciative of empirical data. Special thanks are due to, Mrs. Harriet Mowitt who managed short deadlines to make certain that the "next round" was always ready for feedback; Miss Nadine Reinke who "pitched-in during the crunch" and became an instant-oracle; and to Mrs. Lydia Robertson for her typing and help in getting us through yet another DELPHI.

James Waters

CONTENTS

Abstract of the DELPHI Method

Delphi is a technique of eliciting and refining group judgments.

The rationale for these RAND developed procedures is primarily the

age-old adage "Two heads are better than one," when the issue is one

where exact knowledge is not available, i.e., when decision-makers

must rely on expert opinion.

The procedures have three features:

(1) Anonymous debate -- opinions of respondents are

obtained by formal questionnaires.

(2) Iteration and controlled feedback -- Interaction is

affected by a systematic exercise conducted by

several iterations, with carefully controlled

feedback between rounds.

(3) Statistical Group Response -- Group opinion is

defined as an appropriate aggregate of individual

opinions on the final round.

These features are designed to minimize the biasing effects of

dominant individuals, or irrelevant communications and of group

pressure toward conformity.

INTRODUCTION

Many of the elements involved in projecting future developments do not lend themselves to quantification. Instead, the opinions of experts must be combined in some meaningful way so that their collective knowledge and judgments can be brought to bear. The DELPHI technique is gradually evolving as a way of systematically combining individual judgments to obtain a reasoned consensus. Its unique feature and potential merit lie in requiring the experts to consider the objections and concepts of other group members, in an environment free from bias caused by personalities. Like the ancient oracle, DELPHI has been used to obtain the opinions or judgments on what the future holds. However, the scope of DELPHI is more general than "futurology", in that it can be used in any context where it is appropriate to seek a consensus of opinions among experts on a particular subject.

The Clarke-DELPHI is an illustrative case of the DELPHI technique for use in Dr. J. M. Clarke's course in Organizational Theory which is conducted for a select group of graduate students at American University. In the strictest sense the Clarke-DELPHI is not an applied DELPHI exercise--rather it seeks to illustrate the

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method and demonstrate three of several, forms of formal inter-

rogation (best conducted by questionnaires) that DELPHI uses. The

first type, the "A" questions are of the almanac or factual type, i.e.

answers to questions are verifiable. This type of question serves

to demonstrate the validity of the median as a superior estimator

and the inter-quartile range, a statistical aggregate of individual

opinions, which expresses the group consensus. As a rule, "A"

type questions serve only to calibrate group expertness and

demonstrate method. In practice, "A" questions are not generally

used in the estimative process. The second type, the "B" questions

illustrate the estimative or forecasting aspects of DELPHI and are -

typical of an applied exercise. Finally, the "Proposal Question"

highlights three aspects of the evaluative process, viz. feasibility

desirability and probability of occurrence of a future policy, which,

in real practice, are useful inputs to decision-makers.

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Clarke DELPHI I

Composite Respondent

Number of Respondents:

16 Males -- 5 Females. Number per round varied over three rounds. from 17-21. Overall 23 respondents participated.

Age: Average 30   Range: Low 23 -- High 54

Experience

Government	4 1/2 years
Military	4 of 16
Industry	5 of 21
Other	6 of 21

Overall Experience Factor: 7+ years

Previous DELPHI Participation   20 No   1 Yes

Previous DELPHI Familiarity   17 No   3 Yes

Breakdown of respondents by Academic Background

4   Engineering/Mathematics

2   English

14   Public Administration

1   Political Science/Economics

2   Social Science

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CLARKE -- DELPHI I

QUESTIONNAIRE #1

PREFACE TO INSTRUCTIONS

The experiment in which you are taking part is one in a series investigating human information processing -- a systematic set of procedures for eliciting and refining group judgments. Your primary task will be to answer questions of a specific information type. The experiment is not a quiz or an examination, nor is it a test of social influence. In organizational theory we are interested in the way groups, within organizations, use incomplete information to arrive at factual conclusions. The DELPHI exercise provides one type of control laboratory experiment.

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

On page 3. is the Respondent's Form which requests certain background information. As in any experimental exercise, certain (and in this case minimal) descriptive data are required.

I've selected for this experiment the investigation of Career Management in Government -- an area where normative values have been developed by theorists since the late 1800's. The exercise is not a hidden and manipulative process designed to brainwash the class into thinking, believing, and feeling any particular way about the subject. The process will be open, we will continually describe and discuss (via feedback between rounds) the findings with all class participants. Moreover, the experiment is not guided by a staff panel or exercise manager which is covertly in control and by some magic hides this fact from the Respondents.

Objectivity is paramount. We do not wish to suppress conflicting answers to questions. Consequently, all Respondents will be anonymous and each Respondent will be assigned a number for identification purposes only. In order to maintain anonymity, do not discuss the questions or the exercise with any other class members. I've asked [   ] STAT
serve as exercise manager and to be available if any questions concerning your task should arise. He can be reached on [   ] STAT

Please keep one copy of the answers for reference and comparison in the succeeding rounds. The time requirement to complete the first questionaire is _____.

RESPONDENT FORM   Respondent No. _____

1.   NAME _____

2.   AGE _____

3.   Major Fields of Academic Concentration
     (e.g., Engineering, Law, Mathematics, Social Science, etc.)

     _____

4.   Years of Professional Experience

     _____ Government

     _____ Military

     _____ Industry

     _____ Other, e.g., Academic

5.   Have you ever participated in a DELPHI Exercise before:

     _____ Yes

     _____ No

6.   Do you know how a DELPHI exercise works?

     _____ Yes

     _____ No

3

INSTRUCTIONS

This is the first in a series of several Rounds (perhaps as many as 3), intended to obtain from your group as accurate an estimate as possible of the answers to each of the questions listed on the attached Questionnaire. The subject for this DELPHI experiment is Career Management in Government.

Before attempting to answer any of the primary questions, read all of them, and rate yourself with regard to your relative confidence in contributing to their answers. Specifically, pick out those questions where you feel relatively most confident to contribute to its answers and write '5' in the self-rating box. Next, pick out that statement where you feel relatively least confident to contribute and write '1' in the self-rating box. Having thus established a scale from 1 to 5 within which to express your relative confidence, rate yourself with regard to the remaining questions by similarly writing '1', '2', '3', '4', or '5' in the self-rating box next to the appropriate statement.

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The questions call for a numerical answer. To the right of

some questions are three blanks. These are to be filled in with

numbers which represent a low estimate, a mid-estimate, and

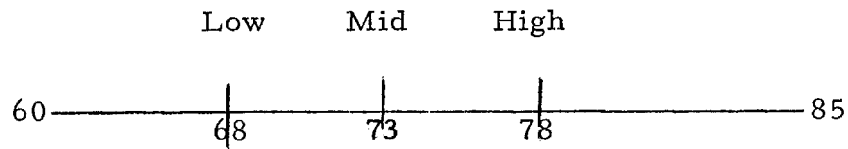a high estimate. As an example, suppose the question were:

What is the present temperature of this room?

L _____ degrees

M _____

H _____

The temperature is certainly no lower than 60 degrees and certainly

no higher than 85 degrees. Thinking along the lines of the figure

```
            Low       Mid       High
             |         |         |
60 ──────────┼─────────┼─────────┼──────────── 85
            68        73        78
```

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 be your low estimate. At around 73 degrees you might think

there is 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 and that the temperature is higher and

that would be your high estimate. The numbers just stated are

5

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,

mid, and high estimates is the same. In the first Round, please

answer the questions relying on what background information you

may have. Do not look up or research the answers, but be

impressionistic. We ask your cooperation on this experimental

rule. In the second and subsequent Rounds you will be furnished

a summary of the answers for the group. The Summary will

consist of the median answers of the group, and the two quartiles,

that is, the range in which 50% of the group's answers are found.

This summary is a form of "pooling" of the information of all

the members of the group and will serve as a basis for revising

your answers if it seems appropriate.

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Respondent No. _____

"A" QUESTIONS

Self
Rating

/ /

1. What was the total civilian Government payroll
(in millions of dollars) in the U.S. in 1960
including Federal, State and Local)?

_____ L
_____ M
_____ H

/ /

2. What was the total number (in thousands)
of Federal Civilian Employees in 1960?

_____ L
_____ M
_____ H

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"B" QUESTIONS

The following questions are a selective sample on career management. This sample queries respondents on possible new employee benefits and services, work environment, and direct employee participation in career planning, etc.

The sample is not meant to be complete but rather exemplary and illustrative of the forecasting aspects of the DELPHI method.

The "B" questions are to be answered as follows: Aside from self-rating on each event-question, place a check in the time interval box you believe the stated event is most likely to occur. Note that "Later", i.e., sometime after the year 2000, and "Never" are valid answers also.

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Self Rating

"B" QUESTIONS

Check MOST LIKELY interval of occurrence

Respondent No. _____

A selective sample of questions on career management

	(1) 1970-1973	(2) 73-76	(3) 76-80	(4) 80-85	(5) 85-90	(6) 1990-2000	(L) Later	(N) Never
1. More generous time-off provisions (25% increase) for:								
a. Civic and political activities								
b. Professional activities such as conferences and papers								
c. Personal reasons								
2. Selection of hours worked during the day.								
3. Formal program designed to encourage career planning on part of employees.								

"B" QUESTIONS (Cont'd)

Check MOST LIKELY interval of occurrence

Respondent No. _____

Self Rating		(1) 1970-1973	(2) 73-76	(3) 76-80	(4) 80-85	(5) 85-90	(6) 1990-2000	(L) Later	(N) Never
	A selective sample of questions on career management								
4.	Optional retirement at age 55 with full benefits for all employees.								
5.	Formation of an elite class in the U.S., composed of scientists, engineers, planners and managers, who hold key positions of power in government and industry.								
6.	Widespread use of automatic decision-making at management level.								
7.	Automation of office work and services leading to displacement of 25% of the current work force.								

10

The following question asks for your opinion with respect to feasibility, desirability, effectiveness and probability of occurrence of a certain event. In a way we will be asking for your subjective probability estimates. As a convenience, for those of you who wish to think in terms of odds, the following conversion equation and examples may be of use:

$$\text{Odds} = A:B \qquad \text{Equivalent to Probability} = \frac{A}{A+B}$$

Examples:

1:99 = .01	3:2 = .6
1:9 = .1	2:1 = .66
1:4 = .2	7:3 = .7
3:7 = .3	4:1 = .8
1:2 = .33	9:1 = .9
2:3 = .4	99:1 = .99
1:1 = .5	

In certain parts of this question we have provided a semantic equivalent to numeric probabilities in particular the section, "Probability of Occurrence." On this part check your answer on the 0-10 scale. This will enable you to further refine your answer if you wish. For example, if you believe the probability of occurrence is an "even chance" but slightly above 50-50, you would check your answer, say, half-way between 5 and 6 or .55. In other words, you believe (conceptually) that there is an equal chance for the event to occur. Yet you may refine your answer, if you wish, to indicate a shading within the "even chance" category without going to the next category.

In other parts of the questions weighing factors and points are provided.

Evaluate and forecast the effect within the Government community of a career management program which forced the exchange of 5% total personnel among major agencies for continuous 2-year cycles.

Self
Rating

/ /   Feasibility (check one)   Probability of Success

        Impossible   _____   .0- .1

        Very Difficult   _____   .1- .3

        Approx. even chance   _____   .4- .6

        Possible   _____   .6- .8

        Simple   _____   .8- 1.0

/ /   Desirability (check one)   Points

        Negative   _____   0

        Neutral   _____   0

        Minor   _____   2

        Moderate   _____   5

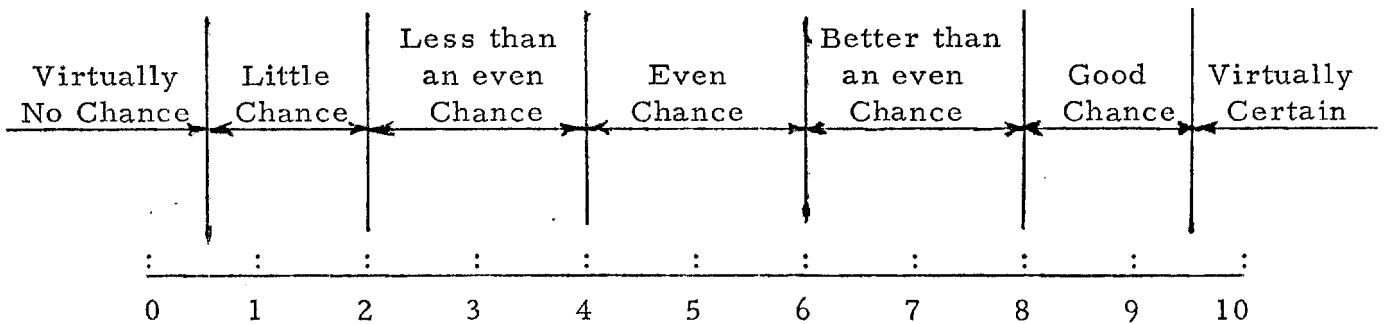   High   _____   10

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Evaluate and forecast the effect within the Government community
of a career management program which forced the exchange of 5%
total personnel among major agencies for continuous 2-year cycles.

Self
Rating

/   /   Effectiveness: in improving coordination and cooperation
          (check one)

		Points
Negative	_____	0
Nil	_____	0
Minor	_____	2
Moderate	_____	5
High	_____	10

/   /   Probability of Occurrence (check one)

Virtually No Chance	Little Chance	Less than an even Chance	Even Chance	Better than an even Chance	Good Chance	Virtually Certain

```
   :      :       :       :       :       :       :       :       :       :       :
_____
   0      1       2       3       4       5       6       7       8       9      10
```

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CLARKE -- DELPHI I

QUESTIONNAIRE #2

QUESTIONNAIRE #2

This is the second in our series of three DELPHI questionnaires.

The same 10 questions that had been posed in the first questionnaire are repeated below with information on the median and inter-quartile range (IQR) of the first round responses. /The IQR is that interval containing the middle 50% of the responses./

Please reconsider your previous estimate and change it if you wish. Whenever your NEW answer is OUTSIDE the IQR, briefly state your reason (in the space provided) why you think the answer should be greater (or less) than that given by the majority of respondents.[1] (No such reason needs to be given when your answer is inside the IQR.)

---

1. As in Round 1, keep a copy of your answers.

Self
Rating

Respondent No. _____

"A" QUESTIONS -- R2

Median	IQR	Your Old Answer	Your New Answer

1. What was the total civilian Government payroll (in millions of dollars) in the U.S. in 1960 including Federal, State and Local? 3000   500-26,000

Average Group Rating
Previous Round

| 1.8 |

Reason why your answer is below
or above the IQR.

2

Respondent No. _____

"A" QUESTIONS -- R2

2. What was the total number (in thousands) of Federal Civilian Employees in 1960?

Median	IQR	Your Old Answer	Your New Answer
1400	500-22,500		

Average Group Rating
Previous Round

2.8

Reason why your answer is
below or above the IQR.

Self
Rating

3

Respondent No. _____

"B" QUESTIONS -- R2

A selective sample of
questions on career management

	AGR* Median	IQR	Your Old Answer	Your New Answer

1. More generous time-off provisions
   (25% increase) for:

   a. Civic and political activities — 3.1 — 1976-1980 — 76/80-80/85

   b. Professional activities such
      as conferences and papers — 3.6 — 1976-1980 — 73/76-76/80

   c. Personal reasons — 3.2 — 1980-1985 — 76/80-85/90

Reason(s) why your answer(s) is/are
below or above the IQR.

1a.

1b.

1c.

Self
Rating

☐ ☐ ☐

*AGR = Average Group Rating, previous round.

Respondent No. _____

"B" QUESTIONS -- R2

	AGR*		Your Old	Your New
	Median	IQR	Answer	Answer

2. Selection of hours worked during the day.

2.0   1990-2000   85/90- Later (2000+)

3. Formal program designed to encourage career planning on part of employees.

3.7   1976-1980   73/76- 76/80

Self Rating

☐

☐

Reason(s) why your answer(s) is/are below or above the IQR.

2.

3.

*AGR = Average Group Rating, previous round.

5

"B" QUESTIONS -- R2

Respondent No. _____

Self
Rating

☐ ☐

		AGR*	Median	IQR	Your Old Answer	Your New Answer
4.	Optional retirement at age 55 with full benefits for all employees.		3.7	1976-1980	73/76-76/80	
5.	Formation of an elite class in the U.S., composed of scientists, engineers, planners and managers, who hold key positions of power in government and industry.		3.6	1990-2000	80/85-90/2000	

Reason(s) why your answer(s) is/are below or above the IQR.

4.

5.

*AGR = Average Group Rating, previous round.

6

"B" QUESTIONS -- R2

Respondent No. _____

Self
Rating

	AGR*	Median	IQR	Your Old Answer	Your New Answer
6. Widespread use of automatic decision-making at management level.	3.3	1985-1990	80/85-90-2000		
7. Automation of office work and services leading to displacement of 25% of the current work force.	3.5	1990-2000	80/85-Later		

Reason(s) why your answer(s) is/are below or above the IQR.

6.

7.

*AGR = Average Group Rating, previous round.

7

The following question asks for your opinion with respect to feasibility, desirability, effectiveness and probability of occurrence of a certain event. In a way we will be asking for your subjective probability estimates. As a convenience, for those of you who wish to think in terms of odds, the following conversion equation and examples may be of use:

$$\text{Odds} = A:B \qquad \text{Equivalent to Probability} = \frac{A}{A+B}$$

Examples:

1:99 = .01	3:2 = .6
1:9 = .1	2:1 = .66
1:4 = .2	7:3 = .7
3:7 = .3	4:1 = .8
1:2 = .33	9:1 = .9
2:3 = .4	99:1 = .99
1:1 = .5	

In certain parts of this question we have provided a semantic equivalent to numeric probabilities in particular the section, "Probability of Occurrence." On this part check your answer on the 0-10 scale. This will enable you to further refine your answer if you wish. For example, if you believe the probability of occurrence is an "even chance" but slightly above 50-50, you would check your answer, say, half-way between 5 and 6 or .55. In other words, you believe (conceptually) that there is an equal chance for the event to occur. Yet you may refine your answer, if you wish, to indicate a shading within the "even chance" category without going to the next category.

In other parts of the questions weighing factors and points are provided.

8

Respondent No. _____

R2

Evaluate and forecast the effect within the Government community of a career management program which forced the exchange of 5% total personnel among major agencies for continuous 2-year cycles.

Self
Rating

AGR	Median	IQR	Your Old Answer	
3.4	.45	.3 - .8		

Your New Answer

Feasibility (check one)		Probability of Success
Impossible	____	.0 - .1
Very Difficult	____	.1 - .3.
Approx. even chance	____	.4 - .6
Possible	____	.6 - .8.
Simple	____	.8 - 1.0

Reason why your answer is below or above the IQR.

9

Respondent No. _____

R2

Evaluate and forecast the effect within the Government community of a career management program which forced the exchange of 5% total personnel among major agencies for continuous 2-year cycles.

Self
Rating

☐

AGR	Median	IQR	Your Old Answer
3.6	5		

Your New Answer

Effectiveness: in improving coordination and cooperation
(check one)

	Points
Negative	0
NIL	0
Minor	2
Moderate	5
High	10

Reason why your answer
is below or above the IQR.

10

Respondent No. _____

R2

Evaluate and forecast the effect within the Government community of a career management program which forced the exchange of 5% total personnel among major agencies for continuous 2-year cycles.

Self
Rating

☐

Your New Answer	
Desirability (check one)	Points
Negative	0
Neutral	0
Minor	2
Moderate	5
High	10

AGR	Median	IQR	Your Old Answer
3.8	5.5	3 - 8.5	

Reason why your answer is below or above the IQR.

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Respondent No. _____

R2

Evaluate and forecast the effect within the Government community of a career management program which forced the exchange of 5% total personnel among major agencies for continuous 2-year cycles.

			Your Old
AGR	Median	IQR	Answer
3.1	.3	.2 - .6	

Your New Answer

Self
Rating   Probability of Occurrence (check one)

☐

Virtually No Chance	Little Chance	Less than an even Chance	Even Chance	Better than an even Chance	Good Chance	Virtually Certain

    0   1   2   3   4   5   6   7   8   9   10

Reason Why your answer is below or above the IQR:

12

3

CLARKE - DELPHI I

QUESTIONNAIRE #3

CLARKE - DELPHI I

Questionnaire #3

This is the last in our series of three questionnaires. The same familiar 10 questions are restated below, together with the second round medians and the inter-quartile ranges (IQR) of the 19 second round responses. Also included are some brief arguments (reasons) as to why the estimates should be lower or higher than those within the IQR.

Please reconsider your previous estimates (you should have your individual copy), and revise them if you wish, giving the stated reasons for raising or lowering them what weight you think they deserve. /If there is no change in your previous response, please re-insert it under "your final answer"./

Respondent No. _____

"A" QUESTIONS - R3

Self
Rating

[ ]

1. What was the total <u>Civilian</u> Government payroll (in dollars) in the U.S. in <u>1960</u> including Federal, State and Local)?

	Median	IQR	Your Old Answer	Your Final Answer
	20B	5B- 36B		

Average Group Rating
Previous Round

[2.6]

<u>Reasons for Answers Below the IQR</u>

1. Guess.

2. 4.5B composite of Federal, State and Local seems highly unreal.

<u>Reasons for Answers Above the IQR</u>

1. Saw figure in Congressional Record for total Gov't payroll. Suspect figure would double if Military, State, and Local are added.

2. Assumption: 8m persons employed at all Gov't levels in 1960.

3. Payroll around 5% of GNP (700B).

4. Assumption: Working force of 80M of which 1 in 4 work for Govt. 12M Govt. workers at 7K income.

5. About 1/3 of GNP.

6. GNP in 1960 around 600B of which 20% applies to Govt. and 90% of Govt. expenditures apply to salaries.

2

Respondent No. ___

"A" QUESTIONS - R3

	Median	IQR	Your Old Answer	Your Final Answer

2. What was the total number of Federal Civilian Employees in 1960?

| | | 2M | .8M - 2.8M | | |

Average Group Rating Previous Round

[3.2]

Self Rating

[ ]

Reasons for Answers Below the IQR

Reasons for Answers Above the IQR

* Guess.

* General unfamiliarity of this field, but am considering the size of the Federal Government.

* Federal "octopus" to a non-bureaucrat can be surprising -- Guess.

3

Respondent No. _____

"B" QUESTIONS

Final Answer. Check MOST LIKELY interval of occurrence.

Self Rating

A selective sample of questions on career management

1. More generous time-off provisions (25% increase) for:

   a. Civic and political activities

AGR 3.4

(1) 1970-1973	(2) 73-76	(3) 76-80	(4) 80-85	(5) 85-90	(6) 1990-2000 Later	(L) Never

Median = (1980-85)
IQR = 1980-85

Reasons in Favor of an Earlier Date

Reasons in Favor of a Later Date

More union and political effort to effect personal involvement of Government personnel plus individual involvement.

* Generous time-off provisions will be made but 25% is large.

*Hatch Act still around in period of enlightenment. Suspect some kind of political prohibition.

*Can't see a 25% increase for 15 years.

*Increasing emphasis upon activities within political sphere.

*Adoption by organizations is very slow.

*Government not ready to permit such action.

*Private practice has difficult time writing off such expenditures.

Respondent No. _____

Self
Rating

A selective sample of
questions on career management

Final Answer: Check MOST LIKELY interval of occurrence.

(1)	(2)	(3)	(4)	(5)	(6)	(L)	(N)
1970 - 1973 - 73-76	76-80	80-85	85-90	1990- 2000	Later	Never	

AGR 3.6

Median = (1976-80)

IQR   1976-80

1. More generous time-off provisions
   (25% increase) for :

   b. Professional activities such
      as conferences and papers.

Reasons in Favor of an Earlier Date

*Private practice has difficulty writing this off.

*Current trends indicate this. Present admin.
fosters government and non-government activities.

*See evidence of this now.

Reasons in Favor of a Later Date

* Conference attendance is working. 25% is high.

*Climate improving but practice won't spread until
1980's.

* 25% time too much to expect.

* Plausible.

5

Respondent No. _____

A selective sample of
questions on career management

Final Answer. Check MOST LIKELY interval of occurrence.

(1)	(2)	(3)	(4)	(5)	(6)	(L)	(N)
1970-1973	73-76	76-80	80-85	85-90	1990-2000	Later	Never

1. More generous time-off provisions (25% increase) for:

   c. Personal reasons.

AGR [3.4]

Median = (1980-85)

IQR   1976/80-1985/90

Reasons in favor of an Earlier Date

* Government has liberal leave policy.
  Concern is paternalistic.

Reasons in Favor of a Later Date

* Never. Has never been considered.
* An unreasonable goal for employees.
* Likely when forced to spend time on leisure.

6

A selective sample of
questions on career management

Self
Rating

Final Answer. Check MOST LIKELY interval of occurrence.

2. Selection of hours worked during the day.

AGR 3.5

(1) 1970-1973	(2) 73-76	(3) 76-80	(4) 80-85	(5) 85-90	(6) 1990-2000	(L) Later	(N) Never

Median = 2000+ (Later)

IQR = 1990/2000 - 2000+ (Later)

<u>Reasons in Favor of an Earlier Date</u>

<u>Reasons in Favor of a Later Date</u>

* 25 Organizations now experimenting.
Little impact on productivity.

* Townsend's "Up the Organization" will be
influential. Younger managers will be
bosses by 1985.

* Logical advance with greater population,
leisure time and shorter work hours.

* Being considered in scientific and
professional fields. Won't affect
production.

7

Respondent No. _____

Final Answer. Check MOST LIKELY interval of occurrence.

Self Rating

A selective sample of questions on career management

3. Formal program designed to encourage career planning on part of employees

AGR | 3.6 |

(1)	(2)	(3)	(4)	(5)	(6)	(L)	(N)
1970- 1973	73-76	76-80	80-85	85-90	1990- 2000	Later	Never

Median = (1976-80)

IQR   1973/76 - 1976/80

Reasons in Favor of an Earlier Date
* Dept. of Army posted guidelines on how programs would be accomplished.
* Evidence in a number of Government programs.
* Formal programs in many agencies.
* Strong push right now.

Reasons in Favor of a Later Date
* Change does not come quick to the political process.
* Much opposition will be encountered.

8

Respondent No. _____

Self Rating

A selective sample of questions on career management

Final Answer. Check MOST LIKELY interval of occurrence.

4. Optional retirement at age 55 with full benefits for all employees.

AGR 3.8

	(1) 1970- 1973	(2) 73-76	(3) 76-80	(4) 80-85	(5) 85-90	(6) 1990- 2000	(L) Later	(N) Never

Median = (1976-80)

IQR   1973/76 - 76/80

Reasons in Favor of an Earlier Date

Reasons in Favor of a Later Date

* In effect already in some Government Agencies.

* Without some requirements other than age, "Full" benefits sounds quite unlikely.

* Such a class now exists, only softly.

9

Respondent No. _____

A selective sample of
questions on career management

Final Answer. Check MOST LIKELY interval of occurrence.

	(1) 1970- 1973	(2) 73-76	(3) 76-80	(4) 80-85	(5) 85-90	(6) 1990- 2000	(L) Later	(N) Never
5. Formation of an elite class in the U.S., composed of scientists, engineers, planners and managers, who hold key positions of power in government and industry.								

AGR 3.7

Median = (1990-2000)
IQR   1985/90-1990/2000

Reasons in Favor of an Earlier Date

*These are the people who run the Government now, e.g., political planners and managers.

*Extreme need for such activity.

*Already have one ...McNamara, etc.

*If this is not the case it will be soon.

Reasons in Favor of a Later Date

* Our system can't withstand this despite push of professionalism.

* Moving from generalists to specialists. Will require a number of years.

* Today's idealistic youth will not allow this.

* Will take time and training for engineers and scientists to assume and operate as managers.

* Our democracy can't tolerate this.

* Don't understand "Formation of an elite class."

10

Respondent No. _____

Self Rating

A selected sample of questions on career management

Final Answer: Check MOST LIKELY interval of occurrence.

(1)	(2)	(3)	(4)	(5)	(6)	(L)	(N)
1970-1973	73-76	76-80	80-85	85-90	1990-2000	Later	Never

6. Widespread use of automatic decision-making at management level.

AGR [3.7]

Median = (1990-2000)
IQR   1985/90 - 1990/2000

Reasons in favor of an Earlier Date

* Coming into play now. In 10 years it will be widely prevalent at levels below top policy.

* Has already begun ..need should overcome technology gap.

* Most organization use computer systems today.

Reasons in Favor of a Later Date

*Dream ...emphasis on human relations will not permit.

* "Auto-Decision-Making" is not management.

* Maybe systematic decision-making.

* Circumstances of each decision are too complex and varied to be programmed.

11

Respondent No. _____

Self Rating ☐

A selective sample of questions on career management

Final Answer. Check MOST LIKELY interval of occurrence.

7. Automation of office work and services leading to displacement of 25% of the current work force.

AGR ☐ 3.4

(1)	(2)	(3)	(4)	(5)	(6)	(L)	(N)
1970-1973	73-76	76-80	80-85	85-90	1990-2000	Later	Never

Median = (1990-2000)
IQR   1985/90-2000+ (Later)

<u>Reasons in Favor of an Earlier Date</u>

* Admin functions outside materiel have been untouched by automation. More confidence in technology will permit additional automation.

<u>Reasons in Favor of a Later Date</u>

* Possible, but will not be implemented because of our concept of worth and individualism.

* Automation of office work will create displacement of work force but also create new types of jobs.

12

Respondent No. ___

R3

Evaluate and forecast the effect within the Government community of a career management program which forced the exchange of 5% total personnel among major agencies for continuous 2-year cycles.

AGR	Median	IQR	Your Old Answer	Self Rating
3.8	.55	.3 - .7		[ ]

Feasibility (check one)	Your Final Answer	Probability of Success
Impossible		.0 - .1
Very Difficult		.1 - .3
Approx. even chance		.4 - .6
Possible		.6 - .8
Simple		.8 - 1.0

Reasons for Low Probability

* Such a program is administratively infeasible.

* Civil Service Commission too cumbersome to handle this program.

Reasons for High Probability

13

Respondent No. ____
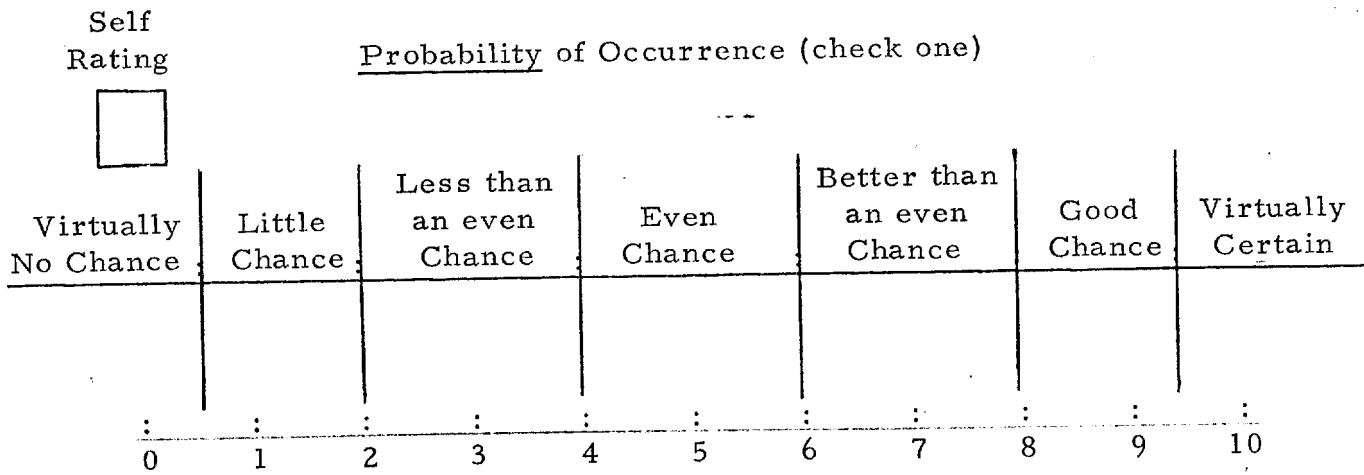
R3

Evaluate and forecast the effect within the Government community of a career management program which forced the exchange of 5% total personnel among major agencies for continuous 2-year cycles.

Your Final Answer	
Desirability (check one)	Points
Negative _____	0
Neutral _____	0
Minor _____	2
Moderate _____	5
High _____	10

Your Old Answer

Self Rating [ ]

AGR	Median	IQR
3.9	5.5	4-6 pts

Reasons for Low Points

* Few employees want to change every two years. * Exchange, forced or otherwise would be beneficial

* Humanists&others wouldn't sanction such a move. * Guess.

* Not necessary at high levels -- they do it themselves if interested in variety.

Reasons for High Points

* For educational purposes.

* Cross-fertilization very desirable.

14

R3

Evaluate and forecast the effect within the Government community of a career management program which forced the exchange of 5% total personnel among major agencies for continuous 2-year cycles.

AGR	Median	IQR	Your Old Answer
3.4	.3	.25-.5	

Your Final Answer

Self Rating

[ ]

Probability of Occurrence (check one)

Virtually No Chance	Little Chance	Less than an even Chance	Even Chance	Better than an even Chance	Good Chance	Virtually Certain

0   1   2   3   4   5   6   7   8   9   10

Reasons for Low Prob.

* Little success without government-community support.

* Infeasible (admin) and therefore not likely.

* Without a time element to project such a change ... virtually no probability of occurrence.

* Not necessary to force this kind of rotation.

Reasons for High Prob.

* As P.A. Major it appears as good project.

* Strong demand for generalists, in these days of specialists, with wider perspectives.

* Now experimenting with Senior Civil Service Exec. Career Program to provide interdepartmental and interagency assignments.

15

RESULTS

RESULTS

Use of a statistical definition of group response is a way of reducing group pressure for conformity and to minimize other psychological drawbacks in face-to-face meetings. Probably equally important, statistical group response is a device to assure that the opinion of every member of the group is represented in the final response. For DELPHI, statistical group response is defined as the median value and the interquartile range (IQR). The-median is the middle value and the IQR[1] is that interval containing the middle 50% of the responses.

The following charts show convergence of range (IQR) with successive questionnaires or rounds. Also shown is Average Group Rating (AGR) for each round. Respondents rated themselves on each question on a scale of 1 to 5. "5" indicates a high competence to contribute to the answer to the question and "1" indicates least competence. It is noteworthy that, generally, group "competence" increases with successive rounds. This seems to reinforce previous

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[1]A more precise statement is: The median is the half-way point in the answers then they are arranged in order of size--the number that divides the answers into halves. The numbers that divide the answers into quarters are termed lower and upper quartile. The difference between the two quartiles, within which the central half falls, is termed the interquartile range.

4

DELPHI exercises, at least with factual questions, that error decreases as average group rating increases. Further, another interpretation suggests that there is less uncertainty associated with the consensus answer which exhibits a high group rating.

One final point: On "A" Question No. 1, the "expert median", i.e., those responsents who rated themselves very high, is illustrated with respect to the true value. The "expert median" and the true value are virtually identical. This is in contrast to the overall group median and IQR which also exhibits good accuracy.

LEGEND

⊢————————⊣ IQR Range (middle 50% of answers)

•—— —— —— ——• Median

+ True Value (applicable for "A" questions only).

"A" Questions

Question 1.   What was the total civilian Government payroll (in dollars)
in the U.S. in 1960 including Federal, State and Local?

True and expert
median value

Range of Estimates (in Billions)

Round   1   2   3
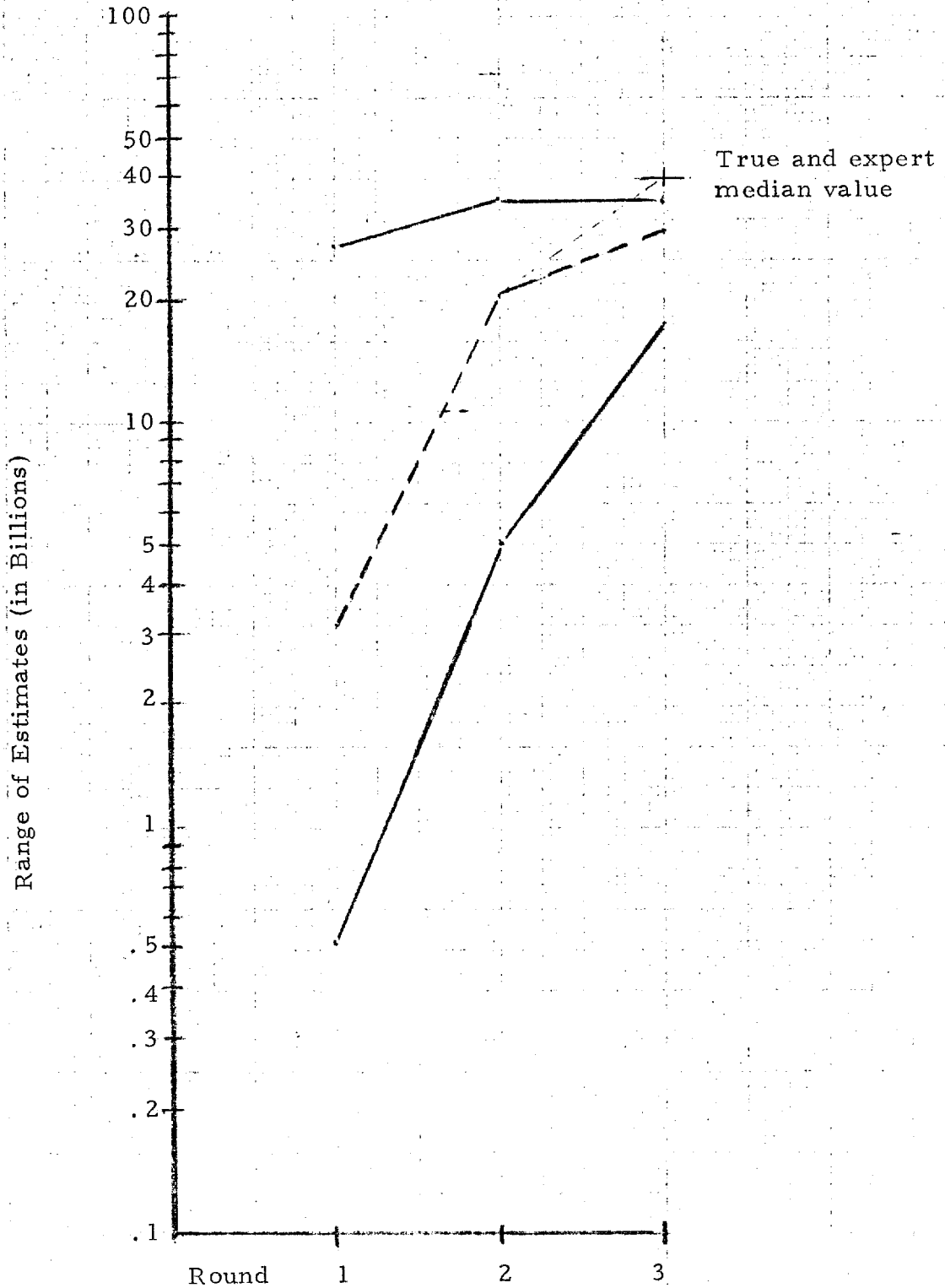
AGR   1.8   2.6   2.6

"A"Questions

Question 2.   What was the total number (in millions) of Federal
Civilian Employees in 1960?

Range of Estimates (in millions)

Round   1   2   3

AGR   2.8   3.4   3.4
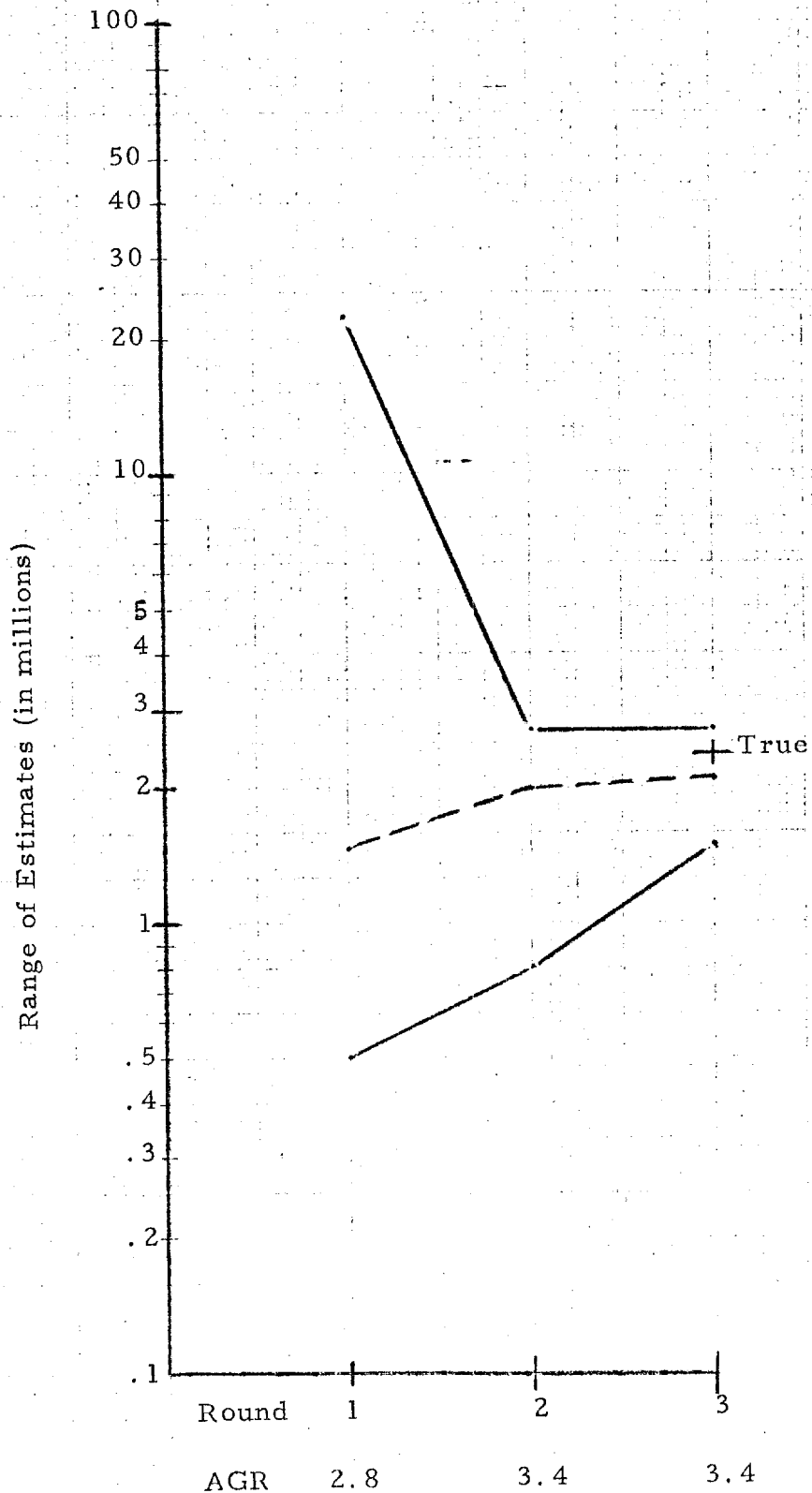
CLARKE - DELPHI I

Question #1a. More generous time-off provisions (25% increase)
for: civic and political activities?

Round   1   2   3
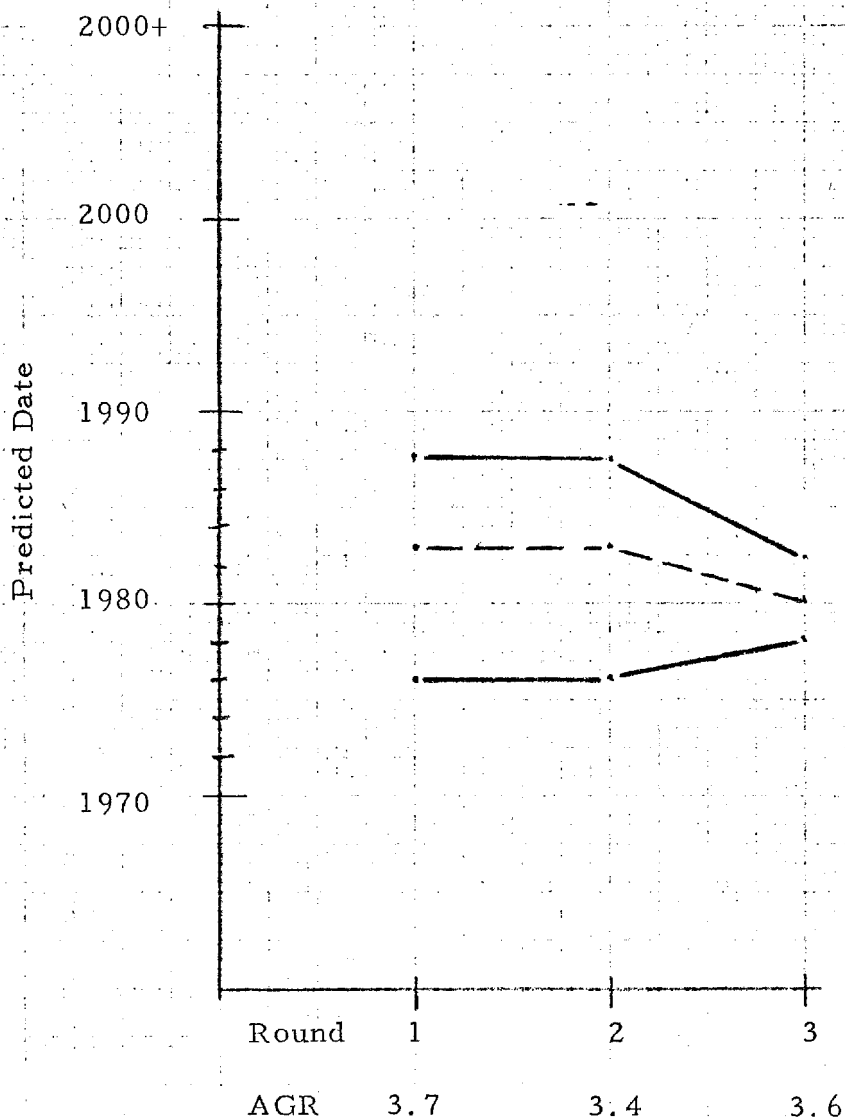
AGR   3.1   3.4   3.6
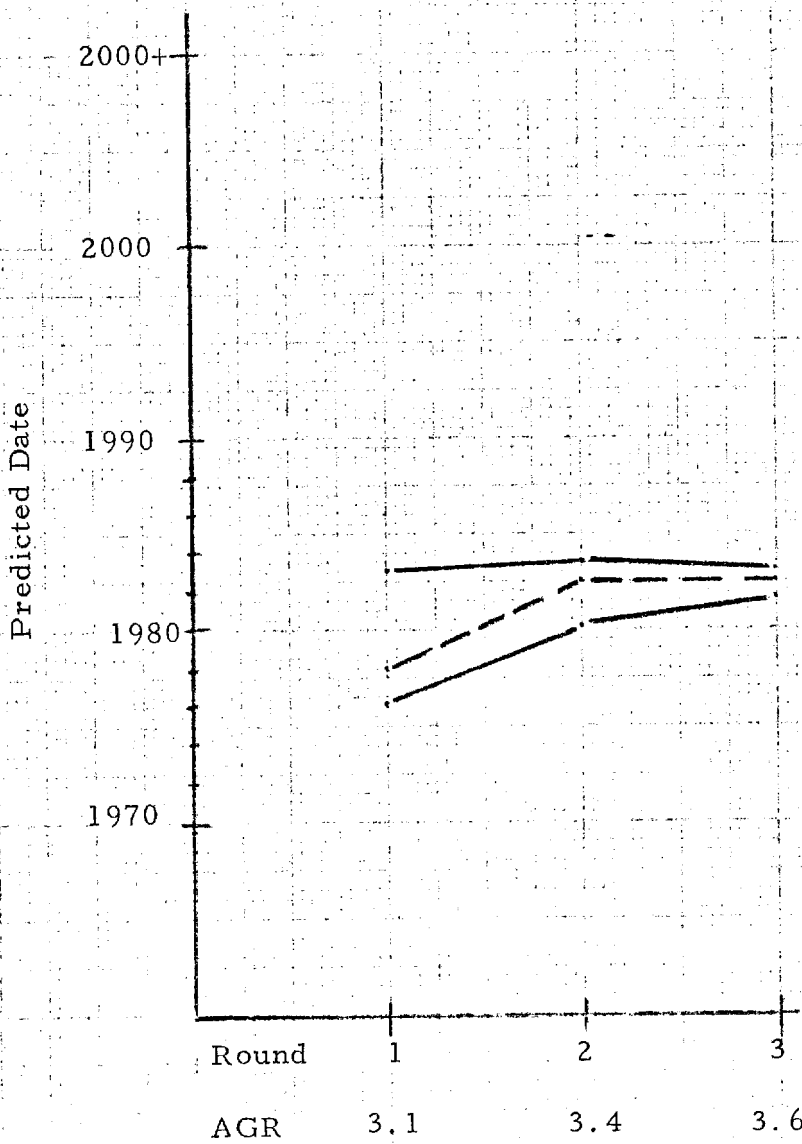
CLARKE - DELPHI I

Question #1b.   More generous time-off provisions (25% increase)
for: professional activities such as conferences
and papers.

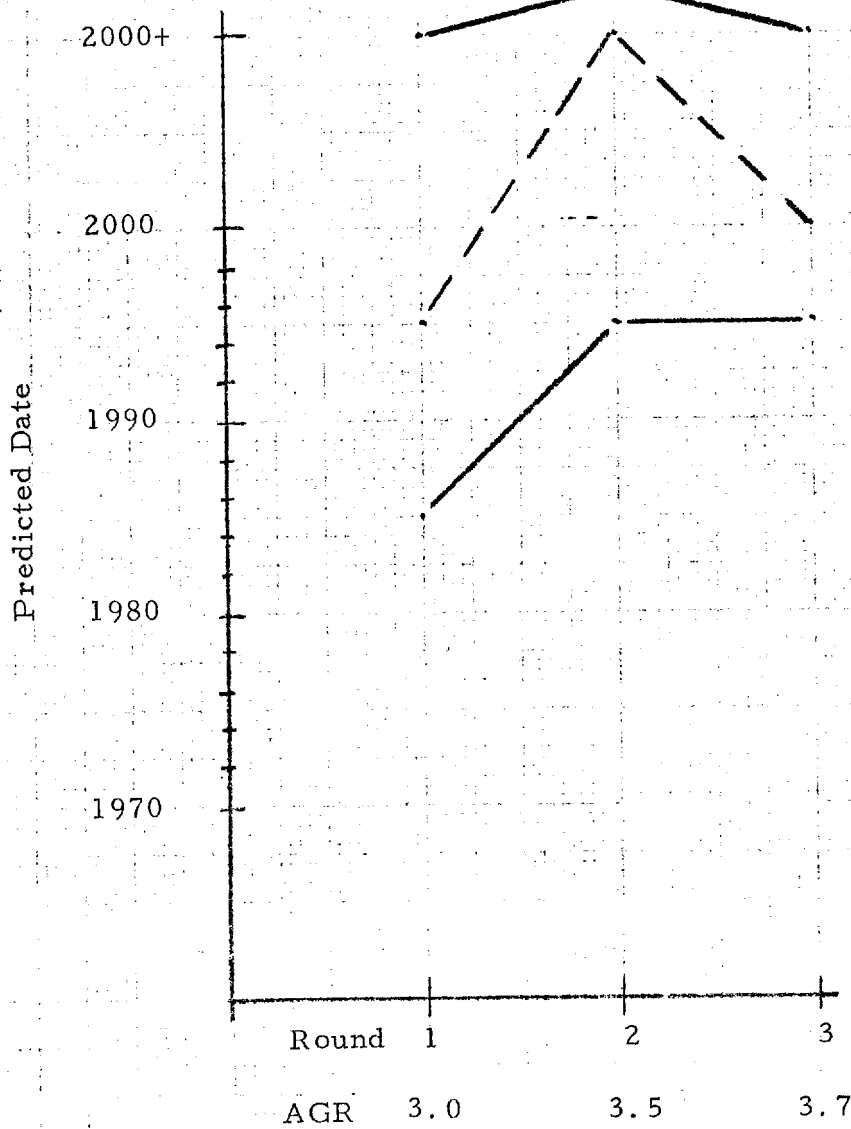| Round	1	2	3
AGR	3.6	3.6	3.7
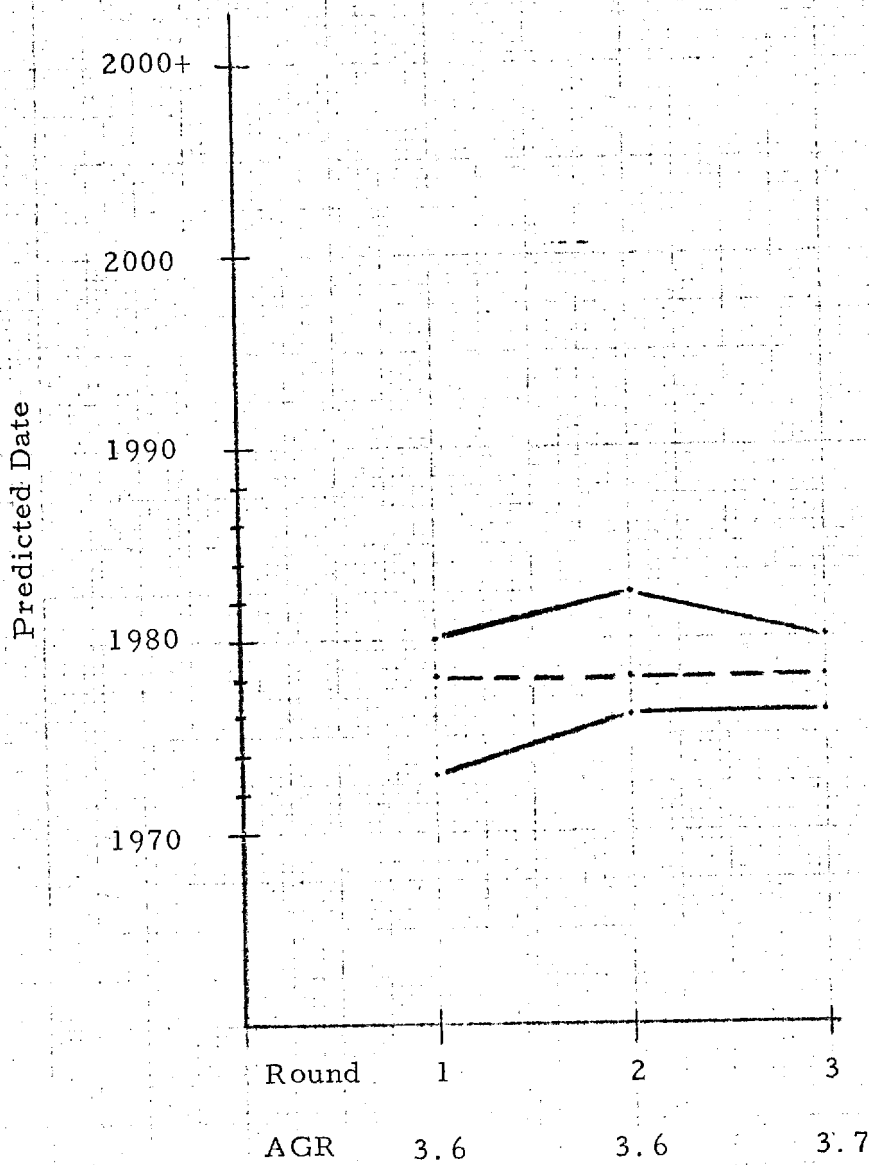
CLARKE - DELPHI I

Question #1c.   More generous time-off provisions (25% increase) for personal reasons.

Round	1	2	3
AGR	3.7	3.4	3.6

CLARKE - DELPHI I

Question #2.   Selection of hours worked during the day.

Round	1	2	3
AGR	3.0	3.5	3.7

Y-axis (Predicted Date): 1970, 1980, 1990, 2000, 2000+

CLARKE - DELPHI I

Question #3. Formal program designed to encourage career planning
on part of employees.

Round	1	2	3
AGR	3.7	3.7	4.0
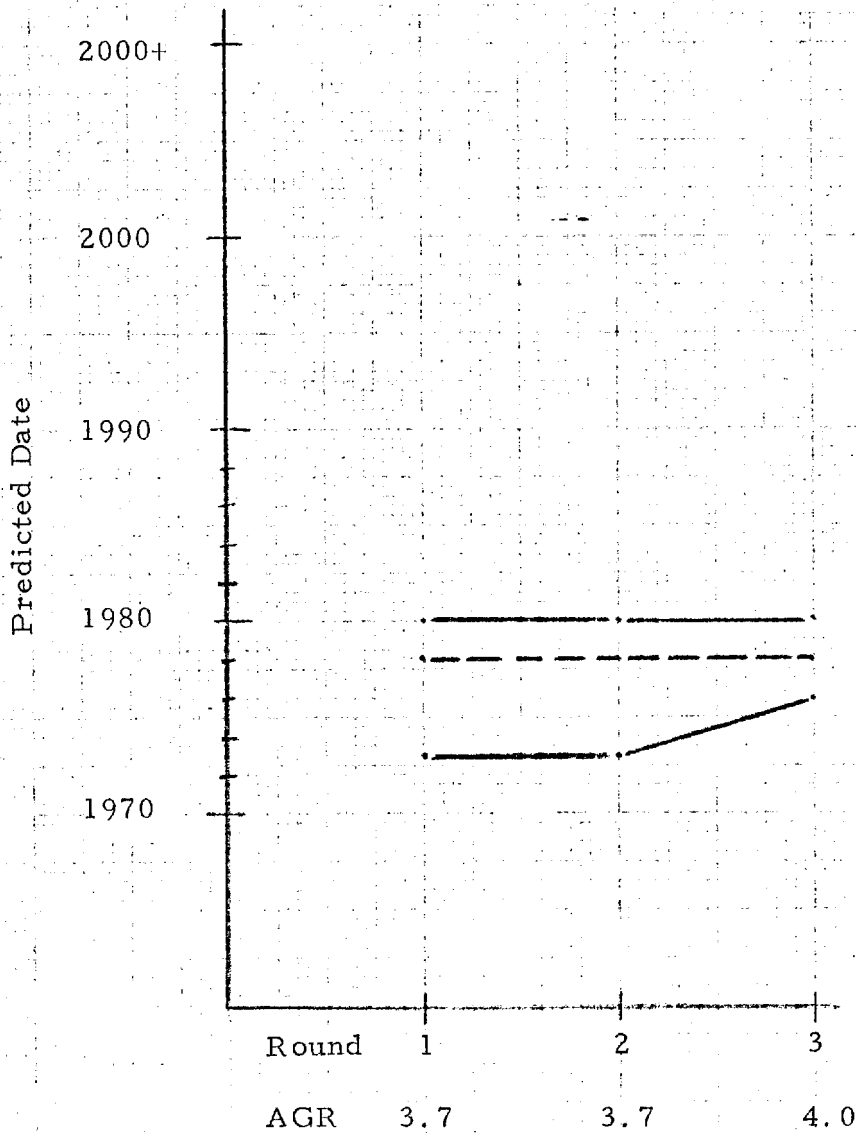
CLARKE - DELPHI I

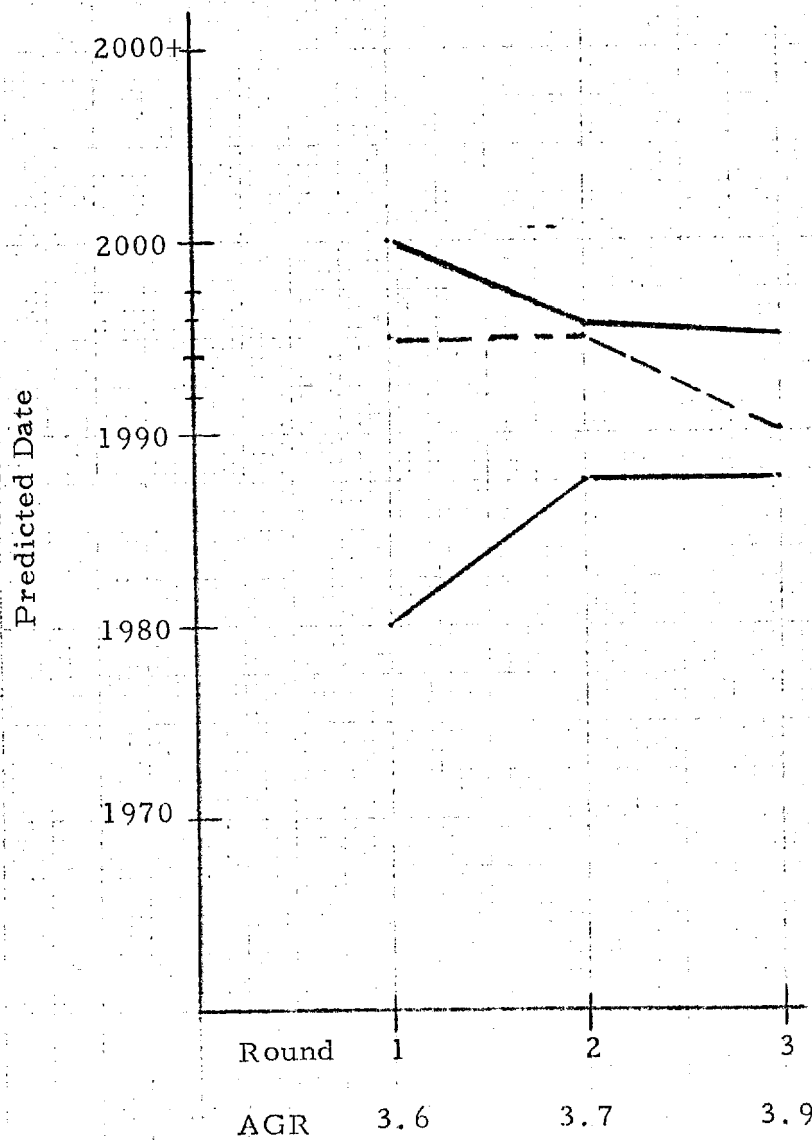Question #4.   Optional retirement at age 55 with full benefits
for all employees.

Round   1   2   3

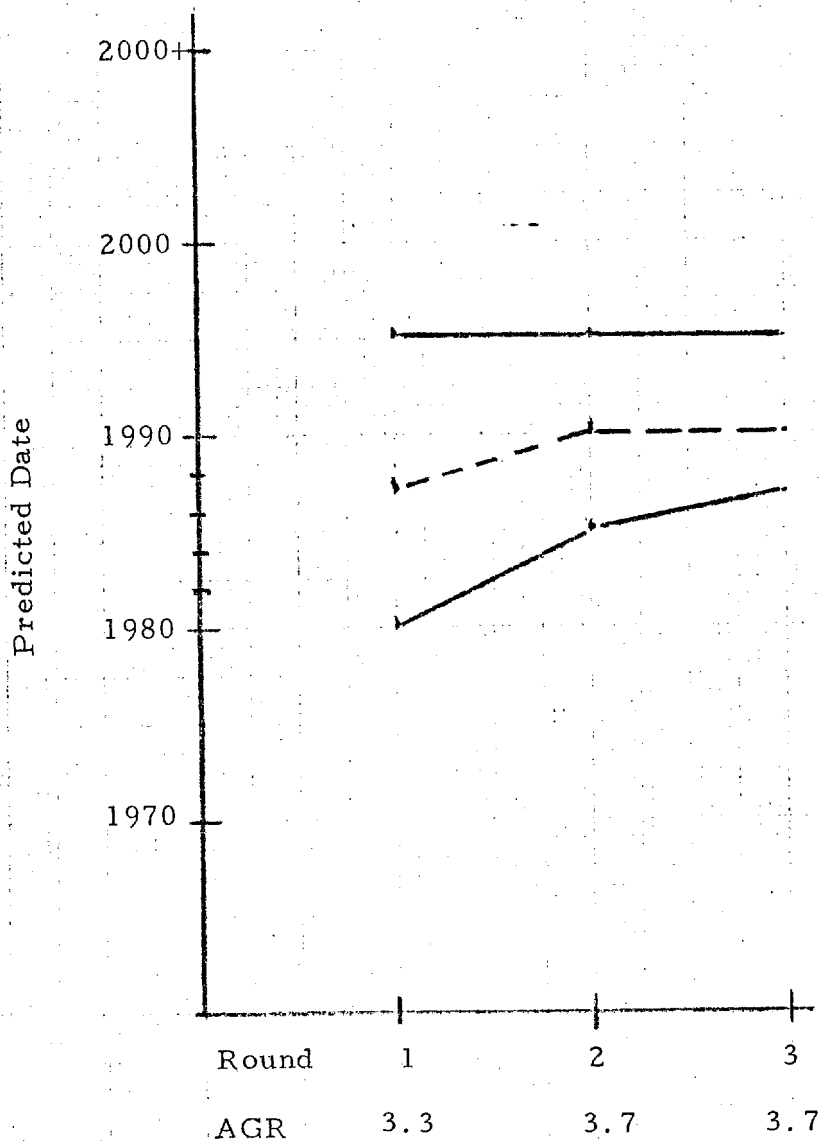AGR   3.7   3.8   4.1
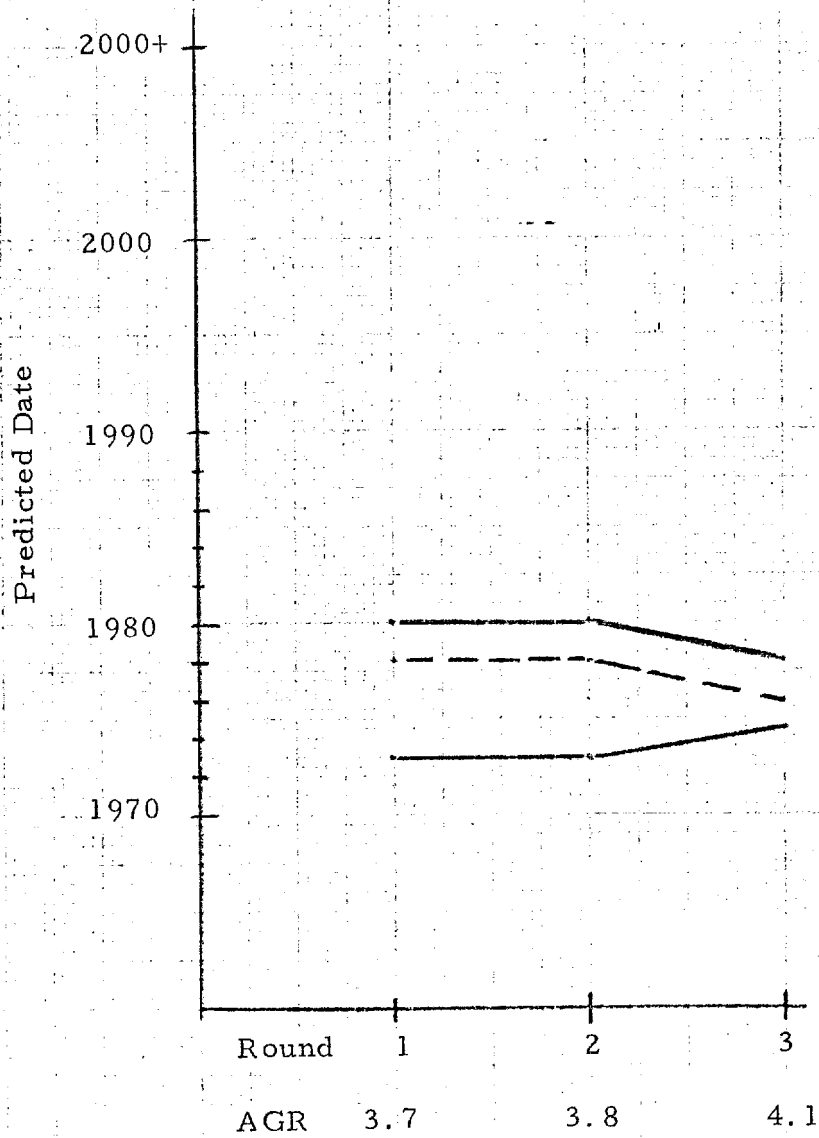
CLARKE - DELPHI I

Question #5. Formation of an elite class in the U.S., composed of
scientists, engineers, planners and managers, who
hold key positions of power in government and industry.

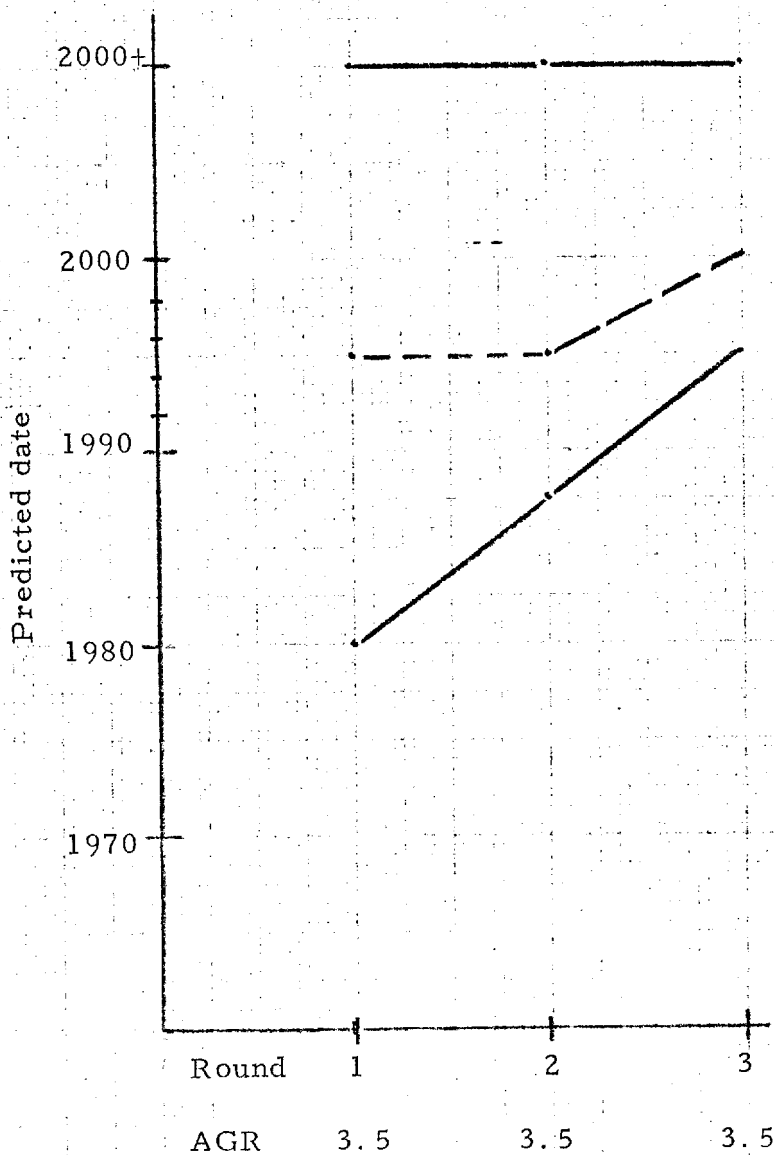| Round	1	2	3
AGR	3.6	3.7	3.9

CLARKE - DELPHI I

Question #6.   Widespread use of automatic decision-making
at management level.   —

Round	1	2	3
AGR	3.3	3.7	3.7

CLARKE - DELPHI I

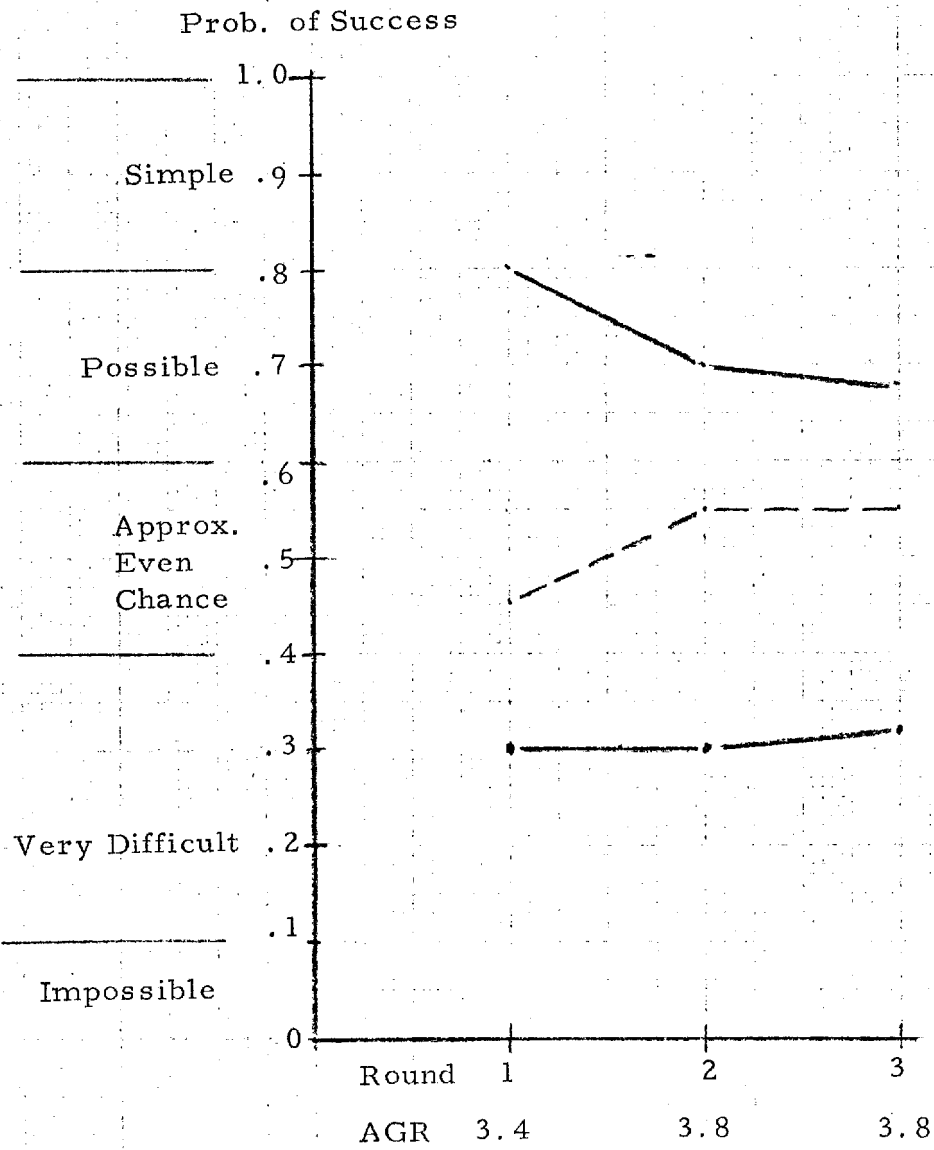Question #7.   Automation of office work and services leading to
displacement of 25% of the current work force.

Round   1   2   3

AGR   3.5   3.5   3.5

CLARKE - DELPHI

Question -- 5% Exchange Proposal

Feasibility

Prob. of Success

Round	1	2	3
AGR	3.4	3.8	3.8

CLARKE - DELPHI I

Question: 5% Exchange Proposal

Desirability

Points

10

High

Moderate 5

Minor 2

Negative 0

Round   1   2   3

AGR   3.8   3.9   3.9

CLARKE - DELPHI I

Question: 5% Exchange Program

Probability of Occurrence

Round	1	2	3
AGR	3.1	3.4	3.4

Y-axis labels (top to bottom): Virtually Certain (1.0), Good Chance (.9, .8), Better than Even Chance (.7), .6, Even Chance (.5), .4, Less than Even Chance (.3), .2, Little Chance (.1), Virtually No Chance (0)
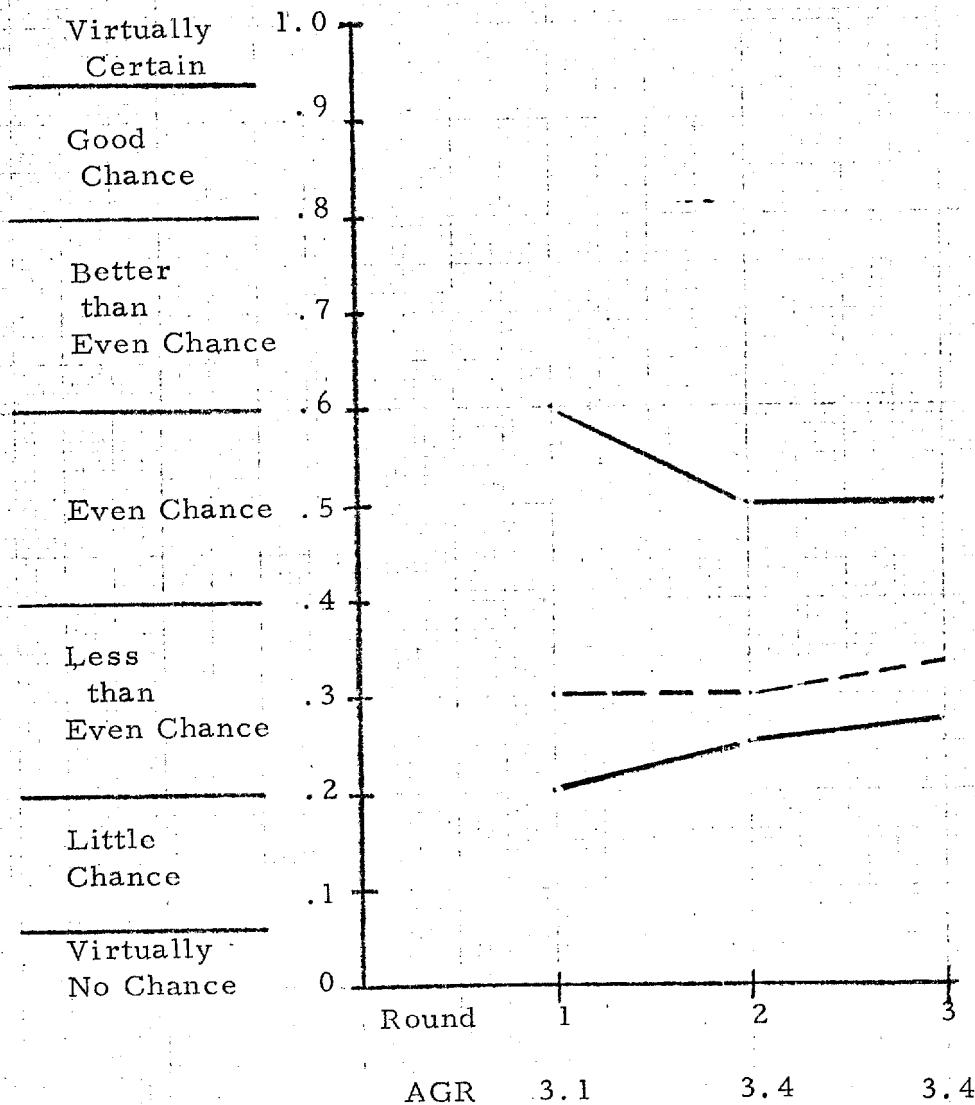
CLARKE DELPHI -- SUMMARY

		M	IQR	AGR
	"A" Questions			
1.	Civilian Government Payroll	26B	17B-35B	2.6
2.	Total Federal Civilian Payroll	2.1M	1.4M-2.8M	3.2
	"B" Questions			
1.	Time-off Provisions			
	a. Civic and Political	1982	1980-1985	3.6
	b. Professional	1978	1976-1980	3.7
	c. Personal	1980	1976-1985	3.6
2.	Selection of working hours	2000	1990-Later	3.7
3.	Career Planning	1978	1976-1980	4.0
4.	Retirement (55) with Full Benefits	1976	1973-1980	4.1
5.	Powerful Elite Class	1990	1985-2000	3.9
6.	Managerial Automation	1990	1985-2000	3.6
7.	Workforce displacement by Automation	2000	1990-Later	3.5

	M	IQR	AGR
5% Personnel Exchange			
Feasibility	.55	.32-.65	3.5
Desirability	5.5 pts	5.0 -5.5*	3.8
Effectiveness	5.0 pts	**	3.6
Probability	.33	.27-.5	3.4

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*Strong consensus in Round 3

**Consensus in Round 1

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